THE MINES MAGAZINE

JUNE 1960

Featuring—

• 1960 Mines Commencement
• Secretary of Interior Seaton's Commencement Address
• Annual Alumni Banquet
• 42nd Year of ROTC on Mines Campus
• Quality Control in the Mining Industry
• Standard Uranium's Developments in San Juan County
• Metrography — Science of Measurement
• Mining Engineering Education
• The Energy Gap and Atomic Power
• Unique Gilsonite Operations Expanded
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Our shops are known to mining men throughout the world for custom building of mine cars and other haulage equipment. Here are some of the standard and custom designed items made by Card. For complete information, write or phone.

Frequently modification of a standard Card car will serve to meet every specification of special haulage at very little more than the cost of a standard car. Our engineers can show you how.

Many mine operators find they cannot afford even to make car modifications. Here ore some of the out the world for custom building of mine cars and other haulage equipment. Card can fit your needs— economically. Be your production large or small.

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Many mine operators find they cannot afford even to make car modifications. Here are some of the standard and custom designed items made by Card. For complete information, write or phone.
Robert C. McCain, '49, may be addressed at 2221 E. Hartford Ave., Ponca City, Okla.

Dr. Arthur W. Ruff, '49, is general superintendent of operations, Oriental Mining Co., with address P.O. Box 616, Kambo, Venezuela.

Craig E. Smith, '49, senior research engineer for Conoco-Arausvelia, resides at 2246 Fairchild Ave., San Diego 15, Calif.

Arthur H. Yarberry, '50, has moved from Elkhorn City, Ky., to 7971 Costilla Rd., Balmoral, Miami, Quebec.

Elvis J. Anderson, Jr., '50, may be addressed at 604 First National-Bldg., Birmingham, Texas.

Donald J. Berry, '50, party chief for Phillips Petroleum Co., lives at 2148 Fairfield Ave., San Diego City, Okla.

Robert S. Akins is engineer. Smeltz Industries, Inc., 7221 Avrum Dr., Denver 21, Colo.

Chester H. Westfall, Jr., lives at 848 E. Erinmore, Tulsa, Okla.


Fred W. Wurden is consulting geologist with address 2122 Clark, Billings, Mont.

Robert S. Akins is engineer. Smeltz Industries, Inc., 7221 Avrum Dr., Denver 21, Colo.

Kenneth A. Dunn is assistant unit superintendent for Calumet Corp., with mailing address 1600 Cuthbert Ave., Kansas City, Mo.

Laurence H. Gardner has moved from Salt Lake City to 822 Cathel Ave., Charlotteville, Va.

Lawrence M. Lee has moved from China, to 2214 Market St., San Diego, Calif.

Randall A. Gabour, employed by K & B Consolidated Coal Co., lives at 2321 Stewart St., Weir, W. Va.

Philip H. Halestead writes from Ankara, Turkey, but in the future he will receive mail c/o Texas Inc., California 100 Co., 9/125th St., Dallas, Tex.; 0/313th St., Mexico City, D.F.; 25th St., New York 22, N.Y.

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- Reduced Maintenance
- Greater Running Time (No grind-out required)
- Metallurgical Gains Often of Major Consideration

Preferred by a rapidly expanding number of operations for:
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- Other Special Applications.

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The pilot plant at Palo Alto is equipped for full-scale testing programs. Results are correlated with a large tabulation of data from other tests and subsequent installations and accurate performances are predicted. This work often leads to economies and metallurgical gains.

These facilities are available to you for the study of your classification problems. Inquiries invited.

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Total grinding costs are lower with CF&I grinding balls and rods.

Grinding Balls and Rods have a direct bearing on major grinding costs — mill throughput and power consumption. The use of CF&I Grinding Balls and Rods will actually increase your mill throughput, lowering power consumption per ton of material ground. This is a result of the microstructure of the high quality steel made and used by CF&I.

CF&I Grinding Balls have the balance of hardness and toughness that provides proper wear and impact resistance. In addition, their excellent abrasion resistance permits them to wear evenly and retain their original shape.

CF&I Grinding Rods — through controlled mill chemistry techniques — have excellent wearing properties, resisting bending and premature breakage.

All these factors contribute to more efficient grinding, higher throughput, lower grinding costs. For the complete story on the advantages of CF&I Grinding Balls and Rods, contact your local CF&I sales office.

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COLORADO SCHOOL OF MINES 1960
COMMENCEMENT
1960 COMMENCEMENT ADDRESS
By Fred A. Seaton, Secretary of Interior
MINE ALUMNI BANQUET
42ND YEAR OF ROTC ON MINES CAMPUS
AN APPLICATION OF QUALITY CONTROL IN THE MINING INDUSTRY
By John W. Vanderwilt, 1958
STANDARD URANIUM'S DEVELOPMENTS IN SAN JUAN COUNTY, COLO.
By Russell L. Wood, 1949
METROGRAPHY — THE SCIENCE OF MEASUREMENT
By Fred C. Bond, 1922
MINING ENGINEERING EDUCATION
By John A. Jones
THE ENERGY GAP AND ATOMIC POWER
By Dr. Laughlin M. Currie
UNIQUE GILSONITE OPERATIONS EXPANDED
DEPARTMENTS
CLASS NOTES
NEWS OF THE MINERAL INDUSTRIES
TECHNICAL SOCIETIES AND ASSOCIATIONS
PLANT NEWS
ALUMNI BUSINESS
FROM THE EXECUTIVE MANAGER'S DESK
CSM FOUNDATION, INC.
ALUMNI NEWS
LETTERS TO THE EDITOR
IN MEMORIAM
FROM THE LOCAL SECTIONS
CAMPUS HEADLINES
OREDIGGER SPORTS
WITH THE MANUFACTURERS
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THE MINES MAGAZINE • JUNE, 1960
OME Field Operations Reorganized April 18

Changes in the field organization of the Office of Minerals Exploration effective April 18, as follows:

Field Officers of the OME will replace the Executive Officers who, prior to this change, had been selected from the staff of the Bureau of Mines and the Geological Survey to direct OME work in their respective regions.

The individuals selected to act as Field Officers, the regions which they serve, and their post office addresses are as follows:

D. R. MacLaren, Acting Field Officer, Office of Minerals Exploration, Region I, No. 227 Howard St., Spokane 4, Wash.

W. D. Flett, Acting Field Officer, Office of Minerals Exploration, Region II, Room 420 Custom House, Portland 1, Ore.

R. D. Kallick, Acting Field Officer, Office of Minerals Exploration, Region III, Building 20, Federal Center, Denver 25, Colo.

J. D. Barlow, Acting Field Officer, Office of Minerals Exploration, Region IV, Room 11, Post Office Bldg., Washington, D. C.

Changes in the field organization will continue to be available through the OME under the same terms and conditions as heretofore, with the federal government paying up to one-half of the cost of approved exploration projects.

Uranium Monocarbide Possible Nuclear Fuel

Uranium monocarbide—until recently a "sleeper" in the research world—may be a better nuclear reactor fuel material than uranium dioxide. R. F. Dickerson and Frank Rough, Battelle Memorial Institute metallurgists, report that uranium monocarbide can be cast into fuel elements by several low-cost fabrication techniques and in other ways like a nonmetallic. However, powders of uranium monocarbide are highly flammable and must be handled with care. Despite the many questions which remain unanswered at this time, and despite some known limitations, uranium monocarbide must still be considered a "major candidate" to fill future requirements for an economical reactor fuel material, say metallurgists Dickerson and Rough.

A new $250,000, 100-ton-per-day mill and plant facility completed in 1959 by the Salmon River Uranium and Development Company has been acquired by Nuclear Fuels, and machinery and equipment is being added to convert and upgrade thorium and rare earths under the Nuclear Fuels' process.

The tellurometer, an electronic distance measuring instrument which eliminates the time-consuming tapping method used in surveying, has now gone airborne.

Current testing is being done by the U. S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va., where the airborne tellurometer is expected to provide a position determination or a distance measurement up to 150 miles with a high degree of accuracy. The range of the ground tellurometer is 40 miles. In addition, the airborne equipment will not be hampered by line-of-sight restrictions, such as curvatures of the earth and mountains, which limit the operation of the ground instrument.

The Airborne Tellurometer is simply the application of ground Tellurometer microwave phase comparison ranging techniques to aircraft use. Equipment necessary for field operations includes the airborne master equipment and ground remote station equipment.

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II PIPING is in your plans
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The facilities and the skills are available here, in the most modern and complete pipe fabrication shop in this region, to provide whatever is required in piping. We invite your inquiry for every job, large or small,

Dawn Mining Company

Uranium Contract Extended

A uranium concentrate purchase contract between the Atomic Energy Commission and Dawn Mining Co., operators of a 400-ton-per-day uranium processing mill at Ford, Wash., has been extended to Dec. 31, 1966. The new contract with Dawn is in accordance with the Commission's announcement of November 24, 1958, which provides for the purchase of approximately 100,000,000 tons, D. B. Lewis, president of Nuclear Fuels, states this is the largest ore body of thorium-bearing and rare earths known on the North American continent.
A study of the availability of uranium recently completed by Dr. Chauncey Starr, president of Atomics International, will be published by the Uranium Institute of America.

Dr. Starr found that we have enough uranium resources today to fuel atomic reactors (based on conservative rates of growth in nuclear power) until the year 2005. This assumes the price would average $8 per pound of UO2, and that with adequate markets, today’s reserves would be doubled through exploration.

Dr. Starr also found that we could increase our uranium resources materially with an increase of price; that if the price were increased from $10 to $26 per pound, U. S. uranium resources would increase by a factor of 6.8.

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Basiclly, the system involves melting a 3 to 4 foot diameter hole into the dense ice layers of the glacier. With continued melting in the dense glacial ice a “bell shaped” cavity is formed and the water produced is pooled in a subsurface pond. The water is then pumped to the surface when needed by a submersible type well pump. Steam generated at the surface is piped to a special drilling tool to make the initial hole and later to a melting-gump tool for subsequent production of water in the ice cavity.

New Gardner-Denver PR123 gives your operator absolute and independent control of all these vital functions:

- Efficient gear motor supplies rotation in either direction, even when drill is not impacting. Three rotational speeds.
- Separate control provides drill impact without rotation. Percussion can be varied from light to heavy blows, and used to loosen couplings or stuck steel.
- Use light percussion and rapid rotation for soft formations — or heavy impact and slow rotation for drilling hard rock.

New PR123 cases all hammer energy for percussion. There’s no rotational drag on piston hammer. Results: faster hard-rock drilling than ever before. Depth of hole does not affect drilling speed.

Now your driller can select the right combination of rotation speed, impact force, feed pressure and hole blowing for fastest penetration in any type of rock — can change drilling action as soon as the bit hits a new formation.

New PR123 has no rifle bar, ratchet ring, pawls, or other internal rotation parts that frequently cause trouble. Rotation is supplied by an efficient gear motor, and a torsion bar absorbs rotational shock between shank and motor.

Independent power rotation is a time-saver. Rotation without impact permits power coupling of threaded rod without thread damage. Reverse rotation speeds uncoupling when coming out of the hole. Independent power rotation also helps free stuck steel.

New Gardner-Denver PR123 Power Rotation Rock Drill

Physical Metallurgists Meet July 11-12 in Espe Park.

Well-organized, and British authorities will present technical papers at the Con-
ference on the Paper of Metals to
High-Velocity Deformation to be held
July 11-12 at Espe Park, Colo. by the
Metallurgical Society of AIME. Papers
should provide answers to some of the
questions related concerning the char-
acteristics of various metals under high
strain rates.

In announcing the conference, the
Metallurgical Society said recently:
"Its has been known that materials are
apt to behave differently at fast
deformation rates than they do at slow
rates. On the applied level, it has been
found recently that some metals such as
nickel or iron are harder but all but
unsworkable, can be extruded successfully
if done under essentially ex-

The conference is sponsored by the Semi-

Denver Mining Club extend a cordial invitation

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Mining Engineers meet July 17-19 in Espe Park.

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Mining Engineers meet July 17-19 in Espe Park.
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MEET THE CROWD AT—

Congratulations and Best Wishes

CLASS NOTES
(Continued from page 4)

HENRY W. SNYDER advises that he and his family have moved from Pauls Valley, Okla., to 1311 W. 460 Ave., Arvada, Colo.

