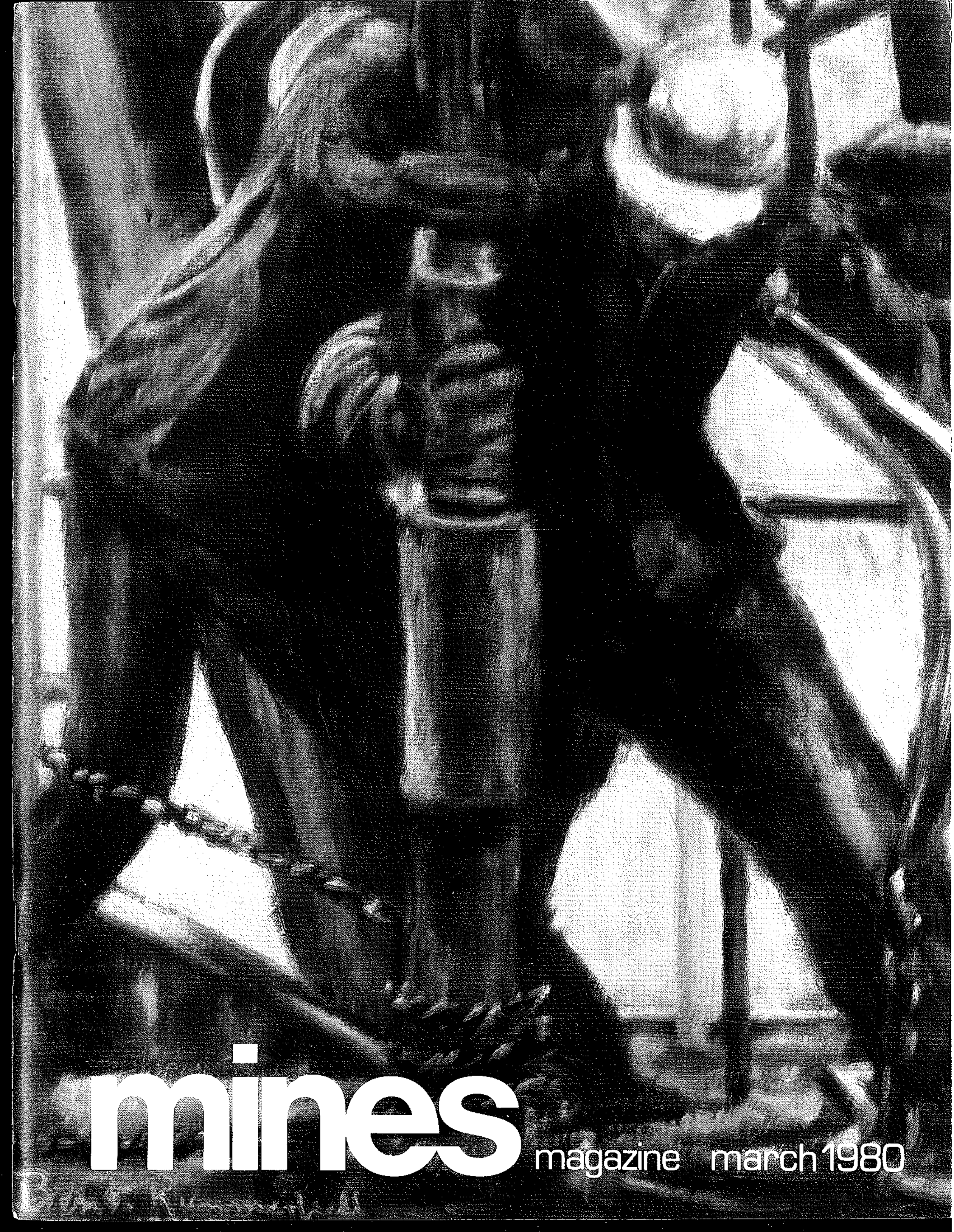

# mines magazine march 1980

**MINES Magazine**

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## alumni events calendar

**March 11-13**—Cont. Ed. "Coal Industry Review". Denver, CO. For further information contact K. M. Barbour, CSMAA.

**March 18-20**—Cont. Ed. "Maintenance Management for the Mining Industry," Denver, CO. For further information contact K. M. Barbour, CSMAA.

**April 8-10**—Cont. Ed. "Maintenance Management for the Mining Industry," Keystone, CO. For further information contact K. M. Barbour, CSMAA.

**April 11-12—E-Day**

**May 8-10—COMMENCEMENT PROGRAM**
**8**—Reunions for 1925, 30, 35, 40, 45, 50 & 55
**9**—Commencement Banquet, Green Center, 6:30 p.m.
**10—COMMENCEMENT**

**June 3-5**—Cont. Ed. "Maintenance Management Seminar for the Mining Industry," Keystone, CO. For further information contact K. M. Barbour, CSMAA.

**June 10**—AAPG Meeting, Denver, CO—CSM Alumni luncheon.

**July 29-31**—Cont. Ed. "Coal Industry Review", Denver, CO. For further information contact K. M. Barber, CSMAA.


# mines magazine

**volume 70** **march, 1980** **number 3**


## features



**The cover painting for the March MINES Magazine was executed by Ben F. Rummerfield, Geol.E. 1940, in 1976. Mr. Rummerfield is founder and president of GeoData, Inc. in Tulsa, and an active member of the Alumni Association and the CSM Foundation Resource Fund Committee, in addition to many philanthropic and community activities in Tulsa. This painting, "The Rig Floor," was one of his first efforts, and has been critically acclaimed.**

## departments

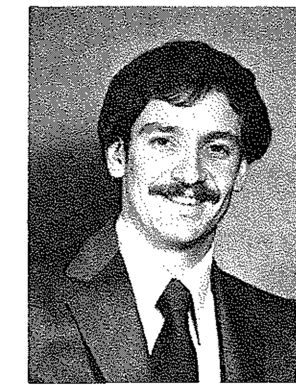



Official organ of and copyrighted, 1980, by the Colorado School of Mines Alumni Association. Second Class postage paid at Golden and Denver, Colorado. Subscription price: regular CSMAA members and non-alumni subscribers, $10.00 per year, CSMAA junior members, $3.50 per year, United States and possessions. Foreign subscribers, $12.50. Single copies $1.00, except special editions. Published monthly except July. Annual Directory, MINES Magazine, issued August. The publisher reserves the right to determine content of advertising carried in the magazine. All correspondence should be directed to: CSM Alumni Association, Colorado School of Mines, Guggenheim Hall, Golden, CO 80401. Publication #ISS N 0098-4859

comments . . .

# AGAIN?

by Gary Nydegger



Gary Nydegger, BSc. Geol. '74

**WHY DID THEY SEND ME ANOTHER ONE OF THESE DAMN MAGAZINES THIS YEAR? or WHAT'S IN IT FOR ME?**

If you don't identify with the above question, you can skip this page and see what's happening to your classmates in the Alumni Update. You've been a member of the Alumni Association for the last several years.

If you have ever asked yourself the above question you are one of the people I'm trying to reach. You've been getting a copy of the MINES Magazine once each year to "spark" you into joining the Association, but it obviously hasn't worked. Clever you! Nor has the altruistic approach—"Give to the ol' Alma Mater."

So I'll take a different approach—GREED. You see, I think it pays to be in the CSM Alumni Association. Yep, I'm talking dollars—BUCKS! Got your attention? Read on.

Mines continues to graduate students who know how to set priorities, make decisions, and get things done. And once they graduate, Miners are definitely not "just engineers." Almost 20% obtain an advanced degree, either in engineering or in such diversified fields as business, economics, law, science, medicine or liberal arts.

Mines graduates are leaders in business as well as science and engineering. FACT: Mines with 8000 non-retired alumni ranks among the top 100 schools (out of 3000), with alumni in top-level management positions. These are the decision makers in the petroleum and mineral industries and they are *your* fellow alumni. There are many reasons why certain people are promoted and seem to move up the ladder of success so effortlessly. Definitely not all of these reasons are tangible, but certainly having a "higher profile" doesn't hurt. What better way to informally meet a prospective employer than at a local alumni section luncheon or kegger?

Perhaps you're not the big-company type and you'd like to consult or start your own company. Over 12% of the Mines alumni are listed as consultants or self-employed. The association is a good place to develop and maintain those valuable contacts that can later help in your own business.

I've often heard people tell me that the school you graduate from doesn't make a difference after a few years of experience in the industry. Maybe so. But the 229 companies that sent personnel to Golden to interview the 292 Bachelor of Science graduates last year think that Mines has a great "raw" talent. Also the 195 companies that have 406 job orders with the alumni placement service believe there's "Something Special" in Miners with experience, AND THE INDUSTRIES ARE WILLING TO PAY FOR IT. Once in the industry, the placement service can keep you informed of what other Mines graduates are making and the types of jobs available.

As a member of the Alumni Association you have a strong influence on the direction Mines takes. A School whose graduates accounted for 13% of the new petroleum engineers, 50% of the mining engineers, 90% of the geophysical engineers, and 75% of the geological engineers in the U.S. last year. You can have a voice in the direction of a School that has the number one ranked departments in the mining and geological engineering, number two in metallurgical engineering and number three in petroleum engineering.* Ninety-seven percent of the Mines graduating seniors obtained jobs in their chosen fields. You, along with the Denver local Section, can have a hand in guiding and assisting the present student body of nearly 2800, and thus help the Section meet its primary goal of more active student/alumni interaction. This includes a career advisement program, "meet the alumni" nights with student chapters at various professional societies, and keggers at many student events. You can have a voice in the direction of the school and its future graduates take—a "direction" which will represent you— the alumnus.

Your annual membership fee, which enables the Alumni Association to operate, can actually reap much greater rewards for your school's fund-raising activities—such as the $63 million Resource Fund drive. When the president of a potential "charitable" mining or petroleum corporation discovers 60 or 70% of the graduates of Mines are in the Alumni Association, he's going to think; "These Miners *do* have pride in their School, they *are* an exclusive group of individuals"—which is something we've known for over 100 years!

The membership committee has set a goal of active alumni participation by 60% of the 7500 known living alumni, and a goal of finding 30% of the 1000 "missing" alumni, whose names are so designated in the Directory, and which may appear from time to time in the MINES Magazine.

There are benefits in belonging to the Alumni Association, many intangible, but others that will pay off in dollars. Of course, the benefits are not automatic—you have to exert a little effort. You can start your benefits by filling out your membership card, and mailing your membership fee, if you have not already done so.

Remember, an alumni association is only as strong as its alumni support. A schools' strength, *indeed*, a schools' reputation, begins with its Alumni Association.

* The Gourmann Report, 1976

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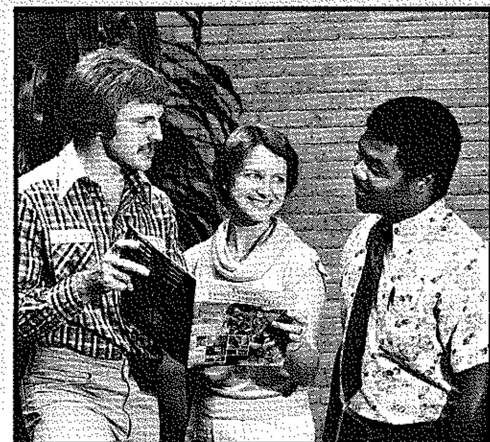
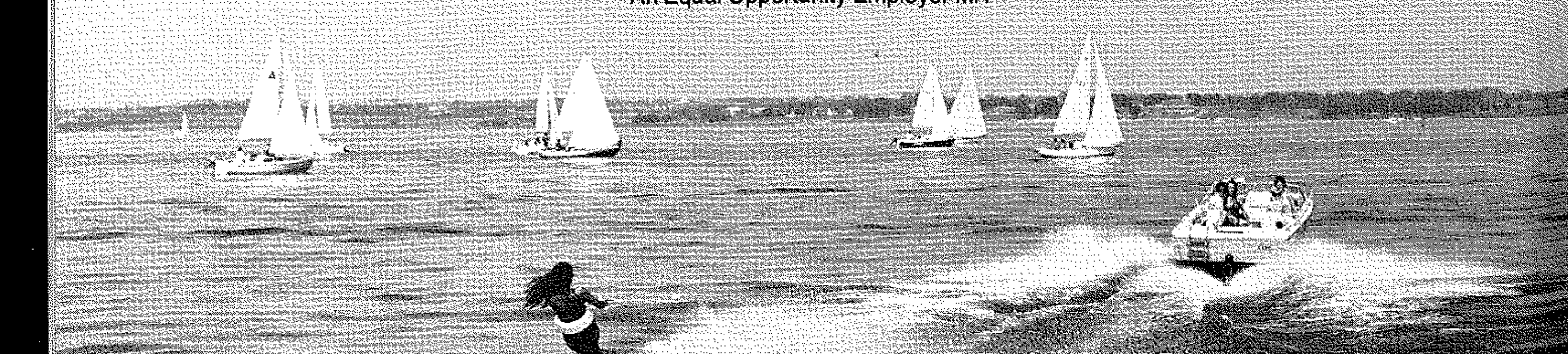








## Oil Industry Profits

# Perception vs. Reality

by A. Saterdal and Jay Glenn Marks

### The Reality

Contrary to the popular conception, most of the large U.S. oil companies have been operating at a loss when results are averaged over the past eleven years.

Because these companies represent a significant part of the capital wealth of the United States, such a loss implies not only financial harm to individual stockholders but a fundamental weakening of the ability of the United States to increase productivity and thereby improve the well-being and security of its citizens.

### Perception vs. Reality

This difference between perception and reality, in regard to profits, is due mainly to two factors:

1. Financial statistics are measured in dollars without accounting for the fact that, with inflation, dollars are not a measure of constant value. For instances, each dollar returned in 1978 from an investment made in 1968 is worth only 50 cents in terms of the purchasing power of the 1968 dollar.
2. "Profit", as used in the accounting sense, is not what is perceived as profit by the average reader. The latter believes profit to be about 30%[1] of the sales price.

Not only is the average reader far too high in his estimate ("profits" as a percent of sales are usually under 5%) but of greater importance, the "profit" figure used by the accountants consists of several major items which most of us don't really consider to be profits. To understand what the accountants are talking about, it has to be realized that to them it is a technical term with a very restricted meaning. The meaning deals with the functions of "profits" which are limited to:

a. **Repayment of long term debt.** (Short term debt is considered business expense.)

b. **Payments of dividends to stockholders.**

c. **Creation of a surplus** (which is essential if the business is to expand to meet the needs for new jobs in a growing society).

When broken down into its component functions it is much easier to determine whether "profits" are deficient, adequate or excessive (as has been charged in the case of the oil companies).

First, it is hardly appropriate to rate any repayment of debt as "excessive". If you have a corporate debt, you repay it or you become bankrupt.

It is almost as inappropriate to rate expansion of business as "excessive" when such expansions create new productive jobs.

This leaves only one function of profits, the payment of dividends, to be examined in order to judge whether they are excessive as charged.

From the above discussion it follows that of the three functions of "profits" the only part which is not recycled in the business is the dividends which are paid to stockholders. Thus, as a practical matter, the ultimate and only beneficiary of corporate profits is the stockholder.

In a real sense, the stockholder *is* the corporation and a true measure of corporate profitability should be the net increase in value which accrues to the stockholder from holding the stock over a reasonably long period of time. This would include capital gains as well as dividends.

**When viewed with the foregoing perspective, the performance of the seventeen largest oil companies over the past eleven years is a disaster!**

By taking into account the effects of personal income taxes and inflation on both capital gains and dividends, we find that each dollar invested in the average large oil company in 1968 has diminished in value to 66¢ in 1978. It was during this period that profits were labeled "obscene" by Senator Henry Jackson, Chairman of the Senate Energy Committee, and the industry was accused of "ripping off" the public by President Jimmy Carter.

On the same basis, but including the year 1979, in which profits were labeled "pornographic" by some members of Congress, the same dollar invested in 1968 would have been worth 77¢.

