

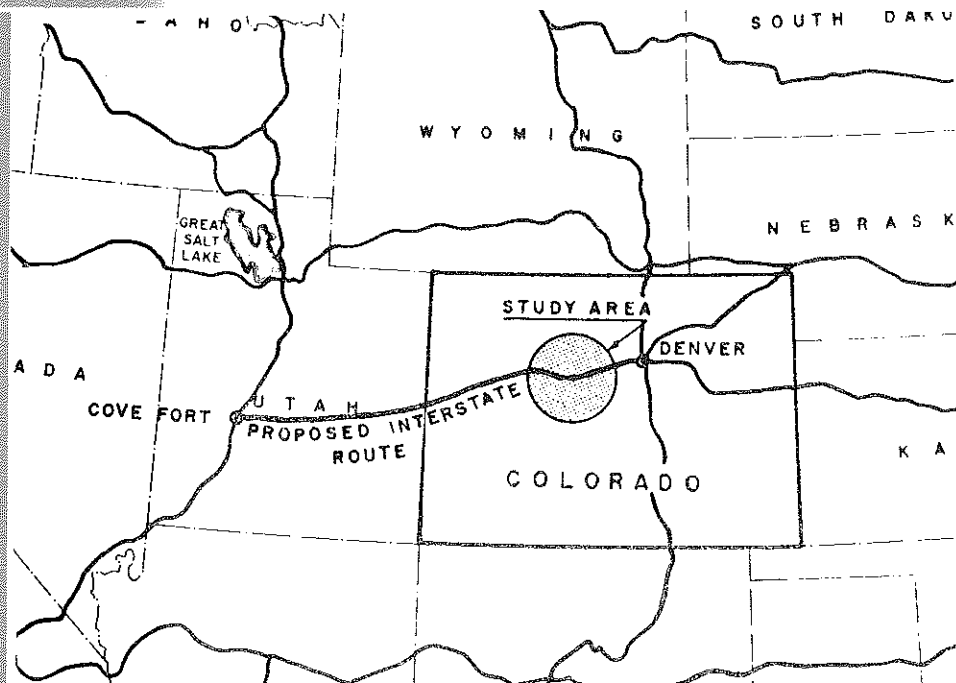
THE MINES MAGAZINE

SEPTEMBER 1960



Featuring—

- A New Drilling and Blasting Combination
- Mining in Mexico
- Columbian at Powderhorn, Colo.
- Interstate Highway West of Denver
- CF&I Sunrise Mine's Safety Program
- A Brief History of Libyan Oil and Esso Standard



CLASS NOTES

When advising us of a change of address, please confirm your position or title and company affiliation.

1882-1930

WILLIAM D. KILBOURNE, '04, whose address is P. O. Box 651, Pueblo, Colo., writes to inquire about membership cards and to say that "the magazine is proving very interesting."

CARL A. ROCKWOOD, '12, asks us to change his mailing address from Tucson, Ariz. to Indian Head Trailer Lodge # 37, 9340 Foothill Blvd., Cucamonga, Calif.

L. E. JONES, x-'12, may be addressed at P. O. Box 45, Rangely, Colo.

NORMAN E. MAXWELL, '17, gives his new address as 130 Central Bldg., Midland, Texas.

WILL VICTOR NORRIS, '21, has moved from Portland, Ore., to 601 Kirkwood Pl., La Jolla, Calif.

HARRY M. FISKE, '21, gives his new address as c/o Ingersoll-Rand Co., 11 Broadway, New York 4, N.Y. He was living in Los Angeles, Calif.

JOSEPH A. HASKIN, '22, receives mail at P. O. Box 1372, St. Augustine, Fla.

ETHBERT F. REED, '22, employed by Inspiration Consolidated Copper Co., may be addressed at P. O. Box 69, Inspiration, Ariz.

HAROLD H. WRIGHT, '24, gives his new address as 5432 E. 24th, Tulsa 14, Okla.

LAMONT E. SMITH, '24, president of Franco Central Oil Co., lives at 400 N. Crestway, Wichita 8, Kans.