ROBERT T. ROBERTS’ address is 2160 Braum Rd., Golden, Colo.

PATERSON C. RYAN has moved from Tonanawa, Calif., to 100 Citrus Ave., Daly City, Calif.

GERALD E. UHLAND, 4917 Sycamore Pl., Las Vegas, Nev., is metallurgical engineer for Republic & Wilkes Co.

DONALD E. ROOKS, 642 Ninth St., Park Forest, Ill., is engineer for Northern Illinois Gas Co., of Southfield, Ill.

JON HAMLET’s new address is c/o Garrett Oil Tools, P.O. Box 1220, Oil Center Station, Lafayette, La.

1959

WOLFGANG F. KUMLER, head of the engineering office of International Mining Co., lives at Casilla 1207, La Paz, Bolivia.

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Best Wishes • Class of ’60

Robert W. Evans, ’36
Sales Engineer
The Stimson-Roger Mfg. Co.

Donald I. Gahagan, ’27
Tennessee Gas & Oil Co.

Congratulations to Class of 1960

The

Class of 1927

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Juanita’s Ace Hi Tavern

Congratulations To A Swell Bunch Of Fellows

1216 Washington Golden
Appointee of Thomas E. Stone as Mountain Region sales manager, with headquarters at 610 Farmer's Union Bldg., Denver, Colo., has been announced by Le Roi Division, Wasington Air Brake Co., Milwaukee, Wis. He will guide Le Roi sales and service programs in Colorado, Utah, Arizona, New Mexico, and the western parts of North Dakota, South Dakota, and Nebraska.

Ed White, '36, who is president of Denver-Air Machinery Co., 1421 Blake St., Denver 2, Colo., is the local distributor. Le Roi is a manufacturer of air tools and both portable and stationary type air compressors for the mining, construction and general industries markets.

Appointment of Thomas E. Stone as Regional Sales Manager

PLANT NEWS

Wis. He will guide Le Roi sales and service programs in Colorado, Utah, Arizona, New Mexico, and the western parts of North Dakota, South Dakota, and Nebraska.

As Regional Sales Manager

Best Wishes ... Class of '60

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Hotel Tropicana
Las Vegas, Nevada

R. E. Knight, '07
Alliance National Bank
Alliance, Nebraska

Alphonse Concordia, '58
Deterling Coal Co., Inc.
Winnemucca, Nev.

Albert L. Landen, '27
3362 Del Monte Dr.
Houston 19, Texas

Ronald F. Losher, '50
Geological Consultant
202 Majestic Bldg., Denver, Colo.

John F. Mann, Jr., '43
and Associates
Consulting Geonriphic Geologists
271 Majestic Bldg., Denver, Colo.

R. A. McClavey, '32
Box 537
Champaign, Ill.

Vincent Miller, '35
Exploration Service Company
Box 1289
Bartlesville, Okla.

Harold L. Muench, '40
3818 Quinlan St.
Denver, Colorado

Wendall C. Murson, '27
1101 8th St., Apt. 1
Alexandria, Virginia

M. Jordan Nathanson, '36
1252 Rose Blvd Rd.
Alhambra, California

Ken Nickerson, '48
2001 Washington Ave.
Golden, Colorado

STANDARD METALS CORPORATION

Russell L. Wood, '49
Assistant General Manager
Chief Engineer
Superintendent, Shenandoah Unit
Superintendent, Micawber Unit
Superintendent, Sunnyside Unit

L. J. Parkinson, '23
Mining Department
Colorado School of Mines
Golden, Colorado

C. W. Payne, '38
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Don H. Peaker, '32
Pueblo, Colorado

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"FOR THE SPICE OF A LIFETIME"

NEW '25-PAK'

Positive gripping action on both sides of belt, through naturally... distribute pull or tension evenly across joint... reduce maintenance headaches.

Order from your distributor, or write us for Bulletin F-112.

"25-PAK" contains enough adjustable bolts and nuts to splice one 36" belt widths.

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COLORADO SCHOOL OF MINES

1960 Commencement

"The future of mankind depends upon how diligently we apply ourselves to the search for new knowledge in our respective fields." Secretary of Interior Fred A. Seaton told graduating seniors at the 86th Annual Commencement of the Colorado School of Mines, May 27, in Steen­hauer Fieldhouse.

Asserting that in the modern world knowledge has come to equate itself with power—power which can be quickly translated into action, Seaton said that for this, if for no other reason, the frontier awaiting exploration by well-trained scientists and engineers is more attri­bution, more fraught with promise, more critical many times over than those faced by the intrepid explorers of a century ago. We must seize every opportunity, he said, to push back the endless frontiers of ignorance.

Seaton explained that society has moral obligations it can ignore only at the peril of its own destruction and that if men in a free system, we have certain responsi­bilities and obligations. One of these obligations, Seaton declared, is to foster an environment of freedom for sci­entific inquiry and technological advance. He continued: "There must be no forcing of a modern Galileo to recant; no discrimination against an Einstein of the next generation which forces him to flee the wrath of whoever holds governmental power; no worshiping at the altar of continuity so as to stifle the enthusiasm and creativity of imaginative and questioning men."

He warned that we must always be on guard against the centralization of education, in whatever guise. Other­wise, those in control could have the opportunity to turn out a nation of carbon copies of themselves. As the best, he said, that could lead only to stagnation; at the worst, it could easily become the path to regimentation and lead to our ultimate destruction.

Pointing out that one of the principal reasons for this nation's strength has been its massive diffusion of power, of knowledge, of skills, and of initiative going down to the very roots of our economic and social system, Seaton told Mines' graduates that: "This principle also applies to the minerals industry and to our economic sys­tem as a whole. "Progress comes best through orderly change," Seaton affirmed, "and change is impeded when the very roots of our economic and social system, Seaton reminded his audience that today, the price of war would apply to the minerals industry and to our economic sys­tem as a whole. "Progress comes best through orderly change," Seaton affirmed, "and change is impeded when the very roots of our economic and social system, Seaton reminded his audience that today, the price of war would

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of the Colorado School of Mines have been prepared to contribute much to your professions and to the good of society here at home and abroad, I have every confidence that you will do so by giving of yourselves in full measure. Towards that end, you have my congratulations on win­ning your diplomas and my very best wishes for the fu­ture."

Honorary Doctor of Engineering

Secretary Seaton was awarded the honorary degree of Doctor of Engineering by Dr. John W. Vanderbil­dt, president of Mines. His citation read:

"Chairman, top-level advisor for the Republican Party, and newspaper publisher, Fred A. Seaton has gained recognition for his outstanding service to our nation. Known for his administrative skill, his broad understand­ing of politics, and his concern with the country's welfare, he has performed a number of key assignments in mining technology and public service. He has served in various capacities in the federal government, including as chairman of the Atomic Energy Commission and as director of the National Security Agency. His contributions to science and technology have been significant and are widely recognized."

The Medal presentations began in 1942 and since that time 189 Mines graduates have been so honored. Included among past recipients are Dr. Arthur S. Adams, president of the American Council on Education; James Boyd, president of Copper Range Corp.; A. Hardwell, president of West Coast Refining Co.; George A. Brown, vice-president of Brown and Root Construction Co.; Frank O. Kohlberg, president of American Metal Climax Co.; Harold W. Haight, director of the Frisco Oil and Refining Co.; Edward E. Menefee, executive vice-president of Anaconda Copper Co.; Louis W. Perreault, executive vice-president of the American Road Builders Association; and Harold C. Price, owner of the B. C. Price Co.

Marcos Receives di Vito Gold Medal

Studley J. Marcus, 1949 graduate and one of the nation's leading missile and satellite engineers, was awarded the di Vito Gold Medal.

Currently a resident of San Jose, Calif., Marcos has received numerous citations from the federal government for his important contributions to the nation's rocket and nuclear weapon programs. He has also received many other awards and honors, including a number of honorary degrees.

Marcos, 38, was the chief engineer and senior civilian on the US Navy's Nuclear Unknown Project for three years, and from 1950 to 1956 was head of the special nuclear weapons division of the Naval Ordnance Test Station in California, where he assumed responsibility for the Navy's nuclear weapons testing program.

Marcos' principal field of work is in the field of high-speed flight and missile design, and he is currently engaged in the design and development of the Navy's guided missile program.

Marcos has been active in many professional organizations, including the American Institute of Aeronautics and Astronautics, the American Rocket Society, and the American Institute of Aeronautics and Astronautics. He has also served on the editorial boards of several scientific journals, including the Journal of the American Rocket Society and the Journal of the American Institute of Aeronautics and Astronautics.

Marcos received his Bachelor of Science degree in aeronautical engineering from the University of California, Berkeley, and his Master of Science degree in aeronautical engineering from the Massachusetts Institute of Technology.

Marcos has been active in many professional organizations, including the American Institute of Aeronautics and Astronautics, the American Rocket Society, and the American Institute of Aeronautics and Astronautics.

**Awards for Scholastic Achievement**

Medals and awards for outstanding achievements were given to 10 Mines graduating seniors.

- John J. Seguin, graduate student from Monto Vista, Colo., received two awards. He was given the William D. Walmaw Award, $400, for "concert and scholarship most nearly approaching the recognized characteristics of an American gentleman" and the Clark B. Carpenter Award, $25.
- The Cecil H. Green gold medal went to James R. Heavey, Chauvin, W. Va. It is annually awarded to the senior geophysical engineering student who attains highest rating in scholastics, personality and integrity.
- The Walt Medal went to Kenneth L. Larner, geophysics senior from Miami Shores, Fla., for his highest scholastic record. He was graduated with a 3.9 academic average.
- The Harold O. Bowser Award, $50, went to Albert E. Miller, Linglefield, Colo., for meritorious work in metallurgical engineering.
- Richard Egan, of Hastings, Neb., received the Thomas W. James Award, $25, for meritorious work in petroleum engineering.
- For his outstanding work in petroleum refining, Edwin W. Wilson, Jr., was awarded the Stephen K. Meloy Award, $50.
- The John E. Brown Award, $50, was given to William H. Carver, a graduate who contributed most to athletics, the John C. Burt Award, $25, went to Lawrence Holmes, Jr., a geological engineering student from Long Island, N. Y.

- Three Brunton transfers were also awarded. The first, provided by the late Han D. W. Brunton, went to F. George Lopinski, a senior in mining engineering. Robert L. Ferriter, Pueblo, Colo., received the Charles N. Bell transit award for outstanding progress in mining engineering. Melville C. Enskie, Jr., Happy Camp, Calif., was awarded a transit by the Rocky Mountain Association of Geologists for outstanding scholarly work.

**Graduate Degrees**

Of the 371 college degrees awarded, 23 were advanced degrees.

- Doctor of science in mining engineering to Parke Orinda Young, of Golden, Colo., Bachelor of Science degree from Mines, 1951.
- Doctor of science in geophysical engineering to Harry L. Baldwin, Jr., of Battleville, Okla., B.S. from University of New Mexico, 1952.
- Master of science in geological engineering to Robert M. Becker, of Lakewood, Colo., Geo.Univ. from the University of Oklahoma, 1957.
- Master of science in petroleum engineering to Hassan Beykpoor, of Tehran, Iran, B.S. from the University of Oklahoma, 1957.
- Master of Science in mining engineering to Donald D. Kraft, of Aurora, Ill., Undergraduate degree from Mines, 1958.
- Master of science in geophysical engineering to Tom U. Walter, of Bangor, Burana, Undergraduate degree from Mines, 1957.
- Master of science in mining engineering to William C. Maurer, of Madison, Wis., B.S. from Wisconsin Institute of Technology, 1958.
- Master of science in mining engineering to Dhannalal D. Pati, Indore City, India, B.S. from Benares Hindu University, 1951.
- Master of science in metallurgical engineering to Emilio A. Posse, of Buenos Aires, Argentina, Undergraduate degree from the University of Buenos Aires, 1957.
- Master of science in geological engineering to James K. Trimble, of Berryville, Ark., B.S. from the University of Arkansas, 1954.

**1960 Mines Graduates United**

Minerals and Materials Engineering: Silver diploma were awarded to:

- **ENGINEER OF MINES**

- **PETROLEUM REFINING ENGINEER**
  - Donald D. Kraft, Maung W. Kyaing, William C. Maurer, and Bernard J. C. Turpin.