In arriving at the above values we followed these procedures:[2]

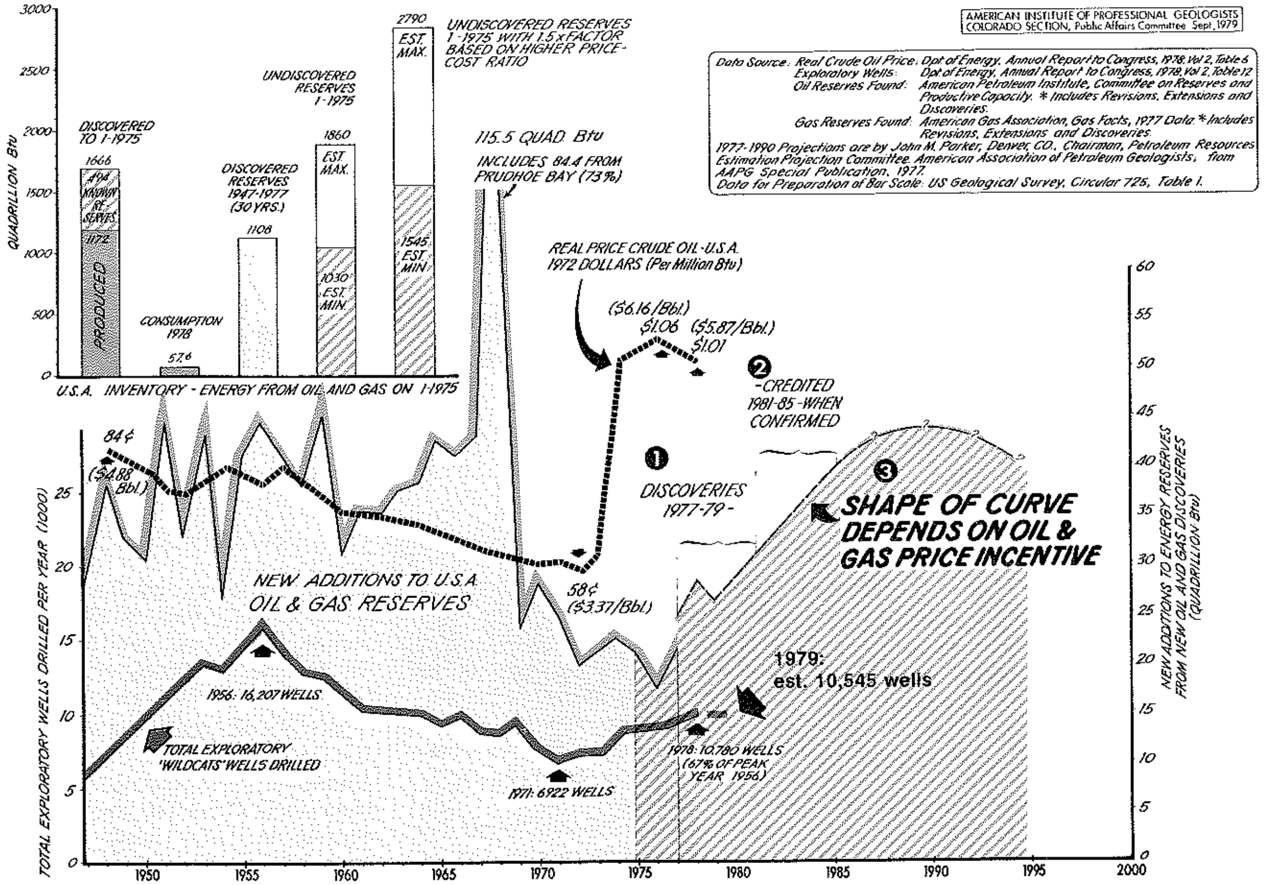
1. We assumed that one share of stock of each of the 17 largest oil companies was purchased at its average price in December 1968.
2. We received all dividends annually, then subtracted 40% from them to account for federal and state personal income taxes.
3. We sold all 17 stocks in December 1978 after adjusting their prices for stock dividends and stock splits. We then paid personal income taxes to federal and state governments on the gains at a rate of 30%. We followed the same procedure for sale of the stocks in December 1979.
4. All after-tax dividends and gains were corrected to 1968 prices using inflation factors determined by the United States Department of Labor[3] or the Federal Reserve Bank of St. Louis[4].

The profit performance of individual companies, on this basis, over the ten year and eleven year periods ending in 1978 and 1979 were tabulated below. Companies are listed in order of magnitude of sales as reported in *Fortune* for the year 1978.

### Popular Conceptions of Profits

The popular conception of high profitability has been espoused by most of the people who talk about profits. In one way or another, they all have a vested

(continued on page 8)




# FACTORS IMPORTANT TO *DISCOVERY OF NEW OIL & GAS RESERVES

### GRAPH 1

*The discovery of new petroleum* ***reserves*** *is related to the number of "wildcat" wells drilled which in turn is related to price of petroleum. The potential exists but price incentive has been inadequate* ***for twenty-two*** *years. As a result the job is not getting done.*

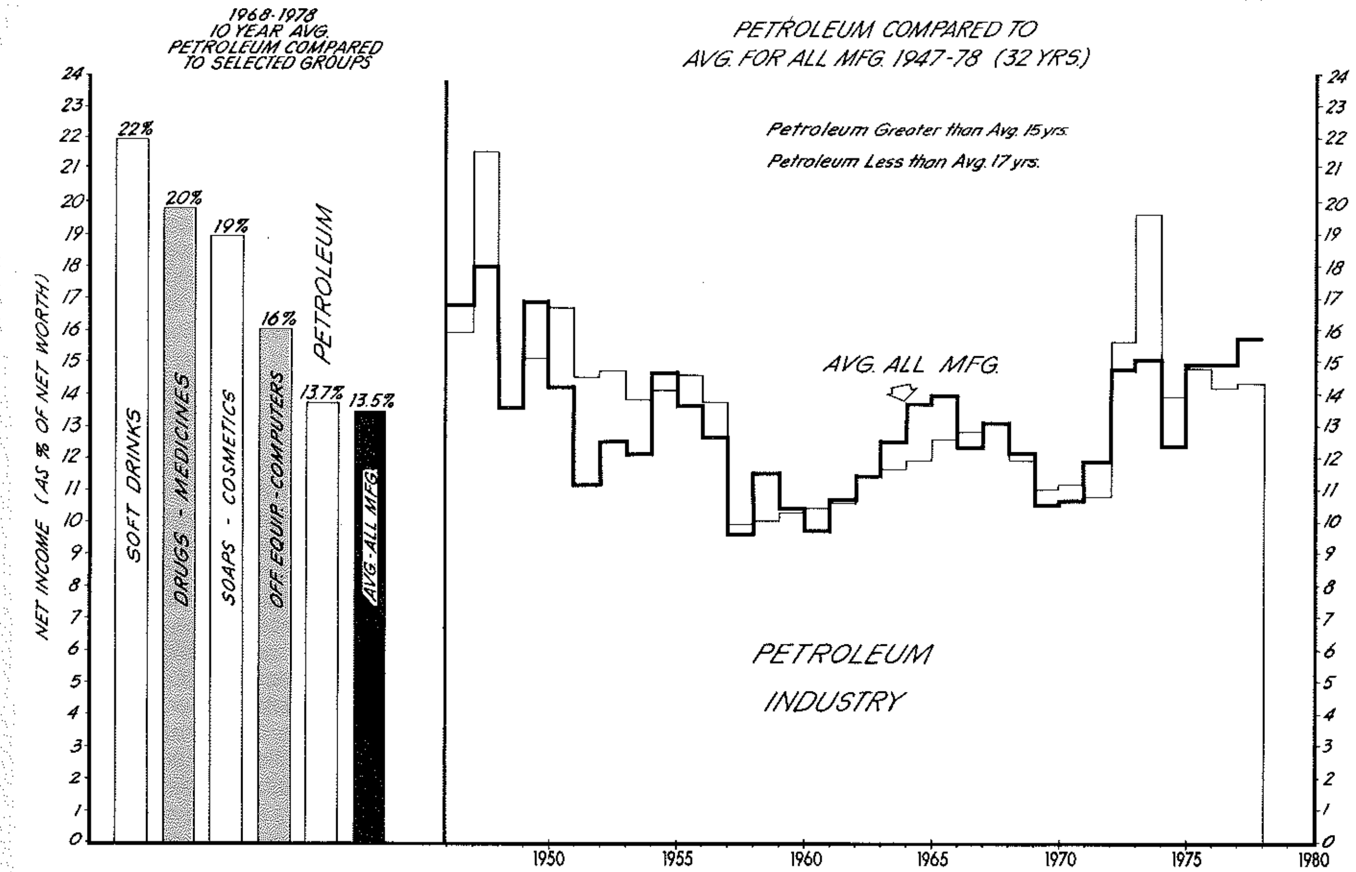
**FACTS**

1. Drilling of exploratory wells ("wildcats") increased in a uniform manner from 1947 to 1956.
2. Additions of new oil and gas reserves increased slightly from 1947 to 1960.
3. Price of crude oil declined 31% between 1948 and 1972.
4. Number of "wildcat" wells declined 57% from 1956 to 1971.
5. The finding rate of new oil and gas reserves declined approximately 40% between 1960 and 1977 in spite of an outstanding exception in 1968 when Prudhoe Bay was discovered in Alaska.
6. Price of crude oil increased 74% from 1972 to 1978.
7. Drilling of "wildcat" wells has increased slightly but is still 33% below the peak year rate in 1956 even though consumption of energy in the United States increased 91%. Improvement in drilling rate is sluggish.
8. Consumption of oil and gas in the United States in 1978 was 57.6 quadrillion BTU (nearly 10 billion barrels of oil equivalent). This includes imports.
9. Proven United States reserves in 1977 were about eight times 1978 consumption.
10. Undiscovered reserves in 1977 were 17 to 32 times 1978 consumption according to U.S. Geological Survey estimates based on 1974 price-cost factors.
11. The U.S. Geological Survey recognized that an increase in the price-cost relationship could increase undiscovered reserves by 50%. In that event, undiscovered reserves could be 25 to 50 times 1978 consumption or up to 2½ times total oil produced in the United States to 1975.
12. Undiscovered reserves are at least equal to all the oil and gas produced in 1975 in the United States.

**CONCLUSION**

1. A large but unknown amount of oil and gas remains to be discovered in the United States—at least 17 times 1978 consumption. When proven reserves are added the total is at least 25 times total 1978 consumption.
2. There could reasonably be total reserves adequate to supply the United States for over 50 years based upon total consumption in the United States in 1978.
3. In order to find these undiscovered reserves, exploratory wells ("wildcats") must be drilled.
4. The present rate of drilling "wildcat" wells is very depressed compared with historical ratios of wildcat wells to reserves found or to consumption. The current rate is 33% lower than in 1956 even though consumption is 91% higher.
5. Based upon cause-effect relationships shown on Graph 1, it is logical to expect that "wildcat" drilling will increase significantly only after sustained large price increases for oil and gas occur.
6. Adequate incentive to accomplish this "catch-up" cannot be generated without a major change in the attitude of government toward profits.






# PETROLEUM INDUSTRY NET INCOME AS A PERCENT OF NET WORTH COMPARED TO ALL MAJOR MFG. COS. & SELECTED GROUPS

*Source: First National City Bank*

### GRAPH 2

*Petroleum industry profits are* ***average*** *not excessive as charged. They are* ***inadequate*** *for the job that needs to be done.*

**FACTS**

1. For the past 32 years oil and gas industry profits as a percentage of net worth have not been "obscene"—they have been average.
2. During the past 10 years, profits were 13.7% compared to 13.5% for all manufacturing. For this period petroleum profits were far less than other groups whose earnings were not judged "obscene":

| | |
|---|---|
| Soft Drink industry | 22% |
| Drugs—Medicine | 20% |
| Soaps and Cosmetics | 19% |

3. For the year 1978, *Fortune* rated 25 industrial groups and placed petroleum refining seventeenth from the top at 13.4% and mining-crude oil at the bottom with 10.1% profits. Groups with high profits that were not defamed as "obscene" included:

| | |
|---|---|
| Broadcasting-Motion Pictures | 21.6% |
| Pharmaceuticals | 17.6% |
| Soaps and Cosmetics | 16.7% |
| Transportation Equipment | 15.9% |
| Publishing | 15.8% |
| Tobacco | 15.8% |
| Motor Vehicles | 15.4% |

**CONCLUSIONS**

1. The oil and gas industry has been wrongly accused of making unreasonably high profits. This accusation is demonstrably false and has created an atmosphere of deep distrust—a dangerous relationship between the American people and the industry from which they derive 65% of their domestic energy.
2. An industry with only average profits is not in a position to substantially increase our oil and gas production.
3. It is the responsibility of members of Congress to become acquainted with the truth in this emotional matter and to clearly inform their constituents.

interest in perpetuating this illusion.

President Carter and a majority of the United States Congress have been move vociferous. Profits have gone from "obscene" in 1974 (Senator Henry Jackson) to "rip-offs" in 1977 (Jimmy Carter) to "pornographic" in 1979.

**These advocates of bigger government in Washington stand to gain by branding the oil industry as "profit-gougers" because, by such tactics cleverly employed, they have been able to direct public rage against the oil industry. Under this umbrella of enraged confusion, the advocates of big government have succeeded in creating the biggest peacetime tax in history. The tax is of such magnitude and power of government is so enlarged by this action that the net effect is partial nationalization of the largest single segment of U.S. industry.**

This tax is referred to as a "windfall profit tax". It is represented that it is being levied on "profits" and that it will be paid by the industry. Nothing could be further from the truth. The tax is *not* on the profits. It is on gross production—an excise tax. The tax will be levied even on wells which are operating at a loss, and in such a case will force premature abandonment.

And it won't be paid by the industry. It will be paid by the consumer—just like any other tax.

It *will* deprive industry of a part of the free market price and by so doing will eliminate some high cost areas from development. This loss in domestic productivity will force the consumer to look elsewhere for the deficiency, including foreign and subsidized domestic sources—or to do without.

The advocates of big government need this tax badly because their traditional revenue raising measures have been threatened by public reaction against taxes and by the growing public realization that inflation is the most burdensome of all taxes.

**Corporate management** has not effectively publicized the real changes in values to the owners of corporate stock. Who has ever heard the president of any major corporation publicly advise his stockholders that the profits shown in the annual report are illusory and that the company has been operating at a loss in terms of real value? Even though he is probably aware of this likelihood, the first one to breathe such "heresy" is apt to be hastily disposed of.

His personal incentive for complicity in this deception is that he may have spent his entire career in reaching the top. His substantial salary, stock options, and other benefits are all contingent upon his reporting success—not failure—to his stockholders. He is also aware that a "high profile" in protesting taxes may subject his company to harrassment by government.

**The news media,** particularly on television and by lead articles in the newspapers, finds that "entertainment" gets better ratings than serious reporting and having the oil companies as a public whipping boy has become routine entertainment.

**Popular business oriented** magazines consistently have expressed an evaluation of corporate profitability as though real values could be measured in dollars. By so doing, and by their failure to account for inflation, they have provided supporters of big government, including consumer advocates and labor leaders, with devastating ammunition which has been used to further weaken corporate structures and to erode the supply of private capital.

Their vested interest is not so clear, but it probably has something to do with keeping good relations with the business community who would rather read good news than bad. It would be frightening to believe that this source of news is so controlled that important truths are being suppressed.

**The accounting profession,** without question, understands the serious problems inherent in traditional financial reporting, but appears to be resisting any changes that would present facts in terms of values, instead of dollars.

It is assumed that they are responding to the wishes of their clients who pay their fees.