HOLLIS JOY, '25, said: "I don't want to miss a single issue of the magazine. It is better than ever." Hollis, who is safety engineer for the Veteran's Administration, lives at 423 N. Park Dr., Apt. 4, Arlington, Va.

DR. GEORGE H. FANCHER, '30, Director of Research, Sinclair Petroleum Corp., may be addressed at Box 3006, Tulsa 9, Okla.

1931-'40

H. F. MCFARLAND, '32, and family sailed for Bandung, Indonesia, where Mr. McFarland will teach mining engineering at Institut Teknologi Bandung on a two-year appointment by the University of Kentucky. His address is c/o William A. Dunlap, Kentucky Contract Team, Institut Teknologi Bandung, Kotak Pos 312, Bandung, Java, Indonesia.

HUBERT A. STRINGER, x-'33, realtor, may be addressed at 1609 Broadway, New Orleans 18, La.

MERLE L. GILBREATH, '33, receives mail c/o The Pure Oil Co., P. O. Box 334, Victoria, Texas.

EDGAR C. NORMAN, '33, metallurgist for U. S. Air Force, Hill Air Force Base, lives at 1628 S. 35 E, Bountiful, Utah.

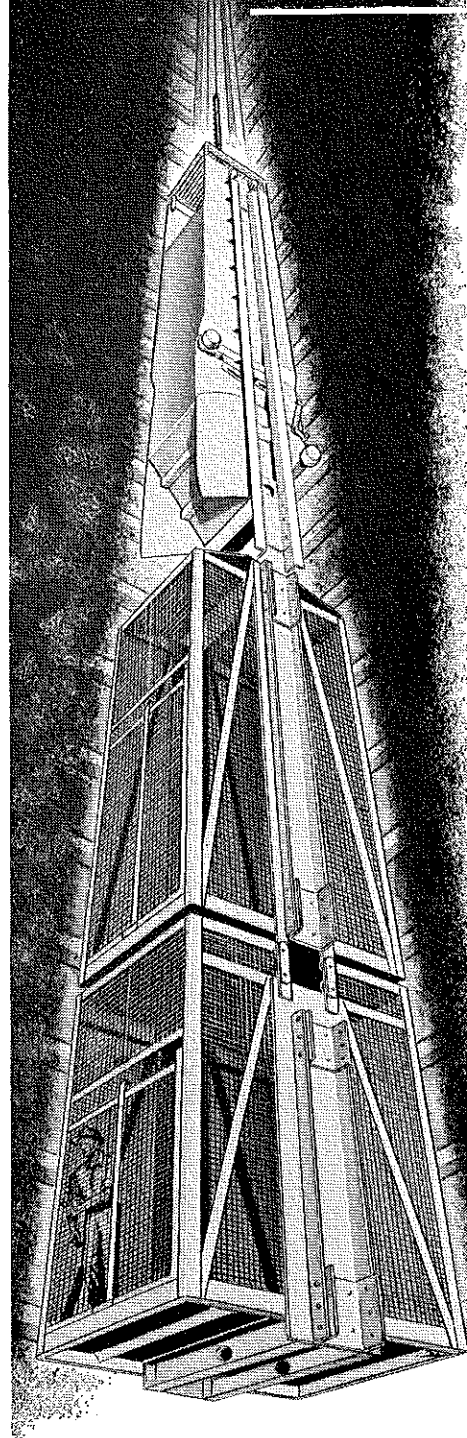
LT. COMDR. G. D. ROBERTS, '34, has moved from Point-Munger, Calif., to 2501 W. 92nd St., Seattle 7, Wash.

LLOYD T. ANDREW, '35, employed by Stromberg Carlson, has moved from Cincinnati, Ohio, to 997 Whitney Rd., Fairport, N.Y.

CHARLES E. MICHAELS, '35, gives his new address as PEO APO152, San Francisco, Calif. He was living in Albuquerque, N. M.