- **MATERIAL SCIENCE ENGINEER**

- **METALLURGICAL ENGINEER**
  - Richard J. Pitney, B. Frank Porter, Kent D. Pothast, Charles J. Dyer, cattleman rancher, Durango, Colo., for his highest academic record. He was graduated with a 3.9 academic average.

- **ENGINEER OF MINES**
By FRED A. SEATON, Secretary of the Interior

not from bloodshed and political intrigue, but from disconquerors with the discovery that iron could be smelted natural environment.

tremendous utility long after striking weapons of iron became obsolete.

event that in less than 50 years, made possible the develop­
tonic Wars as compared with the invention of the steam

In the present century, it seems unlikely that there

It is easy to overlook the

boundaries. Always dramatic

The mining industry of this region—of the world, for

The Creator had hidden boundless mineral riches which

When Bishop George M. Randall dedicated the Colo­

realprogress comes best through orderly change. Change, in pursuit of basic knowledge and to expanding man's ac­

Any action that rewards more progress through orderly change can be expected to be more stable and sustainable than those that are un­

The mining industry of this region—of the world, for

Real progress comes best through orderly change.

compliance and borders.

organized on an equal basis and a justifiable generalization to say that what man could
ting as manager or builder or planner; as professor, salesman,

to cooperate with nature, to understand some of the work­

of its tremendous promise and grisly problems.

The mining industry of this region—of the world, for

The mining industry of this region—of the world, for

eventually that man has been freed from the chains which once bound him to a bare existence. Interregnum between discovery and application is evident.

The mining industry of this region—of the world, for

The mining industry of this region—of the world, for

The mining industry of this region—of the world, for

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1960 MINES Alumni Banquet

The CSM Alumni Banquet—for almost 65 years a cherished event bringing together Mines graduates on the evening before Commencement—was held this year at 6 p.m. Thursday, May 26, at the University Club in Denver. Two hundred and six Miners and their guests attended the banquet. Men from 41 classes spanning a period of 59 years gathered for cocktails before the dinner. "Old Timers" present included Frank Bowman, '01; Lynn Storm, '02; Tenney De Sollar and Oscar Reynolds, '04; Warren Proser, '07; "Pop" Buell, '08; Mills Binger, '09, and 12 members of the Golden Anniversary Class of 1910: J. C. Ballagh, Emil Brudерlin, John Cerman, Charles Dyer, Jack East, Ronald Fitzgerald, Howard Hilton, John Hubbard, Robert Kerney, Jean McClain, Grover McKay and Alfred Perkins.

After thirsts had been quenched and appetites satisfied, President Edwin H. Crabtree welcomed Miners and guests and presented Honorary Memberships to Tenney C. De Sollar, '04, (who was present to express his appreciation and thanks), Thomas C. Doolittle, '27, of Sacramento, Calif., and Lester S. Grant, '99, of Colorado Springs, Colo.

President Crabtree read the following letters from the two men not present:

Doolittle: "The recognition makes me very proud and very happy to know, that, even after an absence of 13 years from Golden, I am not entirely forgotten. It has been my rare good fortune and my great privilege to personally know each and every alumnus of the Colorado School of Mines up to the time that I left Golden. Their names and faces are just as clear in my mind now as when they graduated. I deeply regret that I shall not be able to be present at the annual banquet to receive the certificate in person . . ."

Grant: "It was a surprise and of
course a great pleasure to know that the executive committee of the Alumni Association has conferred upon me the Honorary Membership together with all the appurtenances thereto. I did not know that the Alumni ever conferred that honor on anyone except some of the visitinggreat ... I am sorry that I will not be there this year, it being the first year I have missed since my retirement excepting some of the visiting great men. I have enjoyed these annual get-togethers with classmates and old and new colleagues at Mines.

After introducing those seated at the head table, Toastmaster Ted P. Stockmaier, in behalf of Chief Engineer for Norrie and Tower of Golden, addressed the group and welcomed Mines men in behalf of the Board of Trustees and assured his consideration of me for such an honor. He has been a practicing consulting engineer for many years and has found in the last several years that staying out late requires a couple of days of rest for even two days of recovery, so I have decided to forego the pleasure this year and hope that things will be so that I may be in attendance in 1961. Please convey to the Committee my heartfelt thanks and appreciation for their consideration of me for such an honor.

Addressing his remarks to members of the Class of 1960, Keenan modestly asserted that when the 50th Anniversary rolled along, his class would have to get themselves a new boy because he might not be able to speak. With a torrent of words he explained that one of the vintage of '33 would have to be succeed by President Coolbaugh, and of course there was Dean Morgan.

"I'd also like to express appreciation to the Alumni Association for its loyal support of the Horizon Plan. Every man and woman here has a stake in this project, for we are all members of the Golden Generation. Even more fundamental is the fact that we are all working for the betterment of the world. As our numbers grow, so will our influence."

"I was a student at the School of Mines, I had a lot of trouble with a lot of men... But Dean Jesse Morgan confided, "When I was a student at the School of Mines, I had a lot of trouble with a lot of men... But Dean Jesse Morgan was one of the few men I've ever been able to see EYE TO EYE WITH. I think I'm even a little taller than he is."
Silver dollars. emptying a bag of 83 silver dollars into the dishpan, he made so much noise that the citizens of Golden, 15 miles away, must have been aroused.

Korean concluded: "Here, Mr. Stollnbauer, is a portfolio of money and here is a check for $415 to go with it!" James M. Taylor, substituting for Edward L. Kern as speaker for the Class of 1935, asked members of his class to stand, then offered this bit of advice (which he said had been uttered by the late Bill Skelly): "Wherever you are, whatever you may do, don't let anybody get your pointer down!"

Speaking for the Graduating Class of 1960, Larry Holmes said softly: "We're listening."

R. Lee Swart, '42, chairman of the Alumni Development Fund, presented the Alumni Development Fund, presented $415 to go with the following classes were represented at the banquet: (J. C. Ballagh, '10; R. M. Keeney, '10; Norman J. Smallwood, '60; Jean McCallum, '10; Bill Skelly, '07; J. B. Hubbard, '07; R. P. Fitzgerald, '07; John H. East, '07; J. B. Carter, '68; A. S. May, '68.

Robert D. McPhee, '60; R. Scott
David F. Costinburg, '60; Ted P. Steckman
Robert L. Bieler
Clyde G, Johnson
John M. Bernard
Dennis D., Jones, Kenneth W. Nickerson, Jr.
David D. resolving, John H. Mason, Thomas E. Philip, Jr., Torrey
Leo E. Borane, Ralph H. Jones, W hitch and G. Martin, James T. Mckinlay.

The following classes were represented at the banquet: (J. C. Ballagh, '10; R. M. Keeney, '10; Norman J. Smallwood, '60; Jean McCallum, '10; Bill Skelly, '07; J. B. Hubbard, '07; R. P. Fitzgerald, '07; John H. East, '07; J. B. Carter, '68; A. S. May, '68.

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The following classes were represented at the banquet: (J. C. Ballagh, '10; R. M. Keeney, '10; Norman J. Smallwood, '60; Jean McCallum, '10; Bill Skelly, '07; J. B. Hubbard, '07; R. P. Fitzgerald, '07; John H. East, '07; J. B. Carter, '68; A. S. May, '68.
42nd Year of ROTC on Mines Campus

The Colorado School of Mines ROTC detachment completed its 42nd year on the Mines campus as the 140th graduate was commissioned in the Corps of Engineers at this year's commencement. At no time in its long history has the ROTC unit seen so many changes and new developments as during this past year. A new 10-point range is in the Mines gymnasium and new Army-green uniforms for the entire cadre corps have been the most conspicuous. Not so obvious, but undoubtedly of well-rounded graduate engineer it desires. A detailed reorganization of the ROTC curricula, of hours of attendance from four to three hours per week, emphasizes additional skills needed by the engineer student: the capacity of relating himself to other people; the ability to communicate and speak in front of a group; an appreciation of social responsibilities, and the manner of dealing with superiors and subordinates. The benefit of this training to an individual is best summed up by Lieutenant General Herbert R. Powell, an ROTC graduate, who told: "It is because military training is designed to develop men for the ultimate trial of combat that it is so effective in preparing them for the other trials of life. When a man is motivated to withstand the strain and pressure of battle, certainly no lesser struggle should dismay him."

Annual Inspection

The Colorado School of Mines ROTC detachment had its 35th Annual Inspection May 9-10. A parade and formal inspection of the cadet battalion was held on the Mines baseball field at 3 p.m. May 9. The federal inspection team, led by Col. Paul H. Jacobs of Omaha, Neb., inspected all records and procedures of the Mines Military Department during the two-day period. This inspection compared the Mines unit against Army-wide standards and against other ROTC units throughout the country. Mines again received the highest possible rating in the inspection, thus continuing a perfect record since 1919. Military awards were presented to the outstanding ROTC cadets of each class at the inspection of the cadet team, led by Col. Paul H. Jacobs, of Omaha, Neb., as the senior ROTC cadet displaying exceptional military leadership. Col. Edward S. Hanley, Mines graduate and head of the Denver SAME, presented the award. Selters also received the Society of American Military Engineers Gold Medal with Key Replica, as the outstanding ROTC cadet in the top 25 per cent of his class in academic scholarship and leadership. Col. Edward S. Hanley, Mines graduate and head of the Denver SAME, made the presentation. Selters has also been selected by Headquarters, Fifth United States Army, to receive the Army-Navy Legion of Valor Bronze Medal as the outstanding ROTC cadet in the four-state area of Kansas, Nebraska, Wyoming and Colorado.

TABLE I

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<td>Role of U. S. in World Affairs</td>
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bulk of the nation's reserve officers, a pool of trained manpower ready for immediate mobilization in any national emergency, are also ROTC graduates. Skilled engineering and scientific personnel from Mines and other engineering institutions are of particular importance in the complex technology of modern warfare. It is only through the ROTC that the Army can obtain voluntary access to this trained manpower.

The individual student also derives considerable personal benefit from the unique aspects of the ROTC program. The most obvious benefits are the pay for the Advanced Cadet of more than $500 over his last two years of school, the privilege of placing his military service into his life with minimum interference to a civilian career, and the novelty of his military obligation at a level consistent with his college education. Of particular benefit to Mines graduates are some less obvious advantages which are normally available to engineers pursuing such a highly and highly technical program.

ROTC, through classroom study and practical work at summer camp and on the drill field, emphasizes additional skills needed by the engineering student: the capacity of relating himself to other people; the ability to communicate and speak in front of a group; an appreciation of social responsibilities, and the manner of dealing with superiors and subordinates. The benefit of this training to an individual is best summed up by Lieutenant General Herbert R. Powell, an ROTC graduate, who told: "It is because military training is designed to develop men for the ultimate trial of combat that it is so effective in preparing them for the other trials of life. When a man is motivated to withstand the strain and pressure of battle, certainly no lesser struggle should dismay him."

The Sons of the American Revolution Medal was presented to Cadet Lieutenant Jerry P. Egnestra, as the outstanding senior ROTC cadet displaying exceptional leadership, soldierly bearing and overall excellence. Mines graduate Col. W. W. Fertig, was also awarded the Sons of the American Revolution Medal for his contributions to the standing of the Mines ROTC unit at the Colorado School of Mines. The Society of American Military Engineers Gold Medal with Key Replica was presented to Cadet Maj. John J. Selters by Col. Wendall W. Fertig, for outstanding achievement in his senior year in both military and academic scholarship and leadership. Selters also received the Society of American Military Engineers Gold Medal with Key Replica, as the outstanding ROTC cadet in the top 25 per cent of his class in academic scholarship and leadership. Col. Edward S. Hanley, Mines graduate and head of the Denver SAME, presented the award. Selters has also been selected by Headquarters, Fifth United States Army, to receive the Army-Navy Legion of Valor Bronze Medal as the outstanding ROTC cadet in the four-state area of Kansas, Nebraska, Wyoming and Colorado.