## Supporting Evidence

The oil business, as any other business, when truly profitable will attract more people to invest greater amounts of money. In this business there is only one significant way to measure whether greater or lesser amounts of money are being invested. This measure is the number of wells being drilled. The category which is most signficant is "wildcat" or exploratory wells. It is by the drilling of these wells that most large oil and gas discoveries are found.

| COMPANY | 10 year period ending 12/78 *% Profit | *% Loss | 11 year period ending 12/79 *% Profit | *% Loss |
|---|---|---|---|---|
| Exxon | | 15 | | 15 |
| Mobil | | 20 | | 3 |
| Texaco | | 46 | | 45 |
| Standard of California | | 13 | | 10 |
| Gulf | | 49 | | 44 |
| Standard of Indiana | 2 | | 19 | |
| Atlantic Richfield | | 42 | | 33 |
| Shell | | 36 | | 21 |
| Continental | | 16 | 12 | |
| Tenneco | | 28 | | 24 |
| Sun Oil | | 45 | | 29 |
| Phillips | | 7 | 16 | |
| Occidental | | 66 | | 60 |
| Union of California | | 40 | | 27 |
| Standard of Ohio | 11 | | 87 | |
| Ashland | | 30 | | 26 |
| Amerada-Hess | | 62 | | 48 |
| Average | | 34 | | 23 |

*Change in value of stock with dividends added after payment of personal income taxes and after correcting to dollar values for year of purchase (December 1968), to account for inflation. (See previous text for explanation.)





The trend in drilling of these exploratory wells is shown on the accompanying Graph 1[5], prepared by the American Institute of Profesional Geologists, Colorado Section.

Graph 1 is a preview of potential disaster considering that we presently depend on oil and gas to provide 65% of domestically produced energy.

It shows that about 10,600 wildcat wells are drilled in the United States in 1979. This is 33% fewer wells than were drilled in 1956 even though consumption of energy has increased 91% in this same period.

Even more signficant is the fact that the drilling rate in 1979 failed to increase over the rate of 1978.[1] Nothing could better confirm lack of incentive which in turn is due to lack of *real profitability*.

The sometimes expressed opinion that there is nothing worthwhile left to explore for is simply not valid in view of the most reliable estimates of undiscovered oil and gas. This, too, is illustrated on Graph 1. The bar scale on this graph is based upon U.S. Geological Survey estimates made in 1975 and indicates that undiscovered reserves as of that date were at least about equal to all oil and gas produced in the U.S. prior to 1975. With a higher price-cost factor, recoverable reserves of up to 2.3 times all oil and gas produced to 1975 were anticipated, as illustrated.

## Danger in the Illusion of Profits

The present methods of reporting industry profits in the United States are nearly worthless and are resulting in misconceptions which are dangerous to the national welfare.

At best, comparative profits expressed as a percentage of net worth are routinely reported by the more serious business journals. Such information is illustrated on the accompanying Graph 2[5], prepared by the American Institute of Professional Geologists, Colorado Section. While such a presentation is useful for comparing the performance of a given industry with other industries, it is dangerously deficient in that it deals with dollars of declining value—instead of *real values*. As such, it fails to show real declines in profitability.

**COMMENCEMENT**

**MAY 8, 9, 10, 1980**

**Reunion Classes**

**1925, '30, '35, '40, '45, '50, '55**

**BANQUET MAY 9**

The oil industry, and probably industry in general, is paying taxes on "profits" which are illusionary, largely due to the effects of inflation. When properly corrected for inflation, most payments made as dividends and for taxes on profits are in reality payments out of capital.

In such a case the results are similar to the situation where a farmer feeds part of his seed corn to his hogs. He has one crop of fat hogs but every year thereafter he grows less and less corn to feed fewer and fewer hogs. This procedure, left uncorrected, will produce not only a poor farmer but a lot of hungry people.

## Conclusion

Americans cannot afford to be complacent in view of the consequences of major new taxes which are about to affect their lives. The misrepresentations of industry profits by people in government who are paid well enough to know better is resulting in one of the largest single taxes ever levied by any government on its citizens in the history of the world.

*Business Week* magazine[6] estimates the total revenues to be collected over a 10-year period from taxes on domestically produced oil will be $763 billion, including $436 billion from regular income taxes and $304 billion from the "windfall profit" tax. This assumes $35/barrel oil, a figure that is much too conservative in view of the projected inflation rate in the United States.

This much money in the hands of inefficient government, motivated by political decisions, instead of by competitive need to be productive, will cost every American a signficiant loss in his standard of living and will weaken our ability to defend ourselves. It is probably conservative to estimate that at least one-third of the tax money collected will be diverted from productive purposes. In such an event the cost in lost productivity will be over $10 billion per year from the "windfall profits" tax alone. Considering the total tax, the additional loss in productivity could exceed $25 billion per year. Such a major loss in productivity can be expected to have a serious effect in causing even higher inflation in the United States during the next decade.

The primary responsibility for reducing these counter-productive taxes is with Congress, but so much damage has been done by misinformation on "profits" spread by advocates of bigger government that a major educational effort, directed at voters, is essential if America is to regain lost productive momentum.

Needless to say, a change of balance in Congress is also fundamental.

**FOOTNOTES**

1. "Profits Are for Everybody", *Nation's Business,* Barry Crickmer, Oct. 1979 (Chamber of Commerce of the U.S.)
2. Data on prices and dividends from *Standard and Poor Stock Reports* and from *The Value Line Investment Survey* with corrections made for stock splits and dividends.
3. U.S. Dept. of Labor, Consumer Price Index as reported in the *Wall Street Journal,* Mar. 28, 1977.
4. "National Economic Trends", *Federal Reserve Bank of St. Louis,* Sept. 30, 1979.
5. "The U.S. Oil and Gas Industry. Its Importance. What it Can Do, How to Make it Work Better", *Colorado Communicator,* Oct. 1979, Colorado Section, American Institute of Professional Geologists.
6. "Oil Taxes: Uncle Sam taps into a Gusher", *Business Week,* Feb. 11, 1980.

Mr. Saterdal and Mr. Marks are members, Public Affairs Committee, Colorado Section; American Institute of Professional Geologists, Denver, Colorado.

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# Oil Company Profits

by Charles J. DiBona
President, American Petroleum Institute

Petroleum industry profit reports have been the object of criticism recently in some segments of the press and in Congress.

An important point which does not always surface in earnings discussions is that the overall record of the oil companies is about the same as the record of non-oil companies in the U.S.—not only for the last 10 years, but for any other selected decade.

Over the past decade, the oil industry's return on total stockholders' equity averaged 13.9% compared with 13.7% for total manufacturing—including the abnormal years 1973 and 1974 when oil companies' rate of return rose sharply. The oil industry's rate of return was below that of total U.S. manufacturing in five of the last ten years.

Profitability in terms of return on total assets of the oil companies is also generally comparable with that of other industries.

Where do the profits of oil companies go? Do they go into a sock? Do they go into department stores and other businesses unrelated to energy? They do not go into a sock. Worldwide expenditures by oil companies for exploration and production of new oil and natural gas and other energy greatly exceed their profits.

On the basis of information available to date, capital and exploration expenditures in the first nine months of 1979 substantially exceeded net income for the period. The major portion of these expenditures were in the U.S., principally for exploration and production. Capital and exploration expenditures in the U.S. alone were equal to the worldwide profits of these companies, and 63% of worldwide earnings were expended for domestic exploration and production.

Not all expenditures go into businesses unrelated to energy. During the 1968-77 period, according to Chase Manhattan Bank data, less than 6% of the total capital expenditures by the 27 leading oil companies were made in non-oil businesses. Some went into other energy resources. (Because of the close relationship to energy, petrochemical capital expenditures have been included in these calculations).

One hears a great deal about department stores, circuses and hotels. For the 16 leading oil companies, one department store chain has been acquired, no circuses have been purchased and it is stretching a point to say hotels have been bought.

Given the pummeling of the oil industry in the political arena, it is not surprising some responsible managers have found it desirable to diversify their stockholders' risks. But the non-oil diversification should be kept in perspective: less than 6% of the billions of dollars expended annually on petroleum has been for non-oil activity.

—*Oil & Gas Digest, December 1979*

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Special to the
*MINES Magazine*

# Proposal for Mines

by Guy T. McBride, Jr.

Members of the education committees of the Colorado House and Senate and other members of the General Assembly are mulling over a new policy for financing the Colorado School of Mines, presented to them in January by the trustees and the administration.

The objectives of the proposed policy are two-fold:

- To avoid what is feared will be irreversible deterioration in the School's high level of achievement in mineral engineering education if present State funding policies are continued, and:
- To give the CSM trustees sufficient control over the management of the School so that it can compete in the marketplace for mineral engineering students, even at necessarily higher tuition rates.

At the time of this writing, the proposal had captured the legislators' attention, and their reaction has been generally favorable. The *Denver Post* said the proposal "could break open a new era in financing Colorado higher education."

## The Need for a New Policy

The survival of CSM as an independent institution of quality is threatened more seriously than at any other time since World War II. This situation is the result of two devastating and mutually interacting forces. The first is the continued under funding of the School relative to inflation; the second is the marked increase in external interference and loss of institutional autonomy.

The resultant of the two forces raises serious questions about the long-term ability of the School to continue to deliver the high-quality engineering education for which it is known. While sufficient time still exists to secure the future, continuation of present policies will lead to accelerated deterioration of the institution's human and physical resources. If this were to occur, it would be impossible to sustain present levels of achievement, and the cost of bringing the School "back" would be excessive. Under the proposed policy, students will make a greater financial investment in their education than they would if they enrolled at another public institution in the State, their expectation being that correspondingly greater career satisfaction and financial rewards will be received. This policy will also make the trustees more accountable for the output of the educational process they oversee, since they will have much greater control of the management of the School.

In theory, CSM trustees, like other State college and university governing boards, make up budgets and set tuition rates. In fact, since at least 1972, the Joint Budget Committee of the legislature has set all State schools' budgets and tuition rates; the governing boards have simply ratified whatever the JBC and the legislature did.

## Background

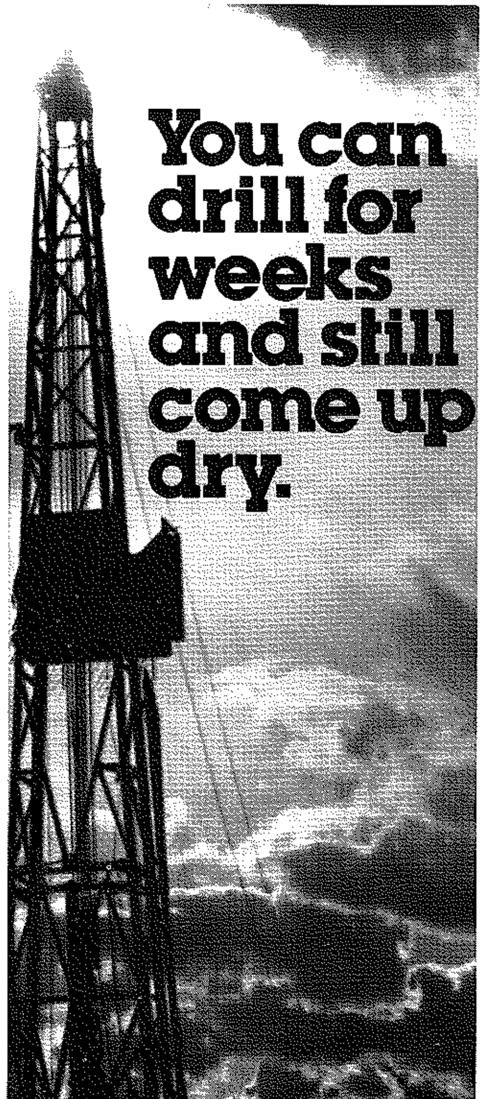
Contrary to conventional wisdom, the School of Mines has not been well funded for a decade. In point of fact, the decreasing real funding for CSM over the past ten years has been such as to raise serious questions about the School's ability to continue to deliver a quality product. Much of this decline in real funding is due to the ravages of inflation, but not all of it. An additional financial factor working against the School has been the increasing cost of engineering education, which is reflected in a continuing need for advanced scientific and technological equipment and the attendant costs of operating and maintaining this equipment.

It now costs approximately $3,900 per year to educate one full-time-equivalent (FTE) student at CSM, based upon a 1979-80 total educational and general appropriation of $11.2 million and an enrollment of 2,900 FTE students. For the 2,050 Colorado residents enrolled at the School, the State appropriated $6.5 million in 1979-80 from the general fund, representing a contribution of $3,200 per resident FTE or 82 percent of the total cost. These Colorado residents, who make up more than 70 percent of the student body, each paid the remaining $700 in tuition, while nonresidents paid the entire $3,900 educational cost.

In the ten years 1970-71 through 1979-80, total education and general appropriations to CSM increased by 131 percent, while general fund appropriations increased 70 percent. On the surface, these appear to be healthy rates of growth. However, in constant 1970-71 dollars these amounted to an increase of only 23 percent in education and general appropriations and a net decrease of 9.5 percent in general fund appropriations.

When appropriations are examined against CSM's growing enrollment (up 60 percent during the ten-year period), the declining funding situation becomes apparent. Total educational and general appropriations per full-time equivalent (FTE) student have increased during the past ten years by 51.7 percent and general fund appropriations per FTE by only 6.8 percent.

In constant 1970-71 dollars, these two appropriations per FTE have actually decreased over the decade: education and general by 19.4 percent and general fund by 43 percent. This






means that CSM is now spending in constant dollars for its overall educational and general activities $461 less per FTE student than it was spending at the beginning of the decade, or $4 now for every $5 spent then. In addition, the State of Colorado is now appropriating out of the general fund (in constant dollars) $842 less per FTE student enrolled at CSM than it was ten years ago, or less than $3 now for every $5 appropriated then.

Under these circumstances, the School has not kept up with the increasing cost of technology, nor has it been able to deal with the legislatively approved growing enrollment. While all of the institutions in the State have felt the impact of inflation, the percentage loss suffered by CSM on an FTE basis is actually many times greater than that experienced by the other state research universities.

Due to the long-term impact of this continued decline of real funding, the School is now at the minimum threshold level of quality. The increasing demand for CSM graduates, due mainly to the national employment picture rather than to any increases in institutional quality, has tended to mask this deteriorating situation. The continuation of recent past appropriations practices for CSM at a time when the rest of the Colorado economy is moving at an annual inflation rate of 14 to 15 percent, though perhaps justified by the State's overall budget situation, will lead to visible deterioration through loss of faculty and diminished value of graduates.

### Proposed New State Policy

The general elements of such a proposed new State policy include changes in the management, financing, tuition and accountability procedures for the School.

### Management of CSM

- The Trustees and the CSM administration will continue to have the authority and autonomy to establish all institutional policies and manage the School's operations, consistent with State law.
- The Trustees will continue to have the authority and autonomy to determine and establish the cost of education at CSM through the institutional budget process.
- The Trustees will continue to control the expenditure of all CSM funds using standard budgeting procedures.
- The Trustees will control all income flowing into CSM, including retaining all cash income generated by the School.



### Financing CSM

- CSM will continue to receive financial support from three sources: student tuition, State tax revenues, and externally generated gifts and grants. The proportion of student tuition will increase significantly.
- The State will continue to contribute to the education of the legislatively approved number of resident students enrolled at CSM through an appropriation of general funds.
- The general fund appropriation to CSM will be in the form of a single line item, calculated from an agreed-upon contribution to each resident student (on the basis of dollars per FTE) and the total number of FTE resident students to be enrolled in that budget year.
- The State contribution to each FTE resident student at CSM will be reviewed annually and changed by the same percentage as that made in general fund appropriations to the other research universities in the State, or by the common upward general fund factor (7 percent in 1979-80) or other as may be appropriate. The base number, for 1979-1980, will be the appropriated general fund amount of $6.5 million divided by the number of FTE resident students of 2,050, equalling $3,200/FTE resident.
- Appropriations and expenditures for capital projects will be handled as in the past.
- The total education and general appropriation to the School will be based upon the cost of education as determined by the Trustees and expressed in the School budget.
- The Trustees will have the responsibility for providing for all other income to cover the cost of education, including continuation of the present statutory authority to set tuition.
- Externally generated gifts and grants will continue to be used to enrich the educational experience, as called for in State law, and will not be used to replace State appropriations.



### Tuition at CSM

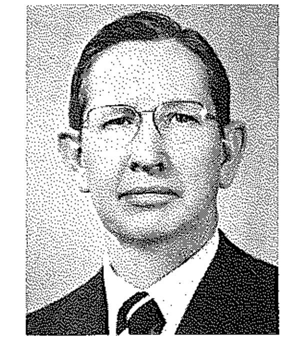
- Tuition rates for resident and nonresident students at CSM will be established annually by the Trustees.
- Tuition rates at CSM will be changed to cover the difference between the State's contribution and the established cost of education at the School.
- Students enrolled at CSM will be encouraged to make greater use of state, federal and private loan funds to cover the higher tuition rates, particularly the Colorado Guaranteed Student Loans.
- State financial aid funds will continue to be available to residents enrolled at CSM, student eligibility and amount being determined in the same way as for students enrolled at the other State institutions.

### Accountability

- The Trustees will present pro forma and detailed budgets for legislative review and approval as appropriate, both in advance and currently.
- The Trustees will continue to be fully accountable for all CSM income and expenditures, using standard financial and accounting practices and reporting annually to the legislative Audit Committee.
- The Trustees and the School's administration will be held fully accountable for the output of the educational effort which they manage, including annual presentations to the Joint Budget Committee and the education committees of each of the Houses of the Colorado General Assembly.
- External State reporting and control will be limited to the financial and output accountability requirements mentioned above, to all other reporting required by State law, and to continued academic program and degree coordination by the Colorado Commission on Higher Education (CCHE).

### Evaluation

- This program wil be phased in over a period of three years, and will have a trial of no less than five years, for a total of eight years, in order to reach equilibrium and evaluate results.



*Dr. Guy T. McBride, Jr., has been President of CSM for ten years. He has a wide background in industry and education and is chairman of APCUP (Association of Public University and College Presidents).*

—mm—

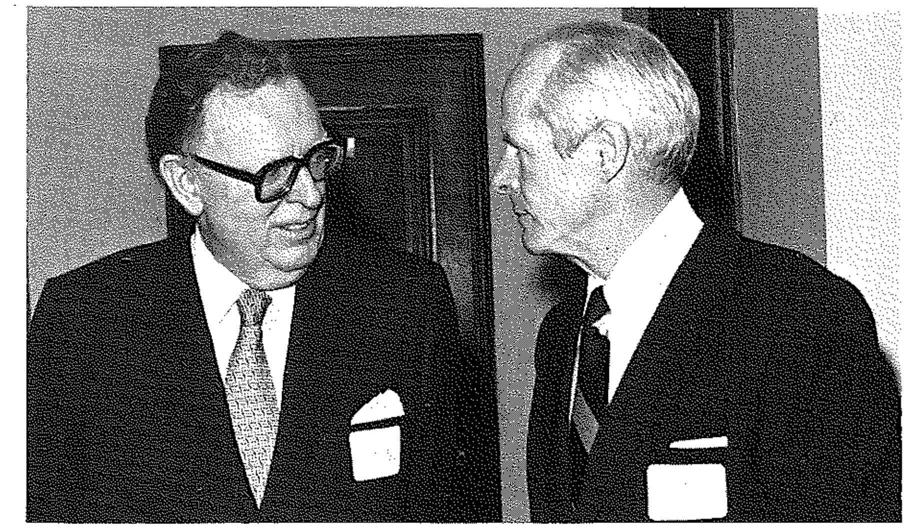
# The Resource Fund is People

by Clarence W. Leeds, III
Secretary, CSM Foundation

"People give to people." Bill Coors didn't coin that. But he's said it enough to own it. The Resource Fund is people giving to people for people. Yes, the cause is important. Perhaps, nothing short of a conspiracy to save Western civilization.

People put things in place for The Resource Fund. An idealistic and pragmatic bishop started an institution 106 years ago that has never had more relevance to societal needs than today. Fifty-one years ago a group of miners laid the groundwork—not surprisingly called a foundation, the Colorado School of Mines Foundation—for the School to earn support from private sources as well as from the public sector.

In 1976 more people: faculty planning committees, trustee planning conferences with alumni and other constituency participation, administrative recommendations; then three significant trustee decisions (discussed by Dr. McBride on page 3 of the December issue of *Mines*): to grow to 3,000, to expand the dimensions of Mines, to determine appropriate characteristics of future graduates; and now a fourth decision: to ensure quality, retain trustee autonomy and accountability by bringing tuition costs more in line with those appropriate for an excellent engineering school.



*Howard Keck and William Coors*

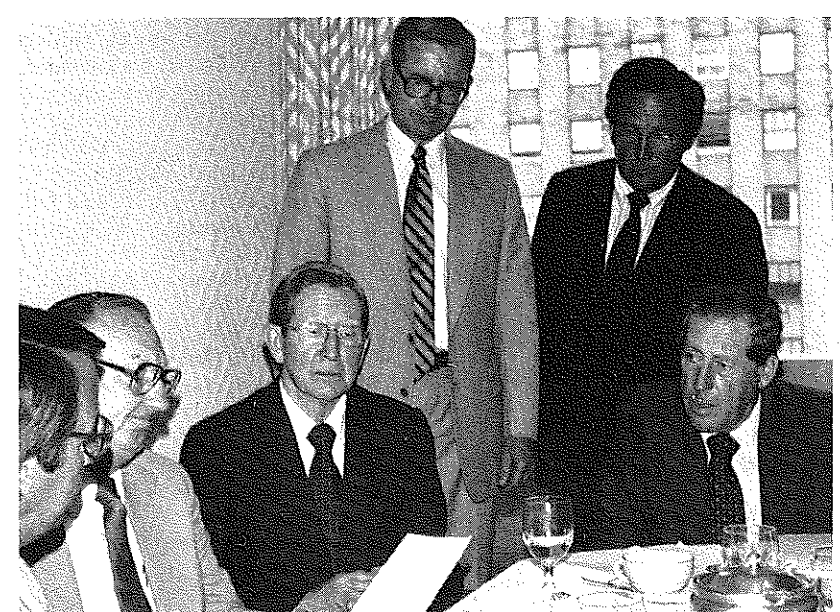
People of The Resource Fund include the president of the School and the board of trustees, who have committed more than $1.5 million of their own personal resources to the cause. Resource Fund people are administration and faculty members who have pledged more than $250,000 from their personal resources as well as serving on committees to determine priorities and implement programs responsive to today's needs and future graduate profile aspirations. Faculty members tell needs to potential donors with credibility that comes from years of productive association with industry.

Resource Fund people include a campus development council with representatives from the Alumni Association, faculty, administration, and the CSM Foundation. The CSM Development Council meets for the fifty-third time in March 1980.

The Resource Fund is a group of extraordinary human beings known collectively as the International Development Council. More than 100 strong —and *strong* it is—this is the group of people, predominantly alumni, who open the doors for the president of Mines to state the case of support.

Resource Fund chairman, Bill Coors, president of the board of trustees, takes the opportunity of this expanded circulation issue of *Mines* to acknowledge with appreciation the efforts of *all* members of our International Development Council:

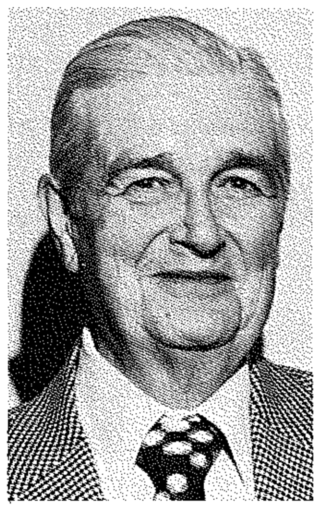
*These magnificant people are helping Mines respond to challenges—inseparably economic, political, and technological—*



*Seated: Tom McLaren '52, Newell Orr, Dr. McBride, Ralph Hennebach. Standing: Charles Irish '50, Bud Leeds, CSMF.*

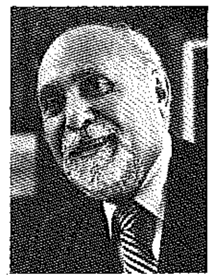
facing our nation, challenges which Mines is uniquely equipped to meet, given the necessary human and material resources.

I focus my thanks on Resource Fund volunteers with whom I have the pleasure of working around the country: as an honorary member of the Mines Class of '23, I must begin with Ed Brook, E.M. '23; Medalist '51; Hon. Mem. '63, organizing chairman of our Dallas committee (now headed by Pierson Ralph, Geol.E. '48), who had the wisdom to



Brook

enlist the services of Cindy Harr, BSc. Geop. '76; MSc. Min. Econ. '79 (daughter of the late Neal Harr, Geol.E. '54, who did so much for Mines during his lifetime and whose friends continue to contribute to the School in his honor) as secretary of the committee (Cindy is exemplary of the kind of human potential in which we are asking people to invest); Marv Gantz, Met. E. '40; Medalist '71, who heads our efforts in Pittsburgh; Norm Christie, Geol.E. '35; Medalist '65, in Calgary; Harry Conger, E.M. '55; Medalist '78 in San Francisco; Ed Borrego, '27, Hon.Mem. '69; Medalist '72, and Dean McGee, Hon.D.Engr. '68; Hon.Mem. '68, in Oklahoma City; Bill Kellogg, Geol.E. '43, current chairman of our Los Angeles committee, who, under the initial direction of Bob Thurmond, E.M. '43, set the pace



Boreggo

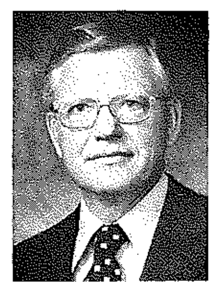
Conger

for the entire volunteer organization. Organizing chairman of the Denver Resource Fund committee (now headed by Tom Reagan, P.E. '53), Hugh Evans, E.M. '49; Medalist '79, shuttling between Colorado and California has provided inspiring leadership to members of the International Development Council on at least two committees and helped Mines earn support from the Atlantic Richfield Foundation. CSM board of trustees secretary and Foundation board president, Jim Wilson, speaking to New York alumni on January 30, 1980 congratulated New York Resource Fund committee members,

Evans

Reagan

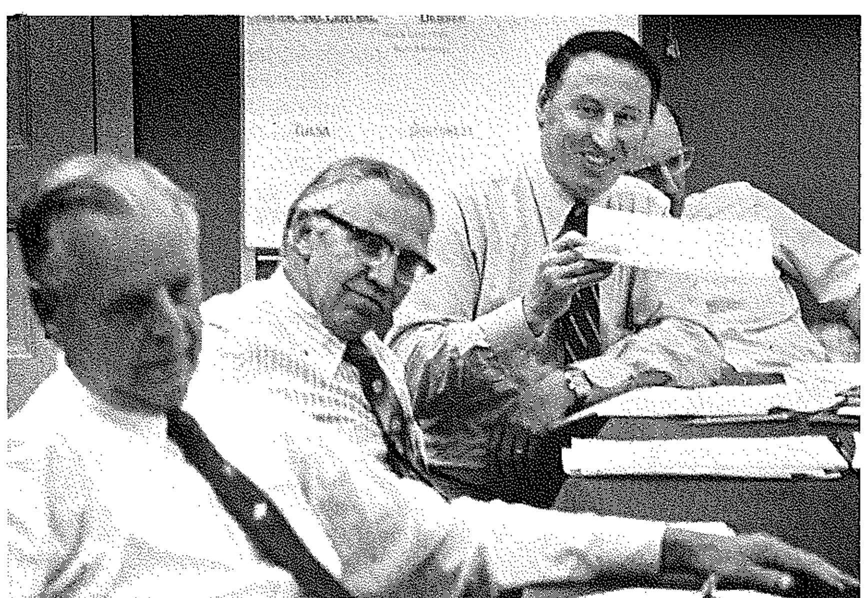
chaired by Ralph Hennebach, Met.E. '41; Medalist '65, for personal pledges exceeding $230,000 and for activities, commending especially Charlie Irish, P.E. '50, president of the New York section, Newell Orr, Met.E. '54, George Wunder, E.M. '36; Medalist '74, Norm Zehr, E.M. '52; MSc. '56; Medalist '77, Jack Thompson, Assoc. Mem. '47; Medalist '74, who has been responsible for corporate commitments during the past month expected to exceed $650,000, Dick Wendeborn, E.M. '52; Medalist, '73.



Wilson

Zehr

Besides lining up corporate support for Mines, New York Resource Fund committee member Dick Wendeborn, making a generous personal commitment, affirmed what has been echoed by many members of the International Development Council: "The single most inspiring factor as I considered my own personal gift to The Resource Fund was the knowledge that the faculty had committed more than $250,000 of their own personal resources on top of everything else they are doing to establish the long-term credibility and earn the support of others. Faculty Gifts Chairman Bob Weimer and his committee are to be commended." Getty Professor Weimer's stimulating influence has been felt on and off campus. Coordinating faculty efforts on campus, St. Joe Professor John Hager has made arrangements to permit President McBride to meet with corporate officials from whom we are earning growing support.

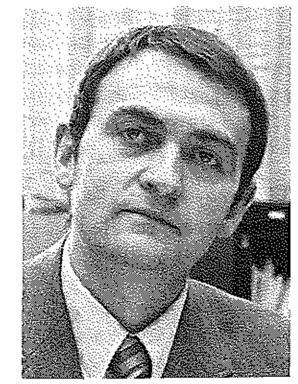


C. L. "Lindy Barker; Robert Weimer, Dick Wendhorn, '52, Norm Zehr, '52.



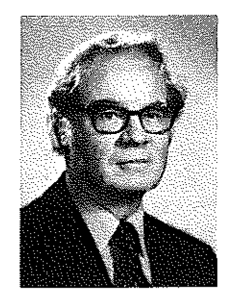


First among International Development Council committees with 100% participation in personal commitments to the Resource Fund was the Tulsa committee headed by Ben Rummerfield, Geol.E. '40; Medalist '78. Diligent efforts by Ben, Tom Manhart, Geol.E. '30; MSc. '32'; Medalist '61, Jerry Westby, Lloyd Elkins, P.E. '34; Medalist '61, and Chuck Earlougher, P.E. '36; Medalist '60 have resulted in gifts from our close neighbors and distant friends in the corporate community from Oklahoma to Texas to Massachusetts.

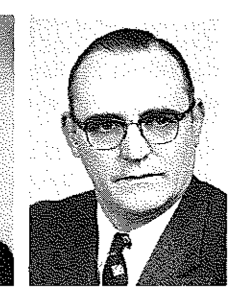


Hager

Under the initial leadership of Herb Thornton, P.E. '40; Medalist '77, Jack Warren, P.E. '50; Medalist '78, current chairman John Capshaw, P.E. '54, Nathan Avery, P.E. '56, Frank Moulton, Geop.E. '51; Medalist '74, and Bruce Barbour, P.E. '37, members of the Houston committee have not only won corporate support but will be first in the nation to launch the broad-



Rummerfield



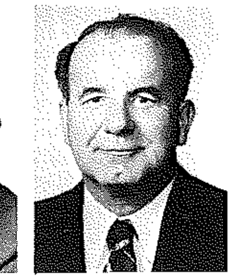
Elkins

based alumni participation phase of The Resource Fund.

My gratitude to those in key positions of leadership such as Marshall Crouch, Geol.E. '67, president of the Alumni Association, who has coordinated AADF efforts with The Resource Fund, and his immediate predecessors Bob Brace, Geol.E. '49, and Don Craig, Met.E. '48, now serving on the Foundation board.

Participation phase of the Resource Fund exemplary of inter-regional cooperation are the efforts of John McCall, Geol.E. '43, of the southern California committee with Houston and New York.

Warren



Rausch

I note with gratitude that Ghaith Pharaon serves on our International Development Council as international advisor, Bruce Rockwell in several advisory capacities, John McKinney as corporate gifts chairman, Gordon Jones as Foundation gifts chairman and Lindy Barker E.M. '31; Medalist '70; Hon.Mem. '79, as alumni gifts chairman.