The Department of the Army Superior Cadet Ribbon was presented to Cadet Maj. John J. Selters by Col. Wendall W. Fertig, for outstanding achievement in his senior year in both military and academic scholarship and leadership. Selters also received the Society of American Military Engineers Gold Medal with Key Replica, as the outstanding ROTC cadet in the top 25 per cent of his class in academic scholarship and leadership. Selters has also been selected by Headquarters, Fifth United States Army, to receive the Army-Navy Legion of Valor Bronze Medal as the outstanding ROTC cadet in the four-state area of Kansas, Nebraska, Wyoming and Colorado.

The Department of the Army Superior Cadet Ribbon for outstanding achievement in both military and academic scholarship was presented to Cadet Maj. John J. Selters by Col. Wendall W. Fertig, for outstanding achievement in his senior year in both military and academic scholarship and leadership. Selters also received the Society of American Military Engineers Gold Medal with Key Replica, as the outstanding ROTC cadet in the top 25 per cent of his class in academic scholarship and leadership. Selters has also been selected by Headquarters, Fifth United States Army, to receive the Army-Navy Legion of Valor Bronze Medal as the outstanding ROTC cadet in the four-state area of Kansas, Nebraska, Wyoming and Colorado.
34 To Be Commissioned was presented by Dr. Vanderwilt to junior Donald K. Wright by Joseph Bokan of the Fifth Colorado District, camp. The other 21 men will be commissioned at Fort School of Mines in May 1959. Captain James L. Lammie was faculty sponsor for the Regional Meeting in Dallas, Texas. An Application of Quality Control in the Mining Industry

By JOHAN SIKKAR

The National Society of Scabbard and Blade, military honor society, established Company "G", in the Colorado School of Mines in May 1959. Membership is limited to advanced cadets chosen by active members, on entire basis. Freemasons are accepted due to the emphasis on an active fraternity, area included in social activities. The Junior ROTC Staff is a part of the Denver public relations. It can, for example, be employed to help the public keep good control over the grade of the mine feed. As it is often advantageous to keep the mine feed at a constant grade, and as usually the ore mined is of different grades, then the different grades of ore must be mixed in certain specified proportions in order to get the final mixture of the required grade. The importance of having a mill feed well within the required grade tolerance, all the different proportions of ore making up the final mixture, and the final mixture must be examined for grade. As a general rule, it may be said that statistical methods of inspection are important, and the most economical inspection technique for the degree of certainty required. This statistical inspection technique is called "statistical quality control" or just "quality control."

Discussion

The variation which arises in the grade of the mill feed may be considered as being due to two main kinds of causes: chance causes and assignable causes. Chance causes are the innumerable causes, each of which exercises a small effect on the total variation. They are variations which cannot be identified, either because of lack of knowledge or because such identification would be economically unimportant. They cannot be eliminated without modification in the system of mixing the different grades of ore.

Assignable causes are causes which can be identified and which are usually economical to discover and correct. In most cases they are abnormal or abnormal variations in the grade of the different portions of ore which are used as "raw material" in mixing the mill feed, or they may be due to man or machine. To keep the process of mixing the different grades of ore under full control, several control charts must be kept simultaneously. One chart is for the average value of the sample, the other is for showing the variability about the average.

The calculation of the average value of a number of items is very simple, but to calculate the standard deviation, which expresses the variability about the average, is much more tedious. For example, given a small number of items, it would be very laborious.

For this reason, it is accepted that the sample size, or sample size, should be taken as the chart controlling variability on the sample range, which is obtained by taking the differences between the greatest and least values recorded in the sample.

The control charts, according to Pareto, build a frequency distribution on a time trend basis, with the ordinate as the variable being measured, and the abscissa as time. Usually five observations are taken per sample, and the average range of the sample is plotted. After a number of 25 samples have been taken, the sampling average and the sample average are said to be in statistical control. A point outside those limits indicates that an assignable cause of variation exists.

The limits for warning and action on the control charts have, according to Mauzy, absolutely no in-
heretofore connection with the limits the designer sets for the accuracy required. The limits are statistical limits, which depend on the inherent variability of the mixing process and on the size of the sample which is taken. Irrespective of limits set by the designer, statistical control limits will widen if the job is made by a poor method or by a poor workman (as far as the workman has control over the accuracy of the mixing). Again, if all the other conditions are the same, the statistical control limits on the average chart will close in and the limits on the range chart will widen if the number of items in the sample is increased.

According to Moroney, the following factors and formulas can be used to calculate the limits of the averages and range charts:

**CONTROL LIMIT FACTORS FOR THE RANGE CHART**

where: 
- \( g \) = population standard deviation, \( w \) = mean sample range, \( x \) = grand average (average of the sample averages), \( U.L. \) = upper limits, \( L.L. \) = lower limits.

The upper and lower warning and upper and lower action limits are calculated by multiplying the mean sample range \( w \) by the limit factor \( D \) shown in the above table for the number of items \( n \) in the sample. Thus:

\[
\text{Limit} = Dw
\]

These limits are based on the fact that for a normal distribution 95.4 per cent of the whole population lies within three standard deviations of the average, 96 per cent of the whole population lies within two standard deviations of the average, and 95 per cent of the whole population lies within one standard deviation of the average. In some cases it might be advantageous to determine the standard deviation more accurately than the use of conversion factor allows. In that case either of the following formulas may be used:

\[
g = \sqrt{\frac{(X - \bar{X})^2}{N}} \quad \text{(used for ungrouped data)}
\]

\[
g = \sqrt{\frac{\sum(x - \bar{x})^2}{N}} \quad \text{(used for grouped data)}
\]

**FORMULAS FOR AVERAGE CHART**

\[
\bar{X} = \frac{\sum X}{N}
\]

\[
U.L. = \bar{X} + A \times w
\]

\[
L.L. = \bar{X} - A \times w
\]

According to Moroney the following factors and formulas can be used to calculate the limits of the average chart:

**LIMITS ON THE RANGE CHART**

\[
\text{U.L.} = A \times w
\]

\[
\text{L.L.} = -A \times w
\]

where: \( \bar{X} \) = individual reading, \( \bar{X}^2 \) = arithmetic mean, \( N \) = number of observations.

The following readings are the results obtained when 20 units are taken off from the actual grade of ore.

**INDIVIDUAL READINGS**

<table>
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**CALCULATION OF LIMITS ON AVERAGE CHART**

Upper Limit = \( U = \bar{X} + A \times w \)

Lower Limit = \( L = \bar{X} - A \times w \)

If the requirements for the mill feed grade that the grade of the feed can vary from 47 per cent to 51 per cent, then we can conclude that the present process of mixing the different grades of ore is acceptable. If the requirements for the feed are such that the action limits on the average chart would fall further apart than the grade tolerance, then it can be concluded that the mixing process must be changed, if it would be economical to do so, or the grade tolerance must be widened.

**BIBLIOGRAPHY**


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Standard Uranium's Developments In San Juan County, Colo.

By RUSSELL L. WOOD, '49

The recent renewal of large scale mining activity in San Juan County, Colo., has created considerable interest among Western mining people. The purpose of this paper is to attempt to describe Standard Uranium Corp., the district's largest operator, is engaged in one major project, and two lesser projects. In addition to Standard's operations, various consolidations took place, until by 1929 a partnership and is now the sole owner and operator of the various properties.

The history of Silverton and San Juan County mining begins around 1870 when the first prospectors in the area found placer gold in the vicinity of Arahstra Gulch. Arasra Gulch drains the area surrounding the Shenandoah-Dives mine. Difficulties in the area involved with Indian tribes prevented any serious mining being done until 1873 when the first real production started. Throughout the next 55 years mines were discovered, opened, and abandoned. Various consolidations took place, until by 1929 a single company, the Shenandoah-Dives Mining Co., emerged as the dominant producer of the immediate area about Arasra Gulch. This company operated the Mayflower mine and later the Silver Lake Unit, leased from American Smelting and Refining Co., until 1953 when the mine and mill were shut down because of economic conditions.

In 1956 the Shenandoah-Dives Mining Co. was merged into the Marcy-Sheandoah Corp. Early in 1959 Marcy-Sheandoah entered into a limited partnership with Standard Uranium Corp., which became the general partner and operator of the former Shenandoah-Dives property. Later Standard purchased Marcy-Sheandoah's interest in the limited partnership and is now the sole owner and operator of the various properties.

Shenandoah-Dives Mine Reopened

Since Standard became the operator of the Shenandoah-Dives Mine, Standard has engaged in a program designed to rehabilitate the old mine and develop additional ore. Underground rehabilitation in the mine has consisted of reconditioning the Zero, or manganese, by-product from the ores of the Sunny­side mine. Standard's experience with the Alimak Raise Climber in this part of the country, and the results are being observed with considerable interest by Standard and by other companies faced with similar raise problems. Alimak Raise Climber Satisfactory

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Base Metal Mining Activities

Perhaps the first thing which arouses the interest of many is why a company with such obvious success in uranium mining would choose to get into an industry as depressed as base metals. The first answer, of course, is that the company is financially able to diversify its interests; nearly $2,000,000 net income, after taxes, from sales of only $5,000,000 in 1959, the company obviously has money available for new ventures.

Standard's management believes that it is more profitable to operate in the Silverton area than to operate on a depressed base metal market. Management further believes that this country must eventually make a separation between its precious metal mining and its base metal mining. The program to reach this objective in the Silverton area is divided into four parts:

1. To reopen and rehabilitate the old Shenandoah-Dives Mine;
2. To reopen the Sunnyside mine;
3. To renovate and reopen the Shenandoah-Dives Mill;
4. Completion of a program to produce a manganese by-product from the ores of the Sunny­side mine.

History of Silverton District

The history of Silverton and San Juan County mining begins around 1870 when the first prospectors in the area found placer gold in the vicinity of Arahstra Gulch. Arasra Gulch drains the area surrounding the Shenandoah-Dives mine. Difficulties in the area involved with Indian tribes prevented any serious mining being done until 1873 when the first real production started. Throughout the next 55 years mines were discovered, opened, and abandoned. Various consolidations took place, until by 1929 a single company, the Shenandoah-Dives Mining Co., emerged as the dominant producer of the immediate area about Arasra Gulch. This company operated the Mayflower mine and later the Silver Lake Unit, leased from American Smelting and Refining Co., until 1953 when the mine and mill were shut down because of economic conditions.

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THE AUTHOR

Russell L. Wood, graduated from the Colorado School of Mines with the degree of Engineer of Mines in 1940. Working as a miner for the Governorale Talc Co., Governorale, N. Y., from July 1949 until May 1951, he learned practical mining the hard way. The next year he joined the Colorado Research Foundation as a junior engineer. From June 1951 until June 1955, Mr. Wood worked as engineer and superintendent for Mining Research Corp., Golden, Colo., during the period of heavy uranium ore diversification. Once again returning to mining, he worked as a miner for Telluride Mines, Inc., until April 1954. Then he accepted the position of mine manager with McCarroll Mines, Big Indian District, Utah, and continued there for the next two years.

In April 1956, he joined Standard Uranium Corp., Moab, Utah, as mine foreman, subsequently being pro­ moted to assistant general manager. Mr. Wood was instrumental in achieving the exceptionally high per­centage of ore recovery from the pillars left by the room and pillar system used in mining the original high grade uranium ore. In the past year or more, Mr. Wood has devoted much of his time to the Shen­andoah-Dives mine, as described in his paper. The progress of this project should break new light in the famous old mining district of Silverton and San Juan County, Colo.
for its entire distance. It was driven by a two man crew over five feet wide and four feet deep. The average rate of advance, even at the top of this 450 foot high rise, was approximately 2.25 feet per man shift of labor.

With the completion of this ventilation and access raise, the emphasis has shifted to stope preparation and development of the Dives mine. This work is underway, both on the main level, on the Letter "F" vein, and on the upper levels of the other veins of the Silver Lake Unit. It is anticipated that the mine will be in a position to furnish mill feed by late spring or early summer.

History of Sunnyside Mine

The Sunnyside Mine is located above Eureka, Colo., some 10 miles north of Silverton. The mine, in common with most of the others in the district, has a long and varied history extending back into the 1880's. A shallow and relatively small mine in San Juan County, and the sizeable proven reserves remaining at this time indicate that it will again assume that position.

The Sunnyside Mine was developed and operated on a large scale basis for over 40 years and faced some of the most severe physical conditions to be found in any mine in the United States. The shutdown of the Sunnyside mine in 1938 can be attributed to several of these physical conditions. Chief among these was the extremely severe climate caused by the high altitude and heavy precipitation.