I wish to extend, on behalf of the entire Mines community, special appreciation to the following individuals who hosted Resource Fund informational meetings for business and community leaders around the country: Sam Scovil in Cleveland,

Pharaon

Sayre

Cecil Green in Dallas, Ted Stockmar in Denver, George Brown in Houston, Fred Hartley and Henry Mudd in Los Angeles, Chuck Fogarty in New York, Dean McGee in Oklahoma City, Arthur Doty and W. H. Krome George in Pittsburgh, Jack Grey in San Francisco, Jerry Westby in Tulsa, and most recently in Los Angeles Howard Keck.

No one has done more to earn the greatest support in Mines history for the School than Chuck Fogarty E.M. '42; DSc. '52; Medalist '62, trustee, New York Resource Fund committee member, and special projects chairman of The Resource Fund Executive Committee.

Fogarty

Foremost among speakers for The Resource Fund is one who commands respect and gets results as a distinguished engineer, top educator, and respected member of the corporate community as practitioner and policy maker, the president of the Colorado School of Mines, Dr. Guy T. McBride, Jr. Whether articulating breakthrough research, teaching undergraduates, stating the case for Mines to corporate chief executive officers, or explaining alternatives to the gasoline pump lines to a frustrated taxicab driver en route to the airport in New York, Guy McBride is able to take the case for the people to the people because he's been there.

Leader among leaders, Bill Coors puts Mines at the top of a list of American institutions he serves as inspiring volunteer. Bill is wherever we need him whenever we need him for stimulating leadership in the corporation and foundation communities, always working closely with Mines alumni. People give to people like Bill Coors, who devote their lives to giving of themselves.

The Resource Fund is alumni. Alumni achievements have contributed to a reputation that has earned Mines support of $25 million toward our initial goal of $63.5 million. Alumni leadership has attracted that support. Alumni contributions at all levels of service and sustaining financial assistance will be essential to perpetuating and improving the quality that has earned Mines a premier international reputation second to none. Support has come from corporations, foundations, friends, and alumni, who—because of the accomplishments of *past* graduates—view their contributions as investments in *future* graduates.

Finally, The Resource Fund is, indeed, that fund of *future human* resources, our students. People.

**—mm—**

## Knowledge for Resource Development

# Know-How and Know-What

by Dr. Edward E. David, Jr.

We are living in a fascinating time—a time of transition on many fronts. The one relevant today is the transition from a time which began at the end of World War II to one which began to take shape in the late 1960's and early 70's. The earlier era was one where know-how was the touchstone. Examples abound: jet flight faster than the speed of sound, unlimited energy supply using nuclear sources, worldwide visual communication, augmentation of human intelligence through computers, space flight and exploration of the solar system, understanding of the origin of the universe and the history of the earth, manipulation of the genetic make-up of life, and much more. Resources, brains and money were poured into the enterprises that produced these and other marvels.

Rarely did we have to make choices between alternatives, since we had not reached the limit of resources. Within the past ten years, the realization of limits came upon us. We as scientists and engineers saw this realization emerging in limits on research funding. It was in the late 60's that we began hearing serious discussions of competition between big science (expensive particle accelerators and radio telescopes) and little science (modest grants for research to individual investigators).

Beyond science and research, the perception of limits on resources has generated many of the issues of today. It may be difficult for us to believe that the energy crunch is only some 7 to 8 years old. Interactions between capital investment, government spending, and the money supply have led to apparent limits on economic growth. Less well known are limits on materials and mineral resources, and water. Few Americans realize that we import the major share of many materials critical to the nation's economy and defense. This share is a larger proportion than our oil imports. Some attention was drawn to this situation in 1978 when the copper mines in what was the Belgian Congo were shut down by an invasion from a neighboring country. It turned out those mines supplied well over **50%** of the U.S. cobalt supply.

### Governance and Action

The psychology of governance and action today is very different from the expansive years from 1945 to 1970. Know-how then held center stage. Today it seems that know-how is not enough—it must be supplemented by *know-what.* Among the many possible alternatives, what do we do? Scholarship and knowledge are as vital to deciding this question as to expanding know-how.

The era of expanding know-how has given us a plethora of new tools and possibilities for resource development. In exploration, the highest profile capabilities come from satellites of the Landsat variety. Remote sensing by satellite is providing vastly expanded capability for prospecting across wide areas of the world, for assessing mineral, energy, and water resources. It is still very necessary to augment remote sensing with field work, which itself is being changed through new methods of transportation, sampling, and analysis. Beyond satellites, new instruments of increasing sensitivity, particularly magnetometers based on superconducting technology, are appearing. These, along with new seismic sources and receiving arrays, permit us to explore deep into the earth and offshore. In oil exploration, we can now drill exploratory wells in water thousands of feet deep, and are doing so in many parts of the world.

Aiding exploration is the burgeoning field of information processing. Many years ago at Bell Laboratories, some of us proposed putting a speech signal from a microphone into a computer for analysis. It was a radical idea for the time, but today it is routine to process all sorts of signals digitally, not only for analysis but for communication purposes directly.

The major advances have come in the computer software and programs which permit multiple signals from hydrophones or geophones to be smoothed, processed, collated, aligned, and displayed graphically for ease of human interpretation. These techniques of data reduction are still advancing apace as new seismic vibration sources giving continuous excitation to earth structures come into use.

### Resource Production

Not only has exploration advanced, production of resources has also. We can now produce oil and gas in the most hostile environments—the Arctic Islands, Prudhoe Bay, the North Sea, and in water over one thousand feet deep. Soon new subsea, bottom-mounted producing facilities will extend the depth limit. Modern techniques of underground and surface mining give reason for believing that higher productivity, increased safety, and higher resource recovery can all be achieved. In a recent trip to an Exxon underground coal mine in Illinois, I was deeply impressed with the ventilation system, the materials handling equipment, the automated roof bolting, of a modern mine. It was quite a contrast to the so-called "low coal" hands-and-knees operations that still persist in some places. I learned quickly to prefer "high coal" to "low coal."

In minerals processing, comparable progress has been made. Perhaps this is the area, however, where there is the most promising frontier. A major goal must be to make minerals processing less energy intensive. Hydrometallurgy is one opening—but certainly techniques for physical separation (such as selective membranes) and chemical treating (as in chemical coal cleaning) can produce important new results. In one of my previous positions work was successfully done on a hydrometallurgical technique for reclaiming lead from used automobile batteries instead of smelting.

We are making great strides in restoring the quality of the environment after resource development. We are finding that techniques must be adapted to the locale and its climate. The very successful moving-pit mining technique with continuous reclamation used near Cologne in Germany would probably not work well in arid sections of the Western U.S. since the German technique is water-intensive. Nevertheless, we can do much more in environmental preservation and reclamation than we knew a decade ago, and without bankrupting ourselves.

### Know-What

The situation regarding know-what is somewhat of a muddle. There are schools of thought here and abroad which are seriously convinced that we should draw back from development. One of these is the zero-growth school. This was begun by Malthus but was made respectable in the modern era by a computer model described in the well-known book, *Limits To Growth.* The point in this approach is that the dual problems of energy and materials depletion and pollution would soon cause a breakdown of world society as we know it. Another school merely says that our running out of energy and resources will cause a similar breakdown. Other doomsday schools concentrate on uncontrolled population growth, particularly in the third world, or growing nationalistic trade protectionism between nations, or a breakdown of the world's monetary system a la "The Crash of '79," or a thorough regimentation of society as in Orwell's *1984.*

But let us concentrate for a moment on the natural resource depletion school of thought. The basic idea is that we must drastically curtail the growth of material and energy consumption—and we must share residual resources with the third and fourth worlds. The deepest pessimists of this school, such as Robert Heilbroner, opine that the political will to share resources is lacking, and that the civilized world will perish in a thermonuclear holocaust.

Let me point out that these views are based upon the assumption that the world is involved in a zero sum game—what is won by one nation or faction must be lost by others. Resources are a fixed pie to be cut up and distributed, and once gone, there isn't any more.

But there are other schools of thought which reject the zero sum view. These are more in line with my own thinking and with history. This view says that the pie is constantly expanding by feeding on contributions from new technology. Human need as reflected (albeit imperfectly) by the economic system results in additions to resources rather than depletion. We have seen this happen in almost every resource area as a result of improving technology which is usually demand-driven. Furthermore, we know that it is possible to find and extract less accessible resources, typified by the frontier oil areas mentioned earlier. We can also extract leaner resources as in tertiary recovery of oil. Currently exploited iron ores have a concentration of the metal about six times that in the earth's crust as a whole. With aluminum, it is only four times. These ratios can be driven lower and resources thereby increased. The finite resources view seems simplistic when seen in this light.

### Recovery of Resources

We should note also that material resources are not lost irretrievably even though they can be expended in providing a service to people. Resources can always be recovered by the expenditure of energy and, of course, at a cost. At any time in history, we may not be able to afford such recovery, but new technology can often overcome, given sufficient technical wisdom and foresight.

Actually, the problems in the know-what arena are two. First, international politics may not allow the process of resource expansion to proceed in its own time scale as set by the development of scientific knowledge and technique. We see this issue in the international oil situation. There seems to be plenty of oil resources in the world; the problems of balancing supply and demand, and cost and price arise from OPEC and consuming nations' politics. the resource expansion I've described can be arrested through **political** action.

Second on the know-what front is the question of investment. Are we as a society willing to forego some immediate gratification to invest in the future so that resources can grow? One type investment is, of course, R&D. Gratification from dollars spent on R&D is postponed until some time in the future. It is my guess that a higher level of investment in finding, extracting, and processing materials and fuel, and in developing efficient end use systems is required if we are to achieve the expanding pie. The *know-what* decisions in our future should follow this philosophy of avoiding international political barriers to development and encouraging investment in S&T and capital today, deferring some consumption to provide for tomorrow.

Resource development is one of the critical frontiers of our world today. We have vast know-how, and we will have more. As important is the know-what. how do we balance the possible with the desirable? Colorado has a prime example—the possible exploitation of oil shale—a vast resource which is rapidly approaching economic viability. The controlling decisions on oil shale will be taken not solely here, but at many levels in our society and government. These decisions will not always be rational; emotion is often a dominating factor in know-what decisions. People with *know-how* must be prepared to participate effectively in these decisions to push them toward rationality. The system of national decision-making is baroque, but it must be worked. Engineers should aspire to be effective contributors to the national scene. This requires knowledge and education beyond know-how—it requires communication and personal conviction, and of course *knowledge* of how the political system works. Only with such participation do we stand a real chance of providing the investment in the future that we so badly need, and to do so in a human context.

I have confidence that students and faculty who can provide that disciplined cohort on which future resource development depends.

*Excerpted from a speech by Dr. Edward E. David, Jr., President, Exxon Research and Engineering Company, at Rededication of Arthur Lakes Library, Colorado School of Mines, Golden, Colorado, on April 6, 1979.*

—mm—



# in memoriam

### JAMES A. APPLETON

James Armstrong Appleton E.M. 1937 died on January 5, 1980 in Seattle, Washington, near his home, Mercer Island, Washington. At the time of his death, he was employed by the Robbins Company.

Appleton served as a submarine officer in the U.S. Navy during WW II. Following his service, he was employed by Goodman Manufacturing Company in Chicago and Canada. In 1972, he moved to the Seattle area with the Robbins Company.

Mrs. JoAnna Appleton survives her husband, as do his children; Russell, Patricia, Susan and Judith; his mother, Blanche Stevenson, and five grandchildren.

A scholarship loan fund has been established in the name of James A. Appleton, through the CSM Foundation.

### SAMUEL A. GUSTAVSON

Samuel Anthony Gustavson, E.M. 1932, died December 11, 1979, in Pittsburgh, Pennsylvania.

Mr. Gustavson retired in 1971 from his position of Northeast Regional physical science administrator for the U.S. Bureau of Mines in Pittsburgh.

A native of Nebraska, he moved at an early age to Denver, and attended high school in that city. During World War II, he served with the Corps of Engineers, retiring as a major in the Reserve Corps.

A life member of the CSM Alumni Association, he was also active in the Masonic order and was a member of Park Hill Lodge #148.

His wife, Jean, survives, also a daughter, JoAnn and a son, William R. and one granddaughter.

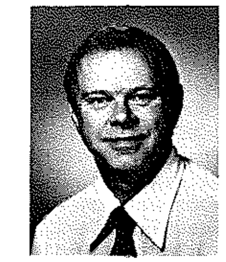
### GEORGE H. ROLL

George H. Roll E.M. 1919, died recently in Naples, Florida, where he made his winter home since retirement. Mr. Roll was 88 at the time of his death.

Active in a volunteer capacity in the CSM Alumni Association activities in New York and Pennsylvania for many years, Roll then became director of the Alumni Association in Denver. He was very influential in the move the bring the Association back to the CSM campus, after it had been located in downtown Denver for a long period of time.

Mr. Roll maintained an extensive correspondence with various active members of the Association after his retirement, and assisted Wendell Fertig with suggestions and advice. He was a life member of the Association.

He is survived by several children.



### HARVEY A. TAYLOR

Harvey A. Taylor E. Met. 1951, died of cancer in Kennewick, Washington on October 4, 1979.

Born in Bridgeport, Connecticut, Taylor attended Bowdoin College for one year, and spent four years in the U.S. Navy before entering Mines. He left the Navy with the rank of Lt. J.G.

He was employed by National Lead Company, then General Electric in Idaho Falls, Idaho, prior to joining the Hanford Laboratories organization in Washington. He had been in Hanford since 1961, serving as manager of the Radiometallurgy Lab and later as manager of Plutonium Fuels Process Division. On two different occasions during this time, he was assigned to the role of consultant, working with the OEC Halden Reactor Project in Norway, and the Argonne National Labs in Idaho. At the time of his death he was employed by Hanford in the Irradiation Test Management program.

Taylor is survived by his wife Ann, a former Denverite, a son Mark and two daughters, Lynne and Lee, and one grandchild.

LORENZ S. WOEBER

Lorenz S. Woeber E.M. 1922, died November 12, 1979, at age 79 in El Segundo, California. Mr. Woeber had been retired for a number of years, since 1965, and had made his home in that city since that time.

Woeber was a native Coloradoan, born and educated in Denver. Before entering Mines, he had attended Regis College. In the last year before his graduation from Mines, he met and later married Zelda Moynahan, secretary to President Alderson, and a member of a well-known Colorado mining family.

He was employed at the famous Comstock Mines, and later for Chevron, working in the oilfields at Bakersfield. With this company for many years, he later became a consulting engineer in Kern County, California.

Woeber is survived by his wife and three sons; James, Edwin and Philip, two daughters; Lorene and June and five grandchildren.

—mm—

# letters

To: President Carter
Senator Alan Cranston
The Wall Street Journal
The Los Angeles Times
The Daily News
The Mines Magazine

Subject: The "windfall profit tax"

Gentlemen:

Of all the misnamed taxes that have been foist on the American people, this is the utmost insult to the voter. It is nothing more than an "excise tax". To the uninitiated an "excise tax" is a tax levied on the manufacture, sale or consumption of a commodity within a country. "Windfall profit tax" indeed!

No knowledgeable American believes that a corporation pays taxes. People pay taxes. In order for a corporation to exist in the capitalistic system it must make a profit or die. So where will the "BIG OIL" company get the money to pay the windfall tax? It will simply charge more for its product, in this case oil. So who is paying the tax? The corporation will just pass on to our government the excess it would have charged ordinarily. The corporation is not hurt at all, the Government gets fat on the tax take, and we the consumer and tax payer get it in the neck—as usual.

If I, an ordinary tax payer, can figure this out, why can't you? You are our elected representatives who are supposed to look out for the voters' interest. Frankly Gentlemen, I am not sure you know exactly what you are doing.

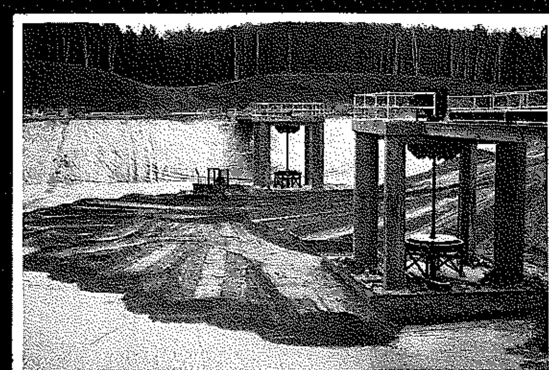
I am enclosing three different editorials. Two from the Wall Street Journal in their January 22, 1980 issue, and one from the January issue of the Mines Magazine from the Colorado School of Mines. It appears that a few (and I wonder why there aren't more) thinking people are finally getting on the soap box to try to stop the taxing power of our government.

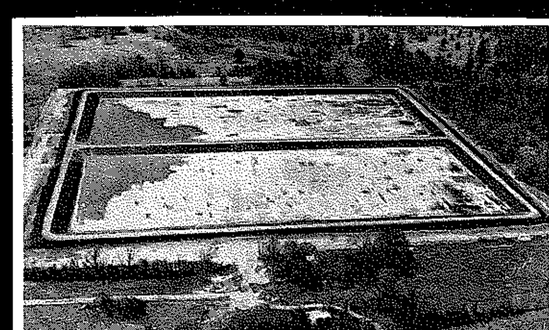
Maybe the voters will have a surprise for you this fall. Dear God, I hope so.

Very truly yours,
Frank A. Foley, E.M. 1949
La Mirada, CA 90638













# alumni update

**'35 Earl R. Parker Met.E.,** was recently accorded a signal honor when he received the National Medal of Science, presented by President Carter at a White House ceremony. The Medal is the highest award given by the Federal Government to the nation's scientists and engineers engaged in research. Parker is professor of Metallurgy, University of California, Berkeley.

**'38 Charles M. Tarr P.E.** has retired from Conoco. His service with that company dates from 1938, and he retires with the title of Senior Staff Engineer. His new residence will be in Sun City, Arizona.

**'39 Harry J. McMichael Met. E.,** who formerly headed McMichael's Inc., in Salt Lake City, has retired and will make his home in Lakewood, Colorado.

**Donald W. Gunther, Met. E.,** has also joined the ranks of retirees, and will continue his residence in Acme, Pennsylvania. He was president of Donald Gunther Associates.



**'41 Arthur G. Wood E.M.,** is now District Manager, Denver, South Dakota Cement Plant, for Texas Industries, Inc.

**'42 Robert C. Weisner E.M.,** has changed jobs. Formerly with Syndestate Co., he is now a supervisor for the U.S. Bureau of Mines.

**Walter C. Seipp Met.E.,** is currently Sales Manager for the A. C. Williams Co.

**'43 Eugene F. Klein Met. E.,** has accepted a position with Barber Greene Co. as a mining sales specialist. He was with Townley Engineering and Manufacturing previously.

**'47 William H. Erickson P.E.,** has been named to a national commission to promulgate standards for state and local law enforcement agencies, according to the Law Enforcement Assistance Administration. Erickson is Chief Justice, Colorado Supreme Court.



**'49 Russell L. Wood E.M.,** President of Copper Range Co., was a featured speaker at the National Western Mining Conference held in Denver February 6-8th.

**Hugh Evans Geol.E.,** is an independent geophysical consultant based in Calgary and functioning on an international basis.

**Howard L. Garrett, Geol.E. and MSc. '50,** who was formerly with Pecten Syria, is now employed by Shell Oil.

**'51 Frederick H. Hartman MSc. Geol.E.,** is no longer with Board Oil Co. as vice president of exploration. He is owner of Fred Hartman Oil and Gas Exploration, located in Oklahoma City.

**Ralph E. Musgrove Met. E.,** is managing partner of Musgrove Investment Co. in San Antonio, TX.

**James R. Paden P.R.E.,** has been transferred by Texasgulf to its chemicals division in Raleigh, N.C. Jim will serve as vice president, potash production, in that operation.

**'52 Ernest A. Lucero E.M.,** has been appointed general manager of the Crownpoint uranium project for Conoco, Inc. Lucero was with the Anaconda Company for 27 years before joining Conoco, as manager of mining operations in Grants, NM, and has worked in Butte, MT and Chile.

**James H. Butler, III Geol.E. and PhD Geol. '72,** is now president of the West Texas Oil and Gas Corp.

**Forrest S. Woodside, Jr. Geol.E.,** is manager, Geology, for the Pendleton Land Exploration, Inc. in Denver, CO.

**'53 William E. Saegart Geop.E.**, who was formerly with Cia Minerias Disputada de Los Condes, is now owner of Bali Hai Polynesian Resort Apartments, in Ft. Lauderdale, FL.

**Phinn W. Townsend, Jr. P.E.**, who was with Clark Oil and Refining Corp., is now Exec. V.P., Saga Petroleum.

**Ed W. Heath, Geol.E.**, has moved from exploration manager to vice president of exploration for Jackson Exploration, Inc., located in Dallas.

**'55 Chester F. Budd, Jr., P.E.**, is vice president and general manager of Union Oil's Philippine Geothermal, Inc. He offices in Union Oil Center, Los Angeles, CA.

**Robert A. Metz, Geol.E.**, was recently in the Denver area recruiting for summer student workers for the Duval Corp., Tucson.

**'56 J. G. Roylance, Jr., Geol. E.**, is executive vice president of Rexcon, Inc.

**'57 James B. Copeland E.M.**, was recently promoted to assistant superintendent of the Sunrise Mine, Guernsey, WY. Sunrise, owned by CF & I Corp., is one of the three remaining underground iron ore mines in the United States. The entire operation consists of 800 ft. deep Sunrise, where block-caving is used, and the Chicago, a small open pit nearby. The mine dates from 1900, when it was begun as an open pit operation. Copeland, a member of the U.S. Army Reserves, was also promoted to the rank of Lt. Colonel recently.

**LeRoy V. Bovey Geol.E.**, has moved from the position of manager, Rockwell International Systems, Inc. to project engineer for TRW Systems, Inc. He is located in Cedar Glen, CA.

**'59 Harold M. Knudsen MSc. PRE**, is now senior process engineer for the Procon Pacific operation. He moves from Jacobs Engineering Co., where he held a similar position.

**Gordon L. Steele, Geol.E.** has been appointed operations manager for the new Candelaria Silver Operations, Occidental Minerals Corp. The company is building facilities at Hawthorne, Nevada for a startup of mining operations late in the summer. Steele was most recently mining superintendent for Homestake Mining Co. in Gunnison, CO.

**Donald L. Matchett Geol.E.**, is manager of the environmental engineering division of Stone and Webster Corp., Littleton, CO.

**Joe L. Thompson P.E.**, is now president and owner of Joe L. Thompson, Inc.

**'60 William C. McClain E.M.**, is executive vice president of RE/SPEC Inc., in Rapid City, SD. McClain was a project engineer for Union Carbide prior to accepting this post.

**John J. Selters E.M.**, has been appointed general manager of tract development for the Rio Blanco Oil Shale Co. The property is located on the 5,100 acre Federal Oil Shale Prototype Tract C-a in Colorado's Rio Blanco County. Selters, with Gulf Mineral Resources Co. for nine years, was most recently a senior project manager for that company in Grants, N.M.

**S. Bruce Heister BSc. Met.** has been promoted from vice president, marketing and sales, to president, Alcan Cable Division, Alcan Aluminum Corp. He is located in Dunwoody, GA.





**'61 David H. Strandberg E.M.**, has moved from California to Florida, where he is Supervisor, Plant Operations, Southeast Division, Chevron USA.

**Bradley Vote Geol. E.**, is now chief engineer, Met-Chem Engineering Laboratories, Inc., Reno, NV.

**Howard P. Christiansen Met.E.**, has been appointed superintendent of Rail Accessories, Mining and Cutting Edge Mills for CF&I Corp., Pueblo, Colorado. He has been with the firm since 1964.

**'65 Donald W. Peters Geol.E.**, is minerals geologist with the U.S. Forest Service, attached to the Salmon National Forest area, Idaho.

**'66 Edward L. Garlington, Jr. P.R.E.**, who obtained his law degree after graduating from CSM, is an attorney at law in La Junta, CO.

**Daniel W. Kappes E.M.**, is a partner in a metallurgical consulting firm in Reno, NV.

**'67 W. Jeffrey Hart CPR and MSc. Min. Econ. '72**, was appointed vice president of marketing for MAPCO Coal Division in November. He will be responsible for all MAPCO's coal marketing activities, and will be based in Tulsa, OK.

**'68 Ronald P. Walden BSc. Pet.**, who was with the University of Oklahoma's Oilwell Blowout Prevention School is now division drilling superintendent for Texoma Production Co.

**Michael O. Russo E.M.**, is now chief engineer for the McDermitt Mine in McDermitt, NV., an 1800 tpd mercury operation. He was with Energy Fuels in Utah prior to this.

**'69 Chris R. Candee Geol.E. and MSc. Geol. '72** is based in Denver as a geologist with AMAX Exploration, Inc.

**'70 Anton W. Bosch E.M.**, has accepted a position with Smith Tool Company in Oklahoma City, OK.

**James A. Hodson, Min. E. Phy.**, is the current president of the Denver, CO Jaycees.

**'71 Clark K. Gestring BSc. Geol.**, is a coal exploration geologist with Northern Minerals Co.

**John C. Willson BSc. Min.**, is now mining superintendent for the Pittsburgh and Midway Coal Co., in Pittsburgh, KS.

**Oral A. Staman BSc. Min.**, has been promoted from mine engineer to director of technical services by the J. R. Simplot Company.

**'72 Claude C. Corkadel, III BSc. Met.**, is accounts manager for the Energy Minerals Division of the Mobil Oil Corp.

**'73 Lytle B. Whitefield, III BSc. Met. and MSc. Met. '75**, is process engineer for the Bekaert Steel Wire Corp.

**Richard K. Glanzman MSc. Geo-Chem.**, is currently with Chevron Resources, after a stint with the USGS.

**'74 Gerald L. Starner BSc.Geop.**, has left the U.S. Army and is now a geophysicist with Micro Geophysics Corp.

**Russell J. Louie MSc. Geop.**, is employed by Elf Aquitaine Oil and Gas as a geophysicist in the Denver, CO office.

**Donald L. Presenkowski BSc. Pet.**, has moved from Natural Gas Pipeline Co. of America to Marathon Oil Co.

**'75 Paul J. Shattuck BSc. Min.**, who was with Consolidated Coal Co. is now a mining engineer with Atlantic Richfield Coal Co.

**'76 Michael B. Woolley MSc. Min. Econ.**, is assistant vice president of the Mellon National Leasing Corp., Pittsburgh, PA.

**'77 Harry M. Conger, IV**, has been promoted to Drill and Blast general foreman, Kennecott Copper Corp., Utah Division.

**Sharon G. Roness BSc. Min.**, formerly quality control engineer for Kerr McGee Coal Co. in Wyoming, is now mine foreman.

**James A. Lillo BSc. CPR**, formerly of Shell Oil Co. is now a petroleum engineer with Champlin Petroleum Co.

**'78 Trevor R. Ellis MSc. Min. Econ.**, is currently with Mobil Energy Minerals.

**William H. Johnston BSc. Min.**, is now design engineer, Texas Power and Light Company, Sandow Mine in Rockdale, TX. He was previously employed by Brown and Root, Inc.

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## Miners Help Guide AMC

Charles F. Barber, Chairman and Chief Executive Officer of ASARCO, who was recently elected Chairman of the American Mining Congress, will have assistance at various levels from members of the Board of Directors who are Mines alumni. Newly elected Mines men on the AMC Board are: Harry M. Conger E.M. 1955, President, Homestake Mining Company and Hugh Evans, E.M. 1949, President, Old Ben Coal Company. Reelected were Charles F. Fogarty E.M. 1942, Chairman, Texasgulf, Inc.; John A. Love, Honorary 1974, President, Ideal Basic Industries; and Plato Malozemoff, Honorary 1957, Chairman, Newmont Mining Corporation.

The American Mining Congress is an industry trade association whose membership includes companies that produce most of America's metals, coal, industrial and agricultural minerals; corporations that manufacture mining and mineral processing machinery, equipment and supplies; and engineering and contracting firms, as well as financial institutions which serve the mining industry.

The Board of Directors, comprised of forty-two leaders of these entities, guides the AMC in its role as an industry spokesman. J. Allen Overton, Jr. is President of the Washington-based organization.

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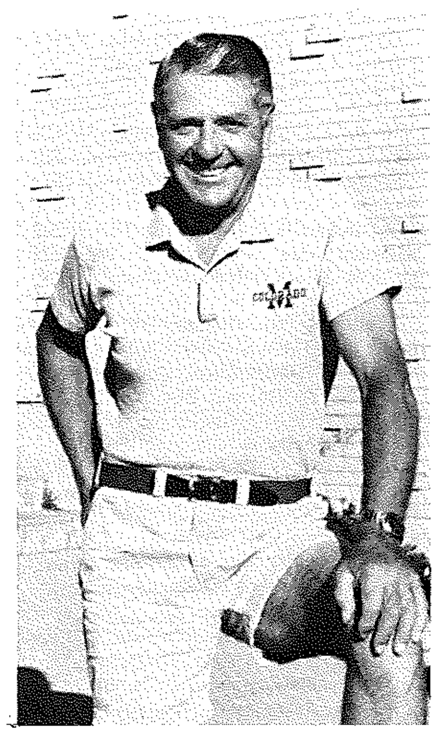
COMMENCEMENT
MAY 8, 9, 10, 1980
Reunion Classes
1925, '30, '35, '40, '45, '50, '55
BANQUET MAY 9

# Brennecke in Hall of Fame



Fritz Brennecke, who endeared himself to hundreds of Mines athletes over his 22-year stint as Athletics director, head football coach and physical education chief, has been recognized by the highest honor in the Colorado lexicon of sports greats. Brennecke was inducted into the Colorado Sports Hall of Fame at the 16th annual banquet February 18, 1980.

The honor culminates a career characterized by a philosophy which seems a little strange today—"athletics for fun." This attitude led Brennecke to a special place in the sport world, and a special place in the school he was proud to be associated with for so many years. He became an outspoken critic of the professionalism practiced by small colleges, and trained his teams to regard sports as an endeavor which would benefit them all of their lives—not a kill-or-be-killed activity for a brief number of years. His teams at Mines produced one Rocky Mountain Conference football championship in 1951, a tie with Colorado College in 1958 and three RMC runners-up. He proudly pointed to these accomplishments and many individual records set by Mines athletes over his tenure as proof of his thesis.

His recognition by the Hall of Fame is based on his performance as an all-round sports star at Colorado Teacher's College at Greeley, now the University of Northern Colorado. He has served college athletics in the state in many other ways, including a period on the National Collegiate Athletic Association football rules committee, and on the committee for the medical aspects of athletics as related to athletic injuries.

Brennecke, born in Montana, went to Greeley from a small farm near Montrose, Colorado, where he attended high school, lettering three years in each of three sports. He also carved out a name for himself as an amateur boxer on the Western Slope.

Brennecke enrolled at Colorado Teachers College in 1932 and worked his way through college to a degree in history and political science in 1936. Later he earned a master's degree at the University of Southern California.

At CTC Brennecke earned three letters and a freshman numeral in football and four letters in baseball, making the All-Rocky Mountain Conference team as a catcher in his senior year. He started every game for the Bears in his three varsity football seasons and still is remembered for his play as a blocking back in a stunning upset of the University of Colorado in 1934.

Brennecke's football coach at Greeley was John Hancock, whom he now joins in the Colorado Sports Hall of Fame.

Brennecke continued to box in his spare time while a collegian and came to Denver to win amateur middleweight championships in tournaments conducted by the Denver Athletic Club and Denver Elks Lodge No. 17 in 1934 and 1935.

After graduation Brennecke became a teacher-coach at Steamboat Springs High School, then shifted to Golden High School, where he produced four football titles and one basketball crown in five years before moving up to Denver South. His first South team won the Denver championship, and after three years of duty in the United States Navy, he returned to coach the Rebels to another grid crown. Then came his 22-year tenure at Colorado School of Mines, which became his "permanent" niche in athletics.

"Retirement" for Brennecke has been a busy time. He became coordinator for the Adolph Coors Co. in its employee recreation program. Previously he had done part-time work for the company in its guest relations department. He also writes a weekly sports column for the Golden Transcript.