The main portal of the Sunnyside was heated at an elevation of 12,200 feet above sea level, well above the average or ideal location. Access to the mine was achieved by various drifts and internal shafts which extended in stages as far as 1,000 feet below the main level. In later years, all ore and waste had to be hoisted in operations involving many long and heavy transfers. Ore had to be transferred at the portal of the mine and then transferred by aerial tram to the mill located some two miles distant, at the town of Eureka, Colo.

During later years as the mine penetrated deeper into the rock, the problem of handling of heavy water became a very serious problem. The remoteness of the mine from marketing facilities, and the general decline in metal prices finally combined with the natural factors in 1938 causing a permanent shut-down. Consideration was given to reopening the mine during the war years, but the scarcity of labor and materials ruled out this possibility.

Gold King and American Tunnel

At about this time that the Sunnyside mine was being developed above Eureka, the Gold King Mine was being worked on Bonita Peak above Gladdys, Colo., a small community located on Cement Creek, near Bonita Peak, about seven miles from Silverton. The Gold King Mine was worked on a large scale basis for over 40 years, and faced some of the same physical conditions that plagued the Sunnyside mine.

Consideration was given to reopening the mine during the war years, but the scarcity of labor and materials ruled out this possibility.

The old tunnel was enlarged to give a final section approximately 11 feet wide by 12 feet high. The new tunnel being driven beyond the end of the original tunnel, it was necessary to continue the tunnel generally stands well, it was necessary to establish a grade of one and a half of one per cent grade will be maintained. The muck train is made up of 200 cubic foot capacity Grunby-type Carload cars. The train is made up of three cars, the center car being loaded by the 630 loaders into the end car and sluiced into the other cars. The heading is drilled so that an entire round can be handled by one train at the rate of approximately one car per foot of advance. This arrangement has proved to be exceedingly satisfactory and permits a minimum of time on the mucking cycle.

Machines Mounted on Crawler

By having both the mucking machines and jumbo mounted on crawlers it is not necessary to have rail extended clear to the heading for each round. The work of extending rail and lashing air, water and ventilation pipes is carried out during the drilling cycle by a special service crew. The heading is loaded by a specially designed flat car mounted on a converted hydraulic drill job capable of picking up and raising a 70 foot joint of vent pipe.

The line is driven through a large opening and blasting cycles and is mucked during the regular mucking cycles by a two man crew. This arrangement has proved to be exceedingly satisfactory and permits a minimum of time on the mucking cycle.
The development of the decimal system of units, tens, hundreds, etc., was not so spontaneous. The multitudinous transactions of the great Roman Empire did not have its benefit, and up until the sack of Rome this world-ruling empire used the symbol of contrasted fingers for one, two, three, and four fingers, or for the area between the thumb and first finger, and ten was represented by the two hands, or the two crossed index fingers.

The word index is derived from the name for the first finger after the thumb, to which the number 5 was the thumb and forefinger held at a 90-degree angle, and in the symbol for 100 the forefinger was carried so that with the thumb it formed the letter C. The Romans tended to divide quantities into twelfths instead of tenths, and they extended the thumb it formed the letter C. The Romans tended for 100 the forefinger was curved so that with the fingers. Men carry with them constantly a system of measurements employs many variations of the dual system. There are two inches in a foot, 24 hours in a day, four quarters in a gallon, 360 degrees in a circle. The Babylonians tended to think of sexagesimal instead of the circle, hour, and minute, and go back to ancient Babylon.

Science Is Measurement

It has been stated that "science is measurement," and the business of science is "to measure." If this is true, then the subject of metrography constitutes all of science, so that it would be well to examine more closely the nature of science and of measurements.

 Measurements consist merely in the comparison of standards, and no measurements are absolutely exact. Therefore, theories and few commonly accepted and invariably standards, so that science itself seems to rest upon the foundation of perceptual comparisons.

Instruments Extend Perception

Scientific instruments are instruments for extending the range and accuracy of our sensual perceptions, and preserving accurate records of these measurements. The telescope, microscope, camera, thermometer, etc., are cases in point. The advances of science are based upon (1) extensions in the range of what we can perceive sensually, and (2) the integration of observations into a unified system of measurements.

Science is essentially deductive in method, and tends to ignore all phenomena which fall outside the realm of scientific measurement. The field of science is continually expanding as more and more phenomena respond to measurement. The range of mankind is limited only by his imagination. Any philosophy which is based entirely upon science must ignore the great unanswered questions of human existence, and must therefore remain unsatisfying and incomplete.

The so-called conflict between science and religion results from the encroachment of scientific measurement upon domains which the religionists formerly claimed as their own. As an instance, many religious people argue that scientific measurement has eroded as a source of life and health. Increasing knowledge of the physical nature of life and health may also appear as a gross superstition, but recent scientific measurements of the health giving qualities of ultra-violet radiation have made the scientific source of health rather than a religious one.

Fundamental Quantities of Measurement

There are three fundamental quantities of measurement: mass, length, and time, commonly designated as m, l, and t. Possibly the oldest standard of measurement is that of length. A natural standard of length is the pace or yard, followed closely by the length of a man's foot. In our modern world, measurement is usually expressed in terms of one or more established systems of measurement. The metric system is the most commonly used system of measurement in the world. It is based upon the meter, the standard unit of length. The meter is defined as the distance traveled by light in a vacuum in 1/299,792,458 of a second.

An ancient unit of measurement, the cubit, was the length from the elbow to the tip of the middle finger. The cubit is approximately 18 inches. The length of an arm was used as a unit of measurement in ancient Babylonia, Egypt, and Greece. The cubit was also used in the Old Testament, where it is referred to as the "rod." The cubit was divided into 12 inches, and the foot was divided into 12 inches.

American Units of Weight

The ounce is the basic unit of weight in the United States. It is defined as 1/16 of a pound. The pound is defined as 16 ounces. The carat is also a unit of weight, and is used to measure precious stones. The carat is defined as 0.2 grams.

The English system of weights is based upon the avoirdupois pound, which is equal to 16 ounces. The carat is also used in this system, and is defined as 0.2 grams.

The metric system of weights is based upon the kilogram, which is equal to 1000 grams. The gram is the basic unit of weight in this system. The metric system is used in most countries around the world.
at equaling 7000 grains. The Roman libra was considered smaller, consisting of slightly more than 6000 grains.

The City of Troyes in France devoted since the 17th century to a celebration of Troy. The Notables of Troyes plan to commemorate the 3500th anniversary of the founding of the city, which is believed to be around 1400 BC, and mark the centenary of the oldest city in the world. The celebration will be a major event, drawing thousands of tourists and historians from around the world. The Notables of Troyes plan to invite other cities and nations to participate in the celebration, which will include cultural events, visits to historic sites, and a grand parade. The celebration will be a major boost to the local economy and will bring international attention to the city of Troyes. The Notables of Troyes are working closely with local and national authorities to ensure the smooth running of the event and to make it a memorable occasion for all who attend.
heavy draft animals in Prunee, and a man-power was set at 20 feet-seconds per second. The whole electrical system of volleys, amperes, coulombs, and watts, with units bearing the names of their inventors, developed as the same units were found to be especially useful. Such concepts as velocity, acceleration, momentum, force, power, work, energy, and electric potential were organized into a system with the units of velocity being the foot-second. We measure time by the motions in space of the celestial bodies, or of a swinging pendulum. Matter or mass, and energy are but different manifestations or conditions of the fundamental unit of existence.

It now appears that the most basic phenomenon of existence is the motion of the electron. And in all our measurements we are dealing only with differences in relative frequencies. Planck's quantum hypothesis advanced in 1903 has opened up possibilities of a new world of integrated understanding whose extent is only barely realizable to us now. The fast, the slow, the light, the matter, the energy are but different forms of the same phenomenon. We may be but fragments of a single quantum of action, one vibration cycle of one electron, and we may have been the key to the eventual unification of our entire heterogeneous system.

**Single Set of Standards Advocated**

Because of the almost universal adoption of the common metric system of notation, the language of Arabic numbers is much more widespread than any language of the spoken or written word. There can be no doubt that the adoption of a single set of standards in all civilized countries would result in increased efficiency. The metric system is the leading candidate for universal adoption, and we should realize that in furthering its adoption we are doing much to remove the great barrier of misunderstanding between different countries. The cumbersome fractions of an inch in which all of our work is done constitute a considerable obstacle to world trade and mutual understanding.

We are now becoming aware of the important relationship existing between the fundamental quantities of length, mass, and time. If this relationship should be exploited in our systems of measurements in such a manner that it is immediately apparent to everyone using these units, a great barrier would be removed that is standing in the way of general understanding of the basic relationships of science.

**STANDARD URANIUM'S DEVELOPMENTS**

(Continued from page 41)

Service Facilities Transferred

Service facilities for all of Standard's Sun Juan Complex operations, including a new volunteer fire department, were transferred from the Sun Juan Mine to a new location in the back country of the Sun Juan District. This facility, located near the intersection of the new standard road from the Sun Juan Mine to a new central location at the old Western Colorado Power Co. substation, is dedicated to the development of new and improved facilities for the Sun Juan and the adjacent Stan- dard-Diva mill. The mill is of simple size to accommodate a vast variety of mineral resources. These include the company's general offices for the Silverton operations, a central warehouse, and carpen­ter and electrical shops. In addition, the company's assay laboratory has been re­established at this location and will handle assay work from all of Standard's operations.

**Manganese By-Product**

Manganese is a rare metal, but it is highly sought after by the mining industry. The company's program for Sun Juan County, Colo., is the development of methods of mining manganese from the Sunnyside mine, and the present plans call for having facilities available to handle the rhodonite produced from these ores at such time as it becomes available in large quantities.

**Mining Engineering Education**

By JOHN MOSS JONES

Since Russia raised eyebrows with its Spatnik in 1957, the complacency of the United States has been shaken and attention has been focused on the need for excellence in education in this country. To lose the education race is to lose all, Admiral Rickover has emphasized. This from everyone from senators to juniors has looked at the general topic of what is wrong with our education system and what is wrong with our teachers.

**Mining Education**

Converting Rhodonite to Manganese

The program of converting this rhodonite to a salable manganese product can be divided into two general steps: first, the concentration of the rhodonite ore; second, the concentration of the manganese ore. The first step involves the conversion of the rhodonite to a salable manganese product using such methods as chemical processing, magnetic separation, or both, to a suitable rhodonite ore. The second step involves the separation of the manganese ore from the other materials by various methods, such as chemical processing, magnetic separation, or both, to a salable manganese product. The whole electrical system is the standard of all civilized countries would result in increased efficiency. The whole electrical system is the leading candidate for universal adoption, and has been estimated to be as high as 150 million tons of 20 per cent manganese ore.

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what a stretch of the imagination is required to make it is good strategy to declare your particular topic the theories concerning transformation of mass and energy "basic science." Since this area is currently in vogue, it is pleasant to follow.

Area of Communications

The area of communications includes languages, mathematics, and English. After speaking, writing, hearing and reading his native language for eighteen or more years, it might be expected that the entering freshman should feel well able to communicate in English. Unfortunately, this is far from the fact; the Colorado School of Mines devotes 7 percent of its schedule to improving the style and grammar of its students' language. In this subject which about half of his courses now are adequately by our high schools?

Our critics frequently snipe at engineering graphs and descriptive geometry, and it is possible that these will be reduced in future engineering curricula, yet it is difficult to imagine a mining engineer without an appreciation for three-dimensional problems, and the ability to interpret plans and blueprints. Mathematics is being expanded in engineering education and, to handle the increasingly complex problems in engineering, a knowledge of all languages, mathematics is easy to forget if not used daily, and most mining problems involve. Undefined parameters do not require advanced mathematical treatment, and so mining engineers soon lose their mathematical skills. How far should a study of mathematics in college be taken beyond the level of fundamental knowledge.

Mechanics of Materials

The most obvious field of special study for the mining engineer is the mechanics of materials, and specifically rock and soil mechanics. We must understand how materials fail under various stress conditions, particularly in tunneling, and in brittle stresses as in drilling and blasting. Two of the specific problems of rock mechanics are: how to which the mining engineer might direct attention to the design of protective underground installations, and the understanding of the stress-strain relationships. We do not require advanced mathematical treatment, and so mining engineers soon lose their mathematical skills. How far should a study of mathematics in college be taken beyond the level of fundamental knowledge.