Brennecke served on the Colorado Athletic (boxing) Commission from 1949 until it was dissolved in 1977 and has been active in many community services. He was a member of the Golden City Council for four years and served with the Jefferson County American Cancer Society. Recently he was named a director of the National Industrial Recreation Association.

While at Steamboat Springs, Brennecke met Betty Anne Leckenby and married her in 1939. They are the parents of three grown children, Paul, Anne Edwards and Louise. The Brenneckes, who make their home in Golden, also have one grandson and six granddaughters.

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## ROTC Appointment Told

Kathleen Rahm, a junior in geology at Colorado School of Mines, has been appointed cadet lieutenant colonel by the ROTC teaching staff, according to Lt. Col. Robert D. Howe, head of the CSM military science department.

Rahm, daughter of Kenneth and Carol Rahm of Lakewood, Colo., is the first woman to attain the rank of cadet lieutenant colonel, and also the first woman at CSM to reach the designation of M.S. 4, top classification for students in the ROTC program. She is a member of the Pershing Rifles, Pathfinders and the honorary military fraternity of Scabbard and Blade.

The cadet lieutenant colonel is chosen on the basis of academic performance, both general and in military science, participation in ROTC advanced camp activities and overall ability in the military science projects. Rahm will be supervising the cadet staff in training M.S. 3 cadets, scheduling courses and providing assistance for the Pathfinder program.

The appointment is for one semester, and is designed to give experience in command to those ROTC leaders who will be putting that experience to work in the Corps of Engineers reserve program upon graduation.

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## Silver Diplomas

Graduate Students receiving their degrees in May will not get silver diplomas—at least on time. The trustees went along with a request by Gordon Scott, vice president for business affairs, that receipt of the diplomas be deferred because of retirements in the instrument shop.

He said that taking the business outside the school "would take money we don't have," and that deferred presentation will avoid the scrappage problem caused when students don't graduate as planned.

The special gold-on-silver diplomas traditionally presented to the 50-year class will be presented on time, Scott said.

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# Sigma Kappa at Mines

## Can't Stop Dancing

by Kathy Rahm

Mines was built on its rich traditions and as 1980 evolves we'll find new traditions being established as well as the commemoration of the old. March 29th will be the start of what is to become a "rich tradition." The Alpha Gamma Delta Women's Fraternity is sponsoring a Dance-a-thon in conjunction with the Loretto Heights College and Colorado Women's College to benefit the Muscular Dystrophy Association. This twelve-hour event will be held at the Russel H. Volk Gymnasium from 9 a.m. to 9 p.m. Following the Dance-a-thon, the dancers will move to the Student Center cafeteria for a party open to the students of all three schools which will feature the final tally of the day's endeavors.

MDA provides services to patients suffering from any of 36 muscle diseases covered by the Association's program. Each year, more and more young people join the love train which has provided MDA with over $2 million during 1978-1979. The Dance-a-thon raises money by having each of the dancers recruit sponsors who will pay them either an hourly wage for each hour they dance or a lump sum of money for participating in the event.

Alpha Gamma Delta anticipates that the Dance-a-thon will become a regular event at the school. "Can't stop dancing" for Muscular Dystrophy is sweeping the nation and will establish itself as one of the proud Mines traditions.

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*1st Row—Karen Baker, Cindy Smith, Linda Sue Law; 2nd Row—Mrs. Doris Nyikos, Mrs. Kay Mueller, Lisa Yoemans, Cherelyn DeWit; 3rd Row—Diana Burn, Diana Boening, Lisa Bremner, Joanna Sixta; 4th Row—Roxanne Pilcher, Kathy Heinlein, Tracey Smink, Patti Griffith; 5th Row—Melanie Edwards, Shereen Clement, Ms. Patricia Petty.*

Initiation ceremonies at the Ben Parker Student Center, a banquet at the old Heidelberg Inn, and a reception at the Green Center, Jan. 2-27 formally installed Zeta Pi Chapter of Sigma Kappa national social sorority at the Colorado School of Mines. Chartered in 1974, the same year in which CSM was founded, Sigma Kappa is one of the oldest women's sororities.

Mrs. William M. Mueller, whose husband is vice president of academic affairs; Mrs. Michael S. Nyikos, whose husband is dean of students; and Mrs. J. S. Petty (Patricia), MINES Magazine editor and wife of Jack S. Petty, E.M. 1952, became honor initiates of Sigma Kappa.

Student initiates Shereen Clement, Cherelyn DeWit, Roxanne Pilcher, Cynthia Smith, and Lisa Yoemens joined student members Karen Barker, Lisa Bremner, Diana Burn, Diana Boening, Melanie Edwards, Pattie Griffith, Kathy Heinlein, Linda Sue Law, Joanna Sixta, and Tracey Smink to form the new Sigma Kappa chapter.

National officers of Sigma Kappa here for the installation were President Mrs. Leslie Collins; former National President Mrs. Field T. Brown; National Director of Expansion Mrs. John Valentine; Director of Chapter Finance Mrs. Ralph Clarkson; and Province Officer Mrs. Fred F. Meissner (wife of Fred Meissner, Geol.E. 1953 & MSc. 1954). Mrs. Carl T. Tinsman, installing officer; Mrs. Jacques Robertson, president of Zeta Pi Advisory Board; Mrs. Frank Reynolds, aided by other members of the Advisory Board and Denver alumnae, all were responsible for setting up the various events.

Special guests at the installation banquet were CSM President and Mrs. Guy T. McBride, Jr.; Director of Student Activities Janet Goodrich, honor initiates and their husbands, student initiates and members, and Mrs. Ben H. Parker, Sr., Sigma Kappa alumna whose husband was the only CSM graduate to serve as president of Mines.

In addition to their many activities, Sigma Kappas earned the second highest academic rating of all sororities and fraternities in the Mines campus last spring.

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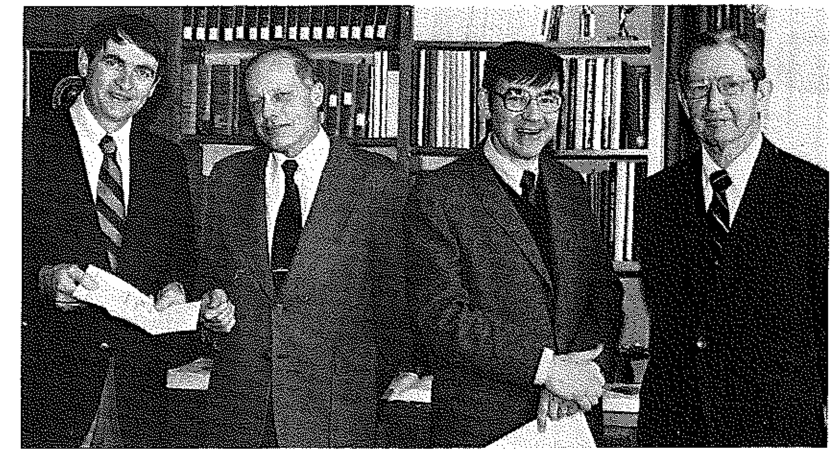
# St. Joe Minerals Grant



*Professor John Hager accepts official notification of the St. Joe Minerals grants from Mr. Robert E. Lund, Director of Extractive R&D, St. Joe Minerals Corp., Monaca, Pa. Dr. Guy T. McBride, Jr. is discussing the scholarship award just presented by Mr. Joseph G. Sevick, Vice President-Technology, St. Joe Minerals Corp., New York.*

The St. Joe Minerals Corporation has announced it is continuing its professorship and fellowship programs in extractive metallurgy at the Colorado School of Mines through 1980.

Beneficiaries of the grant are St. Joe Minerals Corporation Professor of Extractive Metallurgy, Dr. John P. Hager, and graduate student Debra Lee Kaiser, recipient of the St. Joe Minerals Corporation Fellowship in Extractive Metallurgy.

Dr. Hager, a member of the CSM faculty since 1965, has held the professorship since 1975. Now in its sixth year, the program supports the professor as well as provides funds for travel and research.

Ms. Kaiser, of Lisle, Ill., is a 1979 graduate of Lehigh University and is working toward her master's degree.

The latest grant represents continued financial support of CSM by the corporation. In addition to the professorship and fellowship program, St. Joe Minerals has awarded a series of research grants to the Department of Metallurgical Engineering and supports a school-wide scholarship program that provides undergraduate scholarships to four students each year. In the past 10 years St. Joe Minerals has given nearly $500,000 to sustain academic and research activities at the school.

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## $400,000 Grant

A $400,000 grant from Newmont Mining Corporation of New York City to the Colorado School of Mines Foundation, Inc., was announced by Dr. Guy T. McBride, Jr., CSM president, and will provide the school's mining department with badly needed laboratory equipment.

The grant will fund compression and testing machines for Mines' Newmont Rock Mechanics Laboratory to be housed in the school's George R. Brown Hall of Engineering, now under construction.

"This gift will enable the school to have the best equipped educational research labs in the country," said Dr. Thys Johnson, head of the mining department. It will provide expanded opportunities for our students to prepare themselves for challenging careers in the mining industry."

Mining engineering students at CSM study the principles and techniques of mineral exploration and underground and surface mining operations. Studies include rock mechanics, rock penetration, fragmentation, plant design, mine ventilation and operations research.

J. E. Thompson, president of Newmont, said, "Newmont is pleased to establish this important facility at CSM, reflecting a commitment by both of us to excellence in mining education and practice."

The gift was made to The Resource Fund, a $63 million ten-year major development effort which is in the first phase of providing long-term private support for the public institution. More than $23 million has been raised to date.

Scheduled for occupancy in the fall of 1980, Brown Hall is the new $5.5 million mining and basic engineering building on the CSM campus. The building will house 60,000 square feet of classroom, office, and laboratory space and will replace obsolete housing for the departments which are now located in turn-of-the-century buildings on the campus.

Brown Hall was made possible by an early $4.4 million gift to The Resource Fund by The Brown Foundation of Houston, Texas, and is named after George R. Brown, a 1922 Mines alumnus and retired chairman of Brown & Root, Inc.

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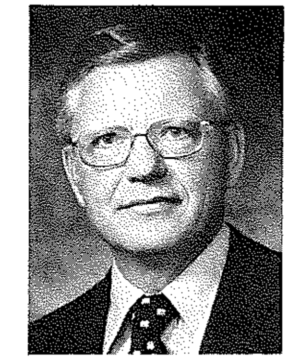
## Wilson Chosen



James C. Wilson, president of Rocky Mountain Energy Company, has been elected Chairman of the Wyoming Coal Information Committee (WCIC) for 1980.

The WCIC was formed as a subcommittee of the Wyoming Mining Association in January 1978 to develop and distribute accurate information about the Wyoming coal industry. Prior to the organization's establishment, there was no industry-wide vehicle for communications with the public, Wilson pointed out.

Wilson replaces Gerard K. Drummond, president of Northern Energy Resources Company, who served as chairman in 1979. Roy Coulson, president of Kemmerer Coal Company, was reelected vice chairman, and Tom Kidd, Western Natural Resources Counsel for Union Pacific Corporation, will continue as Treasurer.

Rocky Mountain Energy Co. is a partner in the Medicine Bow, the Black Butte, and the Stansbury Coal operations in southern Wyoming. In addition, it operates the Prospect Point coal processing and loadout facility near Point of Rocks, Wyoming.

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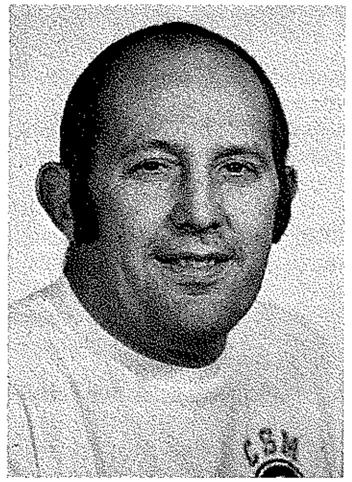
## Kay Kodak Coach of the Year



Colorado School of Mines football coach Marvin Kay has been voted a Kodak Coach of the Year, College Division, by his American Football Coaches Association (AFCA) colleagues in District 8. The district includes Colorado, New Mexico, Arizona, Utah, Nevada, Wyoming and Montana.

Kay is a 1963 mining engineering graduate of Colorado School of Mines. He joined the CSM coaching and physical athletics staff in 1966 and became head football coach in 1969.

Under Kay, the Oredigger football team this year compiled a 6-4 overall record and was 5-3 in Rocky Mountain Athletic Conference (RMAC) play. His overall record is 36-70.

At CSM, Kay won two letters as a heavyweight wrestler and three letters as a varsity tackle. He received All-America mention in 1960 and was drafted by the Denver Broncos after graduation.

Kay is a native of Grand Junction.

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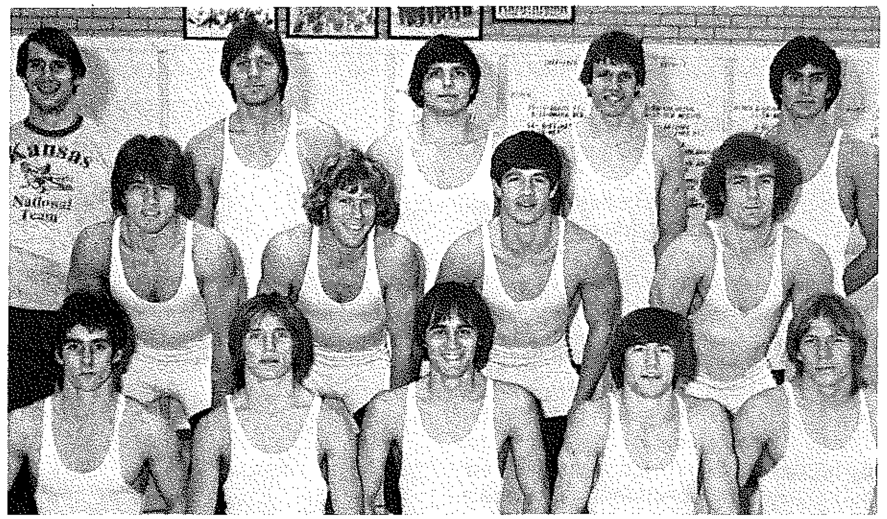
# CSM Wrestling



***First Row, L-R:*** *Lon Rosenzweig, Mike Ribarich, Dave Ware, Bill Myrick, Brian Kennon*
***Second Row:*** *Mickey McCandless, Tom Young, Tom Muth, Karl Kimball*
***Third Row:*** *Rod Montney, Larry Keller, Bruce Tunget, Jim Hancock, Greg Lang*

Starting with one of the youngest teams of the past 25 years, the Mines wrestling team was given no chance for a team win in early season predictions by Amateur Wrestling News. This dubious distinction was dispelled in January when the Orediggers upset tough Idaho State 24-22. With 8 freshmen, one junior, and one senior filling out the ten team weights, the engineers will have the most inexperienced team entered in the conference championships this year. Losses at the time of printing were to Northern Arizona 22-20, Wyoming 40-11, Utah 38-9, Weber State (Ogden, Utah) 36-6, Utah State 41-6, New Mexico 29-16, Ft. Lewis College 27-20, and Mesa College 28-17.

Bench strength is a perennial problem for the mat squad at Mines, last year, only seven to eight wrestlers were available for workouts and meets. The Orediggers placed three in the Conference Championship finals, however, winning one individual championship and qualifying two wrestlers for the NCAA II championships in 1979. The second semester of this year is an about-face in numbers, with the addition of two transfers in January from Arizona State. The Orediggers now list fifteen on the roster, although four presently are not working out because of injuries, residence requirements, and one is red-shirting this year. Looking ahead to the end of the season, it doesn't seem likely that the predominately freshman team can survive the pressure in post season tournaments. Bruce Tunget, Jr. heavyweight (6'2" 215)) and Tom Young, a Sr. at 134 will be the best hope for the Mines Mat team.