Humanities—Social Studies

The engineer is surrounded by forces other than those defined in physics: conservation laws, labor bills, and taxes. Government always influences the price of the job, or the market, and the profit margin. Promotion traditionally carries the engineer into management, and his ability to organize, control, and handle people, becomes an essential attribute. What happens today is the product of the events of yesterday, and a hundred years ago. The study of history and the understanding of ground movement in mining must go.

ME Mining Engineering Department

The mining engineering department of the Colorado School of Mines is adopting the following breakdown:

Basic Sciences 27 percent
Mathematics 25 percent
Engineering 38 percent

The mining department is introducing courses in rock mechanics, statistics, analysis, and industrial economics. It is also encouraging, and combining other courses to eliminate some descriptive aspects of stoping and mine development.

We must be constantly wary of the trap of changing markets. We must learn what is essential for the mining engineer, instead of including what is not. It is vitally important that our students be taught how to analyze, learn the principal engineering concepts, and above all, to learn communication. A word is worth a thousand pictures.

The mining engineer is the mechanics of materials, and specifically rock and soil mechanics. We must understand how materials fail under various stress conditions, particularly in tunneling, and in brittle stresses as in drilling and blasting. Two of the specific problems of rock mechanics are: how to handle people, becomes an essential attribute. What happens today is the product of the events of yesterday, and a hundred years ago. The study of history and the understanding of ground movement in mining must go.

Energy Gap

The energy gap is not new. We have recently expressed concern over the energy gap that exists between the amount of energy required to maintain the current economy and the amount of energy available. This concern has increased recently, as we have become more aware of the importance of energy in our daily lives. Energy is essential for economic growth, industrial development, and national security. Without energy, our economy would be unable to function properly, and our military forces would be unable to defend our country. Energy is also essential for transportation, communications, and other essential services.

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Results of Energy Gap

The energy gap is of great concern to our nation. It is essential that we address this issue in order to ensure a stable and prosperous future for our country. One of the most critical aspects of this problem is the availability of fuel. We must ensure that we have access to the energy resources needed to meet our energy demands.

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These factors are only part of the complex energy gap. We must also consider the economic implications of this gap, including the impact on the economy and the environment. It is essential that we work together to address this issue and ensure a sustainable future for our country.

Following the Joint Geneva Conference on the Peaceful Uses of the Atom, an OEEC study group, under the direction of Sir Harold Hartley, issued in May of 1956 a report, "Study of Europe's Growing Needs of Energy—How Can They Be Met?" Similar studies in the United States and elsewhere over the world indicated that world demands for energy would soon outpace the rate of production and transportation of fossil fuels. Our additional sources of energy would be required.

The most obvious field of special study for the mining engineer is the mechanics of materials, and specifically rock and soil mechanics. We must understand how materials fail under various stress conditions, particularly in tunneling, and in brittle stresses as in drilling and blasting. Two of the specific problems of rock mechanics are: how to handle people, becomes an essential attribute. What happens today is the product of the events of yesterday, and a hundred years ago. The study of history and the understanding of ground movement in mining must go.

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in London, England, as consultant, and in 1958 was elected president of the Manhattan District atom bomb project. Following World War II, Carbide Nuclear Co., to accept his tenure post. Re joined Union Carbide Nuclear Co., a division of Union Carbide Corp., to become director of the Vinetra Division in 1959.

Dr. Currie lives in Manassas, Va. He is married to the former Ethel Snyder Jopp of Niagara Falls, N.Y. They have two daughters, Helen Catherine and Christine McClurran Currie.

Status of Atomic Energy Today

Today the status of atomic energy is somewhat as follows: Four reactor concepts have been developed to a point where they can be constructed and operated in the United States. The oldest is the gas-cooled atomic power reactor, widely used for research and development purposes around the world and the basis of the Dresden Power Plant, and the sodium-cooled reactor, the only one of these reactors. The pressurized water and high-temperature reactors are still under development, and the fast breeder reactor is at the design stage.

Power Lines at Very High Voltages

The second point was to question if the increased demand for energy means that commercial developments in atomic energy have fallen far short of commercial potential. In 1956, Mr. Currie stated very emphatically that "there is as yet no proof of the exponential. The other may be so great that enormous answers may be needed to the question of the time it will engage in a venture that requires an outlay of 25 to $50 million. The cost is so high, and the risks so great, that atomic power has in the country as a whole, and one of these reactors. The pressurized water and high-temperature reactors are still under development, and the fast breeder reactor is at the design stage.

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**Situation Summarized**

The situation then seems to narrow down to these points:
1. There is no immediate likelihood of an energy gap in the United States.
2. There has been, and may again be, in Europe.
3. There are many areas in the world where an increased availability of energy (other than atomic) would greatly improve standards of living.
4. The energy gap is most pressing in parts of the military, nationalistic, or purely economic reasons. There are many areas in the world where an increased availability of energy (other than atomic) would greatly improve standards of living.
5. Nuclear fuels at attractive costs are available at many points over the world, particularly in Africa, Canada, and the United States.
6. Transportation of concentrated nuclear fuels anywhere in the world will not be difficult in peace times.
7. In the near future the production and costs of nuclear fuels are more likely to decrease than to increase.
8. Uses other than military—for example, nuclear power—must develop before a second industry can exist in nuclear fuels. This is of importance both because of the alternative of the stock-piling of yellow cake, and Government experiences with stock-piling have not encouraged this procedure. I cannot paint a sorry picture for the immediate market conditions for uranium.
9. Nuclear fuel cycles, compared with fossil fuels, are already competitive with fossil fuels. In fact, nuclear fuels on a Btu basis can be appreciably cheaper than fossil fuels. It is in the utilization of nuclear fuels that costs begin to mount.
10. Capital costs and engineering for atomic power plants are appreciably lower costs than for conventional plants, but it is particularly true for small (less than 100 MWe) plants.
11. Electric power plants at 7 to 8 years from large nuclear power plants now seem possible and not too far away from the familiar corner. These costs will be competitive with conventional fuels in many areas. Five years will tell the story for future advance. Energy from now on we may be making 7 million power and competing with fossil fuels.

**Story Illustrates U. S. Problem**

Four years ago I attempted to tell the group here in Denver a story of a young mother listening to her little daughter talking to her doll. Little Mary was telling of a little pig who was being chased down a forest path by a fairy bear. Just in the nick of time the little pig escaped by climbing a tree. The mother said to Mary, “Little pigs can’t climb trees.” Mary was crestfallen for a but moment and then replied, “This one could, he had too.”

Now that Russian military experts may have their doubts, but Mr. Khrushchev says they will bury us in conventional warfare. It may be right but I doubt it. I think, though, that regardless of what approach the “big, black bear” may make, we in the free world had better make some upward progress. Advancement in development of nuclear power would be one way.

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**PLANT NEWS**

(Continued from page 19)

8 & W Co. Signs Agreement

With Denver Fire Clay Co.

The Babcock & Wilcox Co. has signed a dealer sales agreement with The Denver Fire Clay Co., it was reported here recently by R. A. Shearer, assistant in charge of B & W’s Refractories division, and C. C. Shepard, president of Denver Fire Clay.

Under terms of the agreement, the Denver firm will market B & W’s refractories products in a six-state area comprising Colorado, Wyoming, New Mexico, Montana, Idaho and Western Montana.

Denver Fire Clay, one of the oldest firms of its type in the Rocky Mountain area, maintains sales offices in Denver, Colo., and Salt Lake City, Utah. In addition to two plants and clay mines in the Denver area.

The Babcock & Wilcox Refractories division has its headquarters in the Company’s general offices in New York City, and a plant in Augusta, Ga. In addition to its refractories production, Babcock & Wilcox is a manufacturer of various processing equipment, tubular products, coagulating systems, meters and controls, electronic equipment and nuclear systems and components.

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**Super-Size Stripping Shovel**

Built for Peabody Coal Co

**Heavy Media Process**

Now Fully Automated

One of the most revolutionary developments in the petroleum and mining industry, the conversion of Gilsonite ore—a solid hydrocarbon asphaltite—into high-octane gasoline, and other fuels as well as cast-iron coke for the metallurgical industry, was started by American Gilsonite Co. in 1923. How this was done in 1960? By the Underkoffler Coal Service Co., a leading manufacturer of heavy media equipment, Brown Instruments Division of Minneapolis-Honeywell Regulator Co., and Industrial Nuclear Corp. At the Underkoffler plant, which is now turning out fuels for diesel locomotives.

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**Unique Gilsonite Operations Expanded**

American Gilsonite Co., a joint affiliate of the Standard Oil of California and Barber Oil Corp. of New York, announces that its unusual refinery near Grand Junction, Colo., has been required to undergo a second expansion program since its inception in August, 1937. This is due to continuing increase in the market for Gilsonite fuels, particularly as economy-grade fuel now being supplied to the Denver & Rio Grande Western Railroad, according to Ernest F. Goodner, president of American Gilsonite.

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ALUMNI BUSINESS

Executive Committee Meeting

Opening of Alumni Assn., Mar. 17

The Executive Committee meeting for the month of March was held on Thursday, March 17, at 7:10 p.m. in the Stans-Roger Manufacturing Co. building, 1685 Banff St., Denver.

Members present were: Edwin H. Crockett, president; S. M. Del Rio, executive committee; Robert Evans, executive committee; Robert Rymer, executive committee; Charles S. Funk, secretary; Harvey Mathews, executive committee.

The minutes of the previous meeting held on the evening of Feb. 25, 1960 were approved.

The report for the month of February 1960 was presented and approved.

The motion for approval for the minutes of the February meeting as well as the financial report was made by Mr. Evans and was seconded by Mr. Waterman.

A brief report was made on the states of recommending names for the Class of 1951. The class of 1951 was already in session. A recommendation has been made to Mr. Crockett, authorizing the naming of four men each of whom should graduate in May. These names are to be submitted to the Executive Committee for their approval.

Mr. Robert Bolster, chairman of the Publications Committee, reported that the following men have been appointed to his committee and they have submitted their report: Kris Farcas, geological engineer; Jim Tate, petroleum engineer; Fred Thomas, petroleum geologist; Maynard Ayton, engineering; Elmo J. Garbella, metallurgical engineer.

Ken Wiedenhold, chairman of the Membership Committee, reported that the following men have been appointed to his committee and they have submitted their report: Mr. L. W. Leff, Frank Bailey, Nina Graverson, George Welsh.

The loan application of Mr. Bill Mc­Clain was considered and denied. Mr. McClain requested a loan of $1,000 to enable friends to study in Great Britain. The decision of the Executive Committee was that the loan fund could not be used for such purposes since it has been set up to assist worthy students completing their work here at the Colorado School of Mines.

It was announced that the annual distri­ bution of the Denver Section will be held at the Denver Press Club, 1310 Glencoe, at 12:30 P.M., April 21. This annual dinner is held for the Mines who attend the National Western Mining and Energy Conference.

The matter of confusion between the AADF and the Alumni Endowment Fund was discussed and it was proposed that balances accumulating from month to month should be deposited in a savings account until their use was determined. Mr. Waterman moved that the savings account be established for this purpose. The motion was seconded by Mr. Robert Evans. The motion to establish the savings account and result of the donations will be accumulated in the savings account in the business of Mines & Log & Linn. As soon as the annual donor­ ship of these funds is determined, the agreement will be withdrawn from the Building Loans Association and deposited in the Alumni Endowment Fund of the First National Bank of Denver.

The desirability of using membership cards was presented in 1960 was talked about at the meeting. The executive committee recommended that an agreement be made available at Dean Burger's office. The American Mining Congress will be handled by a standing commi­ ttee rather than the Alumni office. It is still too soon for mail to arrive offering a verdict, but we have done our best and you will agree that it is a magazine of which you are proud. If you do, show it around your company's office, particularly to the advertising manager. Impress on him, the high quality of readership and the ability of the magazine to reach and interest the top executives of outstanding companies in all fields of the minerals industry.

Office News

Now that I have sold my soap for this issue, I must apologize. We did not move into our new quarters in time for announcement, but we will do so in early June. The offices are spacious and beautiful. To the north, Bear's Tooth is still standing and the Library, wherein out window to the west, the Big "M" keeps company. You will be proud of the new location. Our previous in­ vitation is again extended, "Come and See Us."

The Special Mining issue has been in your hands for some time. How do you like it?

The gold cover was a better color than April and we may stay with it, for the printer says that Gold is a miserable ink with which to work. Poor Gold, no one likes it apparently, but it is still the only monotype medium which is accepted readily by pages, Christian, Buddah or Mu­ hummedan. As for me, I like it and wish that there was more of it in life.

The Placement Service needs additional help. It is not operating effectively because of inadequate staff. Yet between Dean Burger and our office, we have filled more than 20 jobs during the past six weeks. With proper han­ dling this service could be improved, for neither he nor I have time or personal capability to handle it properly. When Indus­ try wants competent Engineeries, they call on the Alumni Association to find them.

THE MINES MAGAZINE • JUNE, 1960

FROM THE EXECUTIVE MANAGER'S DESK
Alumni Development Fund, Chart shows steady growth of

$40,000

$25,000

$20,000

$15,000

$10,000

$5,000

Yearly increases in alumni support of the Annual Alumni Development Fund have continued to push that fund nearer its goal of $40,000—established several years ago on the basis of $10 contribution from each Mines alumnus.

Through its fourth year, the AADF has shown a steady growth in the number of contributions and in the total amount contributed. Last year 1187 of the known mining alumni contributed $22,828.10 to this important fund. Not only has the fund become a major source of support for the faculty improvement program in itself, but it has provided the base for further financial support from the industry, foundations, parents, alumni and other friends of the School. Last year that total support exceeded one-quarter million dollars.

Still Short of Goal

As of May 15, the Fifth AADF has a way to go if it is to uphold the growth trend. By that date 1802 alumni had contributed $17,637—still some $3000 short of last year's final figure—and $8000 short of $25,000, a logical yearly increase from the $17,000 that had contributed $17,637—still some $5000 short of last year's total amount contributed.

The past success of the AADF can be attributed to the alumni who have recognized the need for such a program and have contributed their support. Alumni support has not only been in terms of gifts, but in time and energy given to class agents, on development committees, or independently on the Mines development program and in selling it to others. It is this same alumni leadership which will bring the Fifth AADF to its goal for the year.

The alumni development committee is headed up by Chairman R. Lee Scott, '42. Current members of his committee are James Mullinax, '47; Edwin H. Crabtree, '27; president of the Alumni Association; and Col. Wendell W. Fertig, '51, executive manager of the Colorado School of Mines Alumni Association.

New Class Agents

In connection with the AADF a new procedure has been adopted for the appointment of class agents. Beginning with the Class of 1960, a class agent will be named from each of the six options, rather than asking each alumnus to work with more than 150 classmates. Seniors who have been elected class agents in previous years, including: John J. Seibert, mining; Ronald L. Bredehoft, petroleum engineering; Samuel Bruce Heister, metals; Jack P. Bonardi, mining; and John W. Wilford, Jr., metallurgy.

Alumni Section Gives $1000

The Southern California Alumni Section set a challenge to its members and contributed $1000 to the Colorado School of Mines Foundation. The story is covered in "From the Local Sections" in this issue of the Magazine.

Alumni News

Frank Coolbaugh, '31, President Of American Metal Climax, Inc.

Raymond A. Morgan, '29, Appointed Assistant Dean of the UW College of Engineering

Frank Coolbaugh, who received his E.M. degree in 1915 from the Colorado School of Mines, has been elected president and chief operating officer of American Metal Climax, Inc., 1270 Ave. of the American, New York, N. Y. A year ago last June he left Golden, Cola, to assume the presidency of Climax Molybdenum Co. and to bring the Fifth AADF to its goal for the year.

Professor Morgan received a mining engineering degree in 1929 and a master of science degree in 1933 from the Colorado School of Mines in Golden. He has been a registered professional engineer since 1933.

He joined the Univ. of Wyoming faculty in 1941 as an instructor and became head of the engineering drawing and general engineering department in 1946.

Prior to 1941 he served as an engineer with the Standline Oil and Gas Co. of Tulsa, the H. W. Gardner Co. of Golden, Cola, and the U. S. Bureau of Mines in Pittsburgh.

Mr. Coolbaugh joined Climax Molybdenum Co. in 1939 as assistant general manager and was named to the post of general manager in 1943. He served in that capacity until 1953.

He is a director of the Colorado School of Mines Research Foundation, Golden, and of the Colorado National Bank, Denver.

Rolf Rokwer, '50, Has Tunnel Connected to New House

Rolf Rokwer, '50, is the envy of all Miners, for he can boast of having his own private mine tunnel connected directly to his house.

Rolf, wife Louise and son Douglas, recently moved into their newly built home. The Rokwers bought a natural spring in the tunnel furnishes all their water. It also houses a walk-in for cooling Golden's favorite beverage.
W. N. Lyster, '53, Promoted to Senior Chemical Engineer After 11 Years with U.S. Gypsum

W. N. Lyster, a 1953 petroleum engineering graduate, who was recently promoted to senior chemical engineer in the production section of Technical Division at the U.S. Gypsum Co. in Baytown, Texas, is responsible for technical aspects of production at the company's naphtha re-run section, which is responsible for the production of aromatic solvents and paraxylene. He has also worked in the applied math and engineering sections, and is currently involved in a computer simulation program.

Mr. Lyster's recent work has included a study of improvements in production of aromatic solvents and methods of increasing the capacity of aromatic production facilities. He has also been involved in the development of new products for the company.

Mr. Lyster and his family live in Baytown, Texas.

Harry E. Haynes, '50, Promoted Division Geologist for Carey

Harry E. Haynes, who received his geological engineering degree in 1950 from the Colorado School of Mines, has been appointed division geologist in the Dallas headquarters of William J. Carey, independent oil producer. He has worked for the company for the past 30 years.

Mr. Haynes' business address is 1112 Republic National Bank Building, Fort Worth, Texas.

Philip A. Ray, '29, Retires From Hercules Powder Co.

Philip A. Ray, a 1929 metallurgical engineering graduate of the Colorado School of Mines, retired May 1 after 39 years as manager of Hercules Powder Co.'s Navy Stores Department.

Mr. Ray joined Hercules in 1929 when he became associated with the company first as a metallurgist in the Colorado Laboratory. After several years, he transferred to Hercules Home Office in Wayne, N.J., where he served in various capacities until his retirement.

Mr. Ray and his wife live at 307 Looltout Rd. in Golden, Colorado. Educational Highlights

- Received his B.S. degree in metallurgical engineering from the Colorado School of Mines in 1929.
- Joined Hercules Powder Co. in 1929.
- Worked in various capacities, including manager of the Navy Stores Department.

Letters to the Editor

ROBERT W. GLEASON, '58, The 'Old Bronco' of the Mines Men's Association, has been elected president of the Association for the 1960-1961 term. Mr. Gleason, a 1958 petroleum engineering graduate, is currently the Manager of Exploration for Gulf Oil Co. in Dallas, Texas.

Letter to the Editor

ROBERT W. GLEASON, '58, The 'Old Bronco' of the Mines Men's Association, has been elected president of the Association for the 1960-1961 term. Mr. Gleason, a 1958 petroleum engineering graduate, is currently the Manager of Exploration for Gulf Oil Co. in Dallas, Texas.
Robert H. Sayre

E. Floyd Shields

Blair Livingston Sackett

Robert H. Sayre, a 1909 mining engineering graduate of the Colorado School of Mines, died April 27 in a Salt Lake City hospital. On March 7, Mr. and Mrs. Sackett observed their 50th wedding anniversary, and at last year’s Alumni Banquet, Mr. Sackett served as a speaker for the Class of 1909.

From 1947 until his retirement in 1956, Mr. Sackett was metallurgical manager for the Incogneato Refining Co. at Salt Lake City. He served as the company’s superintendent at the Tooele, Utah plant from 1922 to 1947.

Born Sept. 16, 1886, in Jersey City, N.J., Mr. Sackett enrolled at Mines in 1906 and was an active member of the Crucible Club and of Beta Theta Pi. He began his professional career in 1909 with Goodrich Consolidated Mining & Smelting Co. at Grand Forks, B.C., where on March 7, 1910, he married Mrs. Daisy Hedges. He was employed by Cero de Fuego Copper Corp. in Peru, South America, from 1910 to 1917, when he became associated with International Smelting & Refining Co.

Mr. Sackett was a member of American Institute of Mining, Metallurgical, and Petroleum Engineers, Society of the Cincinnati, Red Cross, Travelers’ Aid Society, Knute Bean Club, and Presbyterian Church.

Survivors include his widow, Mrs. Daisy Sackett, 1762 Harrison Ave., Salt Lake City; a daughter, Mrs. Virginia Alsop of Salt Lake City; two sons, Earl L. H. Sackett (a 1933 graduate of Mines) of Potosi, Mo., and Paul Sackett of Hilo, Hawaii; and six grandchildren.

Ernest Floyd Jones

Col. Robert H. Sayre, a World War II general, was the Colorado School of Mines’ 1909 mining engineering graduate. He died April 27 at a Salt Lake City hospital.

Robert H. Sayre, who was a member of the board of trustees of the Colorado School of Mines from 1924 to 1936 and who was president of the board for two years, died April 8 at Presbyterian Hospital in Denver.

Mr. Sayre was born in Denver Dec. 18, 1887, and was educated at St. George’s School, at St. Paul’s School, and at Harvard College where he graduated in 1908. He engaged in mining in Colorado, New Mexico, and Arizona, and in the early 1920s was associated in a Guatemalan business venture with Ex-President Herbert Hoover. He served for years as a mining consultant for the U.S. Department of Justice.

Organizations to which he belonged included the American Metallurgical Society, Harvard Club, Colorado Scien­tific Society, and University Club.

Surviving in addition to his wife, Mrs. Gertrude Berger Sayre of Denver, are two sons, Robert J. of Grand Junction, and William of Denver; three daughters, Mrs. Dorothy Hoyt of Denver, Mrs. Phyllis Balduin of Golden, and Mrs. Constance Callier of Logan, Utah; a sister, Mrs. William Berger of Denver; and 16 grandchildren.

The Sayre family have been strong in their support of Mines. Robert, who graduated in 1934; while Mrs. Sayre, who was killed in action in World War II, was a member of the Club of Denver.

As Robert H. Sayre, Jr., said of his father: “We may truthfully say that with the passing of Robert H. Sayre, we see the end of the era of really great mining engineers: Charles A. Clove of Silverton, Charles Bell of Ouray, Orville Whitaker, and Quinn Schwerdt of Denver, to mention a few. The mineral industry owes an indelible debt to these independent hard-driving men of rock-like honesty and ethics.”

Ernest Floyd Jones, a 1910 mining engineering graduate of the Colorado School of Mines, died April 8 in Corpus Christi, Texas. He was born in Huntington, Va., in 1890.

After his graduation from Mines, Mr. Jones worked in Pennsylvania and New Mexico, leaving his posi­tion in the latter state to serve his country in World War I. When the war was over, he returned to work in Colorado, and then Mexico, where for many years he was employed by Compania Real del Monte y Pachuca at Pachuca, Hidalgo, Mexico. When he retired because of ill health, he was district superintendent of mines.

Mr. Jones is survived by his wife, Consuelo Rawson Jones.

The Mines Magazine • June, 1960

FROM THE LOCAL SECTIONS

Alaska

Birmingham Section
Pres.: Joseph Bald, ’35
Sec.-Treas.: Will E. Heflin, Fairfield

Arizona

Arizona Section
Pres.: John A. Reynolds, ’41
V. Pres.: Gene Klein, ’39
Sec-Treas.: E. Floyd Shields, ’24
1201 Flora Ave., Phoenix

ARIZONA

MINNESOTA

Iron Range Section
Pres.: Paul C. Schuler, ’23
V. Pres.: Lenn Riddell, ’24
Sec-Treas.: James Bing, ’30
St. Cloud Section
Pres.: Robert T. Miller, ’54
V. Pres.: Consuelo Rawson Jones.
Sec-Treas.: Ernie Nelson, ’32
St. Paul Section
Pres.: E. Floyd Shields, ’24
V. Pres.: Howard Itten, ’41
Sec-Treas.: E. E. ‘Stump’ Schuster, ’32

Missouri

St. Louis Section
Pres.: Earl E. H. Sackett, ’35
Sec.-Treas.: E. W. Armstrong, ’22
226 Union Ave., Belleville, Ill.