A quick look at the wrestling team records and hometowns: 118, Long Rosenzweig, Fr. 6-7-0, Nucla, Colo.; 126, Mike Ribarich, Fr. 7-10-0, E. Meadow, N.Y.; 134, Bill Myrick, Fr. 4-12-1, Castle Rock, Colo.; 134, Mark Huppenthal, Jr. (ASU transfer), Tucson, Arizona; 134, Frank Uhlarik, So. (ASU transfer), Omaha, Nebr.; 142, Tom Muth, So. 1-7-0, Elko, Nev.; 142, Tom Young, Sr. 15-9-0 (1979 RMAC Champ), Denver, Colo.; 250, Mickey McCandless, Fr. 1-10-0, Steamboat Springs, Colo.; 158, Karl Kimball, Fr. 5-13-0, Pullman, WA.; 167, Greg Lang, Fr. 1-14-0, Denver, Colo.; 177, Jim Hancock, Fr., 2-12-0, Norman, Okla.; 190, Rod Montney, Fr. 4-8-0, Garden City, Kan.; Hwt, Bruce Tunget, Jr. 9-5-0, Delta, Colo.; Hwt, Larry Keller, Jr. (6'5" 250) transfer from NE Colorado Junior College, Seward, Nebr.

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# CoOp Services Available

The Cooperative Education Program is alive and well at Mines, and several CSM students have now taken advantage of its unique benefits.

For those of you who are unfamiliar with CoOp, it is a program in which students complement their academic work with a "real world" work experience. The Co-Op Office will endeavor to place a student in a full-time position relating to his/her option, thus giving a student first hand experience in an engineering situation. For the student who is still undecided, Co-Op can be a great way to find the "right" major.

We have 21 students out on Co-Op this semester. Their job locations range from Denver to Arizona; from Wyoming to Pennsylvania, and from Indiana to Texas. Average salaries are $1100-$1200 per month. Students generally are responsible for all their living and travel arrangements, although some companies help pay for part of an apartment's cost and/or some travel expense.

What do Co-Op students do on the job? Well, the answers to that question are as varied as there are Co-Op students. Mark Wiley and Mike Nagorka, both sophomores in metallurgy, are working as engineer trainees at J & L Steel in Whiting, Indiana. Roger Redlien is interpreting geologic field data for a consultant in Texas. Joel Brown and Jim Korber, both CPR juniors, are working as engineer trainees for Phillips Petroleum in two different Texas refineries. We have several GP students working for the Geophyisics Department collecting field data. Six mining students are out in industry in Colorado, Wyoming, and Arizona working both coal and hard rock.

The newest innovation for Co-Op students is the option, beginning this semester, to take Co-Op for up to three hours of academic credit. While in almost all cases this credit is "add-on" and does not count toward graduation. It does appear on the transcript as a School-sanctioned course. A letter grade is assigned by the departmental Co-Op representative based on a report written about the work experience, and thus the academic integrity of the Program is assured by the student's department. Appropriate tuition is charged per part-time student guidelines, but a student may take the course for "zero hours" and thus save this tuition payment. This keeps the program financially attractive even to non-resident students.

To enter Co-Op, a student must 1) have at least 45 hours of credit; 2) have been enrolled as a full-time CSM student the semester immediately preceding the Co-Op work period; 3) have a 2.00 cumulative GPA; and 4) be in good academic and behavorial standing with the School.

If you are interested in learning more about Co-Op and how it can benefit you, contact Mr. Greg Staff, CSM Extension 2235, or come by his office on First Floor Guggenheim. Application deadline for summer placements is April 1.

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### Darden Honored

Baseball Coach Jim Darden recently received a 25-year coaching award from the American Association of College Baseball Coaches. The plaque cites Darden, who in his 26th year of coaching at CSM, for his "leadership and devotion to college baseball."

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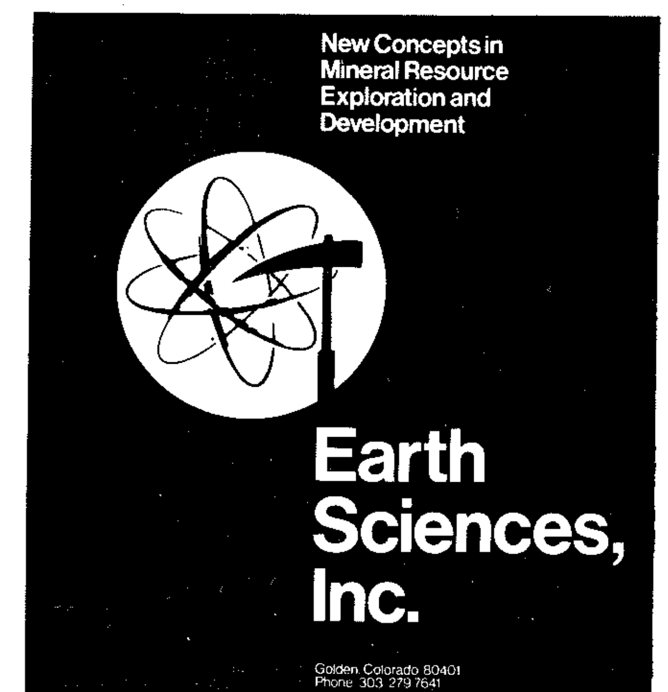
**COMMENCEMENT**
**MAY 8, 9, 10, 1980**
**Reunion Classes**
**1925, '30, '35, '40, '45, '50, '55**
**BANQUET MAY 9**



# $105,000 Endowment

Establishment of a $105,000 endowment fund by Kaiser Alumnium and Chemical Corporation to support scholarships for qualified students at the Colorado School of Mines was announced January 23 by CSM President Guy T. McBride, Jr.

A first installment of $65,000 on the new endowment was presented by Kaiser Aluminum vice president Ralph L. Cheek to Dr. McBride. In making the presentation, Cheek said the new program will place special emphasis on scholarships and fellowships for minority students and women.

"We wanted to put our scholarship/fellowship program, which has previously been conducted in one-year increments, on a more permanent and continuing basis," Cheek said. "Establishing an endowment does this."

The endowment will take the form of an irrevocable gift to the school. The funds may be mingled with other university endowments and will be invested in accordance with the school's usual endowment policies.

Earnings from the endowment will be used to support a new Kaiser Aluminum Scholarship Program built around the award of annual scholarships of $1,000 or more. In any case where earnings are less than the amount required to support the number of scholarships to be awarded, the company will make up the difference with an additional contribution. Earnings in excess of the requirements of the program are to be reinvested in the fund.

The Kaiser Aluminum executive added that the company will determine the number of scholarships to be awarded each year, as well as the amount of each award and the field of study from which the selections are to be made. The recipients will be selected by the school in accordance with its standard procedures for identifying students with a high degree of merit and promise.

Cheek said the company expects to continue to have the same close relationship with students selected to receive its scholarships under the new program as it has enjoyed under the previous year-to-year programs.

"One of the best investments we can make—in the corporate interest and in the broad public interest—is to assist the educational development of gifted and dedicated young people who are preparing for careers in the sciences and business," Cheek added.

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# Ethanol On Small Scale

In order to provide information on the produciton of fuel alcohol, the Department of Energy's (DOE) Solar Energy Research Institute (SERI) has announced the publication of a guide to aid in small-scale ethanol production from farm crops.

**"Fuel From Farms: A Guide to Small-Scale Ethanol Production,"** a product of SERI's Solar Energy Information Data Bank, addresses not only those in the U.S. farming community who may wish to consider the production of ethanol as part of their normal farming operation, but also owners of small businesses, inventors and entrepreneurs.

The 170-page publication is available free to the first 100,000 requestors by writing:

U.S. Department of Energy; P.O. Box 62; Oak Ridge, TN 37830; Attn: Fuel From Farms.

"We are carrying out a national campaign to place reliable information about ethanol production in the hands of every American farmer, farm owner or potential producer," said Denis Hayes, SERI's Director. "The expanding support for gasohol in this country provides an opportunity to directly reduce U.S. oil imports now and increasingly in the future."

Ethanol, commonly known as grain alcohol, is produced from materials whose carbohydrate (starch and sugar) content can be fermented.

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## Uranium Resource/ Technology Seminar

A seminar to examine the issues of technology, regulations and environment surrounding the uranium supply industry will be held March 10-12 at Colorado School of Mines.

"Uranium Resource/Technology Seminar III" will examine improved exploration, mining and milling techniques that are leading to an expanded uranium resource base, as well as the restrictive requlatory climate affecting the industry.

New to the seminar will be an emphasis on environmental issues because of increasing public awareness and concern. A series of papers on how industry mitigates environmental concerns in mining and milling will be presented, and a panel discussion on the subject will include representatives from the regulators, the industry, and the public.

The seminar will open Monday, March 10 with a talk by George Hooley, manager of market planning for Westinghouse Nuclear, on nuclear reactor projections, followed by a discussion of the U.S. uranium resource base by William Chenoweth of the Department of Energy's Grand Junction office.

The rest of the day will be devoted to presentations on technologies.

Mitigation of environmental issues will be discussed during the morning of Tuesday, March 11, with the panel discussion that afternoon. Ross Scarano, chief of uranium mill licensing for the Nuclear Regulatory Commission, is tentatively scheduled to be on the panel, along with Paul Smith, regional radiation programs coordinator for the Environmental Protection Agency, and Al Hazle, director of hazardous wastes with the Colorado Department of Health.

Representing the industrial sector on the panel will be Clark Bolser, manager of environmental programs with Rocky Mountain Energy Co., and Ann Vickery of the Colorado Mountain Club will represent the public.

Martin Robbins, director of the Colorado Energy Research Institute, will speak at Tuesday's banquet on "Eight Energy Myths."

The presentations will end Wednesday, March 12. Among the speakers that day will be Payne Kibbe, chairman of NUEXCO, speaking on uranium market balance.

The $275 registration fee includes lunches, receptions, banquet and a copy of the proceedings. For more information, contact the CSM continuing education office, Golden, Colorado 80401 or call (303) 279-0300 Ext. 2321.

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# BE Computer Addition

With the introduciton of a new computer system in the basic engineering department, students are able to become more proficient in less time than in the past, said Scott Marshall, an associate professor in the department.

The Hewlett-Packard 3000 Series II system includes 15 terminals, a central processing unit, a magnetic tape unit, a magnetic disk, a console terminal and a line printer. Valued at $147,000, the system was a gift of the Hewlett-Packard Corp.

The system, installed in Chauvenet Hall; got its first real workout this last semester with more than 350 freshmen in 24 lab sections. The students logged more than 4,000 hours of computer usage with their nine programs, but still used less than half of the 50 megabyte magnetic disk (25 million words), according to Marshall.

Upperclassmen who recall spending hours in the Green Center waiting in lines and punching cards will be envious to hear that students using the new system have cut their weekly workload down to two hours plus homework with the new system.

"These students are at least twice as proficient on the computer as students under the previous system," said Marshall. "It's the first lab I've had where you have to pry the students out of the classroom."

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# Cost of Silver Threatens Graduation Tradition

*(Reprinted by permission from the Denver Post)*

by Art Branscombe, Denver Post Education Editor

The high price of silver is threatening to tarnish a unique tradition at the Colorado School of Mines.

For 46 years, since 1934, Mines, as befits one of the world's leading mineral-engineering schools, has been awarding at least some of its graduate diplomas etched on thin sheets of silver.

Until 1968, all Mines graduates received silver diplomas. Because the size of the graduating class had grown in preceding years from 150 or so to 220, and silver cost a solid $2.10 an ounce, starting in 1969 only those graduating with master's and doctoral degrees received silver diplomas. Bachelors' degrees came on parchment.

**Now, with silver** quoted at $50 an ounce, diplomas for the May graduating class are becoming a costly problem for the Mines Board of Trustees.

Don Ljungvall, foreman of the instrument shop at Mines where the silver diplomas are produced, estimated Monday that if all the silver has to be bought at $50 an ounce, each diploma will cost about $165. The diploma sheets measure 5 by 6 inches, and are 20 thousandths of an inch thick, Ljungvall said, but even so weigh about 3.2 ounces each.

Though most of the graduating class of some 400 will receive parchment diplomas. Chuck Morris, Mines director of college information, estimated that 110 or more will be receiving master's or doctor's degrees. At $165 each, the bill for silver diplomas will run more than $18,000.

**At a meeting** last week, trustees instructed Gordon Scott, Mines vice president for business affairs, to go ahead with silver diplomas for this graduating class, but to come up with less costly options for the future.

Graduation fees for master's and doctoral degree candidates are $100, but that fee covers rental of caps and gowns as well as diplomas and ceremonial costs.

Scott and Morris suggested that one way out of the bind would be to go to parchment diplomas for all graduates, unless an individual graduate is willing to ante up the $165—or whatever the cost is by May—of a silver diploma.

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The AMAX Foundation lectures are always thought-provoking, with exciting new ideas expounded for the large crowds attending. This was true of the Wassily Leontief lecture on January 30. Unfortunately, much of Mr. Leontief's empathy with his subject, indeed, the gist of his talk was lost as he moved away from the microphone in his enthusiasm, thus leaving the audience at a loss from time to time. I was pleased that Dr. Ralph Buultjens, AMAX Presidential Professor, had made some background material on Leontief available to me.

Reading the story of his life is a stimulating exercise. Leontief had an excellent education and was awarded a degree as a "learned economist" before his 19th birthday. A degree in Russia was not destined to do him much good—he kept getting put into jail for his criticisms of the regime!

In 1925, at 19, he published an article, "The Balance of the Russian Economy—A Methodological Investigation" in a German economics journal. It was to form the cornerstone for his input-output economic theory, for which he received the Nobel Prize in 1973. An ironic twist—after being unable to accept the young Leontief's theories and behavior while he remained in Russia, the Soviets eagerly embraced the article, published it without his knowledge or permission, and used it to establish their claim to having founded input-output economics!

The history of input-output economics is fascinating, and the ultimate implications for a planned world economy both intriguing and frightening. I would recommend that the material pertaining to Dr. Leontief in *The Economists*, by Leonard Silk, c. 1976, Basic Books, New York, NY, be required reading for all of us.

More and more, world decisions are based on economic rather than political considerations—witness OPEC, the Common Market, and the various small cartels. It behooves us to study and understand the rationale for these decisions.

Theories of economics sometimes seem to be far removed from the everyday balancing of the checkbook, the concerns about office overhead, production costs—all of those financial tasks which must be done in a successful organization. Getting a larger picture recently has been good for me, taking me away from the routine of balancing income/outgo at MINES Magazine. For a liberal arts graduate, it's more fun to edit articles, write columns and even sell advertising than it is to check invoices, and worry about increasing costs of paper and inks—which, incidentally, are made from petrochemicals, more difficult to obtain these days and commensurately more expensive.

Costs of printing have gone up an average of ten percent per year each year for the past three, and we've raised our rates to reflect this increase. We still have one of the lowest advertising rate structures in the general area of industry publications—a fact which can be interesting. Since much of our advertising is handled through advertising agencies, we find low rates are actually a disadvantage—the ad agency likes to begin with a high base figure on which to base its 15 percent commission! We are keeping the costs of production within the limits established by the revenues for any given month—so when the magazine varies from 28 to 36 pages, it's not because we have a shortage of material which is readable, we have a certain amount of advertising scheduled for that month.

On the fiscal side, another note: The Honorable Roy Romer, Treasurer of the State of Colorado, will speak at a WAAIME-sponsored luncheon March 12. His topic, "The Greening of Colorado: Economic Benefits of Mining and Energy Development in Colorado." Ms. Robt. Merrill, 9120 W. 3rd Place, Lakewood, CO 80226 is handling the $8.50 per person reservations. Space is very limited!

Patricia Curtis Petty

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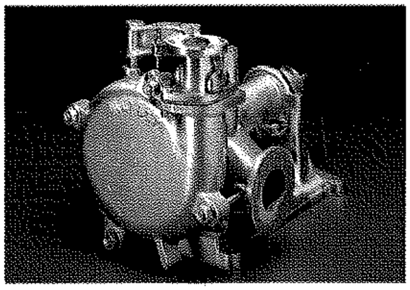

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