Montana

Montana Section
Pres.: John Isely, ’42
V. Pres.: John Riddle, ’39
Sec.-Treas.: W. E. Marriott, ’38

NEW MEXICO

Four Corners Section
Pres.: Albert Lock, ’50
V. Pres.: R. R. Lock, ’44
Sec.-Treas.: I. C. Tremen, ’53
824 W. Elbert St., Albuquerque

New York

New York Section
Pres.: E. Floyd Shields, ’24
V. Pres.: Ben F. Zwick, ’24
Sec.-Treas.: W. F. Catrow, ’21

Ohio

Central Ohio Section
Pres.: Roland Fischer, ’42
Sec.-Treas.: Frank Smolka, ’42
Barnesville Mem. Inst., Columbus

Pennsylvania-Ohio Section
Pres.: Charles L. LeMaster, ’12
V. Pres.: Theodore Simon, ’31
Pennsylvania-Ohio Section
See Pennsylvania for officers

OKLAHOMA

Bartholomew Section
V. Pres.: R. G. Conner, ’53
Sec.-Treas.: Will E. Heflin, Fairfield

Oklahoma City Section
Pres.: Lynn Reeves, ’55
Sec.-Treas.: John Thornton, ’50
Meetings in the first week of each month at the Oklahoma Clubhouse

Tulsa Section
Pres.: Charles H. Westfall, Jr., ’54
V. Pres.: Brook Tarbet, ’52
Sec.-Treas.: Charles J. Diver, ’52
526 S. New Haven, Tulsa 12

Pennsylvania-Ohio Section
Pres.: Donald Moeller, ’54
V. Pres.-Treas.: Arthur Most, Jr., ’38
Sec.-Treas.: Nick Shiftar, ’40
Pennsylvania-Ohio Section
See Pennsylvania for officers

TEXAS

Houston Section
Pres.: J. Elwood Stud., ’49
V. Pres.: John C. Caples, ’42
Sec.-Treas.: Nick Shiftar, ’40
5401 Arden Ave., Dallas 3
Sec-Treas.: John T. Sommerville, ’47
699-B Scott St., Wichita Falls

Permian Basin Section
Pres.: Van Manstein, ’39
V. Pres.: Bail Hallery, ’41
Sec-Treas.: W. F. Catrow, ’21
4311 Mercedes, Midland

South Texas Section
Pres.: James R. Star, ’51
V. Pres.: Edward Warren, ’50
Sec.-Treas.: W. E. Marriott, ’38
1075 Midland Blvd., San Antonio

Utah

Four Corners Section
Pres.: E. Floyd Shields, ’24
Sec.-Treas.: C. C. M. Ball, ’32
Salt Lake City Section
Pres.: C. T. Baroch, ’23
V. Pres.: R. C. Loring, ’37
Sec-Treas.: Ben F. Zwick, ’24
50 Garden Dr., Mt. Iron, Minn.

Washington

Pacific Northwest Section
Pres.: Wm. Donation, ’41
V. Pres.: Charles H. Westfall, Jr., ’54
2404 S. 6th St., Bellevue

Washingon

Central Wyoming Section
Pres.: E. Floyd Shields, ’24
V. Pres.: C. C. M. Ball, ’32
Walt Forbes Co., 5th National Bank Bldg, Casper, Wyo.

WYOMING
THE MINES MAGAZINE • JUNE, 1960

Members voted to present the Colorado School of Mines Foundation, Inc. with $1000. Shown, left to right, President John W. Vanderwilt accepts check from Raymond E. McBrine, '53, section president, at a meeting April 21 in Los Angeles. The donation was an unadvertised gift to the Foundation.

Considerable time was spent discussing ways and means of generating more interest and participation in the Horizon Fund. Howard Kaylor and Bob Turley will head up a group to make a special effort in that direction. Everyone present at the luncheon made a small contribution to be forwarded to the Horizon Fund.

The following members attended the March 2 luncheon meeting at the Houston Club:

Albert W. Wolf, 71; S. A. Mawaher, 71; E. C. Berkey, 72; M. L. Rowr, 71; J. L. Ballard and D. M. Davis, 21; Dee De Goshagen, 77; R. K. Tracy, 72; L. E. Ferguson, 71; K. E. Berrell, 72; Donald L. Herbert and Mere Gillette, 73; R. A. Kerr, 71; Bruce Barbour, 77; W. J. Vickernot, 74; Nick Stith, 71; W. H. Heath, 72; Jim Ogg, '72; Bob Turley, 76; W. W. Gallerata, and Jim Ogg, 72; John Swanson and Jim Ewing, 74.

The section held its monthly luncheon meeting on May 4 at the Houston Club, with the following members present:

Albert W. Wolf, 71; J. L. Ballard and D. M. Davis, 21; Robert B. Alford and Merle Gillette, 73; R. A. Kerr, 71; R. W. Snyder and W. B. Barbour, 72; Nick Stith, 71; Cen Lennard, 72; Bob Turley and Bob Gallagher, 72; Jim Ogg and Jack Earl, 72; James Cappel, 74.

Jack Earl led an interesting discussion about the Horizon Fund, described his visit to Golden, and spoke highly of plans and efforts to improve the Alumni Association. He was much impressed with the new facilities in the new athletic complex.

The Alumni Association is a credit to the school. Members were bowled over by the new blood stirred up. Those who attended were or in dress appropriate for the celebration and were prepared to cope with the elements. There were jackasses a plenty (some 4-legged too) and picturesque characters as Rock Hound Park or Baby Doll Emerson. Chicken for dinner at Andy's Diner, Seattle, Wash., the meeting was called to order by President Douglass. The following 10 members were present:

Albert W. Wolf, 71; S. A. Mawaher and L. E. Berkey, 71; C. W. Bowlby, 70; C. Ted Robinson, 51; Richard O. Barnes, 52; Carter R. Kelly, 51; Members of the Southern California Section of the Alumni Association voted to present the Colorado School of Mines Foundation, Inc. with $1000. Shown, left to right, President John W. Vanderwilt accepts check from Raymond E. McBrine, '53, section president, at a meeting April 21 in Los Angeles. The donation was an unadvertised gift to the Foundation.

The Memo stated that enrollment has held steady and the Progress Report shows a total of 1003 for the second semester. State distribution shows Colorado first with 416, 48 percent; California second with 496, 49 percent; New York third with 57, 5½ percent, and Texas fourth with 37, about 3½ percent. Graduating class of 1852: 51 metallurgists, 47 geologists, 27 petroleum engineers, and 25 miners.

Two new buildings—the Metal—lunge Building and the New Gymnasium—are a credit to the school. The Progress Report is very informative and indicates that Dr. Vander­

The Alumni Association is a credit to the school. Members were bowled over by the new blood stirred up. Those who attended were or in dress appropriate for the celebration and were prepared to cope with the elements. There were jackasses a plenty (some 4-legged too) and picturesque characters as Rock Hound Park or Baby Doll Emerson. Chicken for dinner at Andy's Diner, Seattle, Wash., the meeting was called to order by President Douglass. The following 10 members were present:

Albert W. Wolf, 71; S. A. Mawaher and L. E. Berkey, 71; C. W. Bowlby, 70; C. Ted Robinson, 51; Richard O. Barnes, 52; Carter R. Kelly, 51; Members of the Southern California Section of the Alumni Association voted to present the Colorado School of Mines Foundation, Inc. with $1000. Shown, left to right, President John W. Vanderwilt accepts check from Raymond E. McBrine, '53, section president, at a meeting April 21 in Los Angeles. The donation was an unadvertised gift to the Foundation.

The Memo stated that enrollment has held steady and the Progress Report shows a total of 1003 for the second semester. State distribution shows Colorado first with 416, 48 percent; California second with 496, 49 percent; New York third with 57, 5½ percent, and Texas fourth with 37, about 3½ percent. Graduating class of 1852: 51 metallurgists, 47 geologists, 27 petroleum engineers, and 25 miners.

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Locomotive Presented to Experimental Mine

Formal presentation ceremonies of a locomotive to the CSM Experimental Mine were held Sunday, April 24, at the mine site near Idaho Springs, Colo. T. Waterman, vice president in charge of advertising for Plymouth Locomotive Works, and Madison J. Finch, engineer in charge of the company's Mine Locomotive Division, presented CSM officials with bronze plaques commemorating donation of the locomotive to Plymouth Locomotive Works and of the diesel engine by Hercules Motor Corp., of Canton, Ohio. Accepting in behalf of the Colorado School of Mines were Truman H. Kuhn, dean of faculty, and Prof. Lute J. Parkinson, head of the mining department.

The locomotive—a Plymouth Mine O-Motive Model FM-24, 3 Ton, 18" gauge, powered with a Hercules diesel, Model DODG engine, and a Fuller Model 12-U Turque Converter—was placed in service in July 1956. The presentation ceremony was attended by some 70 members of the large number of students in mining laboratory practice classes scheduled for Sunday, April 24.

An AIME Student Chapter picnic was attended by some 70 members, their wives and graduate students taking the special class in mining laboratory practice scheduled for Sunday, April 24.

At Mining Department

For Research Project

Dr. James L. Hall, assistant professor of chemistry at the Colorado School of Mines, has been granted $19,800 by the Petroleum Foundation. The grant was announced by Dr. Truman H. Kuhn, dean of the School of Mines.

The grant will cover over a three-year basic research project on the use of acenonitrile as a solvent for inorganie reactions. The grant became effective in April. The grant covers Dr. Hall's salary plus the aid of a graduate research assistant.

Dr. Hall has been on the Mines faculty since last fall. He is a graduate of Colorado Western State College and holds a doctorate from the University of Texas. He is the second NSF grant awarded to Dr. Hall this spring. He will also direct a $17,829 NSF grant this summer for further research in chemistry and geology for advanced high school students. The institute will be held at Mines July 11th through Aug. 20th. About 50 outstanding high school students from throughout the nation will participate in the institute.

Mines Trackman唐 In Surprisingly Good Season

The majority of Colorado School of Mines track lettermen will return next year, following a surprisingly good season in 1960. The Orediggers won two and lost one dual meet. They won one triangular meet and took second place in both the Rocky Mountain Conference Relays and the Rocky Mountain Conference Championships.

The fellowships, in five fields of study, the faculties of the institutions where fellowships are offered.

Each American fellow is free to select any area of study or research he desires within the defined field of his school. No fellow is in any way obligated to the foundation or its founder either during his tenure as a fellow or at any time thereafter.

Mines Senior Seis Award For Work In Investments

Robert L. Ferriter, mining engineer, senior engineer, has been awarded the Student Achievement Award by the Wall Street Journal for his outstanding work in investments, an op- portunity senior economics course. This is the first time a Mines student has received this recognition.

The award consists of a silver plaque and a year's subscription to The Wall Street Journal.
Honcock, NAIA Chairman

Hancock also announced his 1960-61 schedule for wrestling. The home team will be dual meets with the University of Oklahoma, Colorado State University, the University of Illinois. Hancock also announced his 1960-61 schedule for wrestling. The home team will be dual meets with the University of Oklahoma, Colorado State University, the University of Illinois.

The NAIA meet will be the first national tournament ever staged at Mines.

Baseball Squad Wins Eight of 23 Games

Single-hit Kim de Rubertis took the 1960 batting honors for the Colorado School of Mines baseball squad. The junior infielder collecting 30 hits—led the team batting average of .448 for the Denver-based team.

Hancock's team won 1960-61 dual meet competitions. The 1960-61 schedule for wrestling. The home team will be dual meets with the University of Oklahoma, Colorado State University, the University of Illinois.

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Erbium and Holmium Metals

Data sheets on erbium and holmium metals, published by Nuclear Corporation of America's Research and Engineering Division, Burbank, Calif., gives complete information in regard to these rare earth metals. The data sheets, available at the cost of 25 cents each, cover properties and characteristics of erbium and holmium, as well as their uses in various industrial applications. The data sheets are useful to engineers, chemists, and physicists engaged in research and development work involving the use of these rare earth metals.
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