(Continued on page 8)

The tough ones
come to



Card

Copper-Silver Mine Boosts Tonnage with Card Automatics

At Wallace, Idaho, a small shaft is producing up to 12,000 tons of silver-copper ore per month using Card automatic bottom dump skip-cage combination. Skips are rated at 125 cu. ft., handling 16,000 pounds per trip. The ore pocket is kept filled with Card cars, both rocker-dump and Granby types. Surface haulage utilizes larger Card cars, 60 cu. ft. Granby type.

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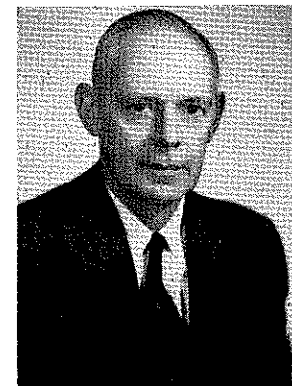
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DENVER 1, COLORADO

NEWS OF THE MINERAL INDUSTRIES

Macgregor and Henderson Named to Executive Positions With Climax Molybdenum Co.

Wallace Macgregor, vice president of Homestake Mining Co. and former treasurer of Climax Molybdenum Co., has been named president of Climax Molybdenum Co. and vice president of American Metal Climax, Inc. He succeeds Frank Coolbaugh, Mines '33, now president of American Metal Climax.



Robert Henderson was recently appointed vice president of Western Operations of Climax Molybdenum. Prior to his appointment he was general manager of the company's Western Operations. A graduate of M.I.T., Mr. Henderson is president of the Colorado Mining Assn., a member of AIME, chairman of the Natural Resources Council, and a director of the Colorado State Chamber of Commerce. Before joining Climax in 1936, he was associated with International Nickel Co. and other mining industries.

Silver Used to Purify Swimming Pool Water

Mining companies interested in developing new uses for silver are watching with interest the use of a silver water purification system installed at the community swimming pool in Wallace, Idaho.

The size of a large thermos bottle, the silver water purification unit is connected to the existing circulation and filter system. Water flows through a cylinder containing four silver rods about 10 inches long. Electricity flows through the rods and electrolysis frees silver ions which kill bacteria on contact. One set of silver rods is said to last about three months.

Advantages of the new system are (1) elimination of the chlorine taste and odor in drinking water caused by the chlorine method, and (2) in swimming pools, eye irritation from chlorine is eliminated as is bleaching of swim suits.

Synthetic Mica Developed By U. S. Bureau of Mines

A method of forming tiny flakes of synthetic mica into paper-thin sheets that may prove superior to natural mica for certain uses in electronics has been discovered by Bureau of Mines scientists. Both the new paper and the synthetic-mica flakes from which it is made are products of studies by the Bureau at Norris, Tenn., under an accelerated research program sponsored by the General Services Administration.

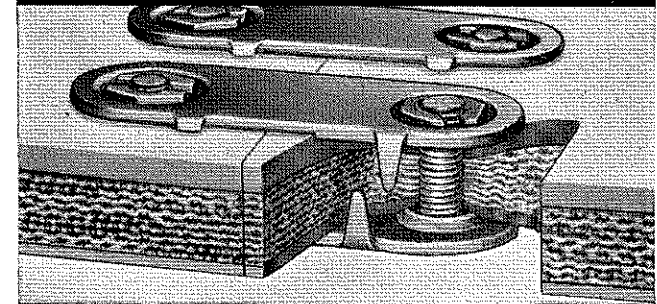
Further work, to reduce the mica paper's tendency to absorb water in storage and to improve its properties, is being undertaken as part of the

same GSA program by the Bureau and General Telephone and Electronics Laboratories, Inc., of Flushing, L. I., N. Y.

According to Bureau of Mines Director Marling J. Ankeny, the synthetic-mica sheets obtained by the Bureau are both strong and flexible. Moreover, he added, they have what is known technically as "high dielectric strength." This means they should make an excellent material for use in capacitors, tube spacers, and other parts of such electronic devices as computers, radar, and missile-guidance systems.

(Continued on page 30)

FLEXCO CONVEYOR BELT FASTENERS

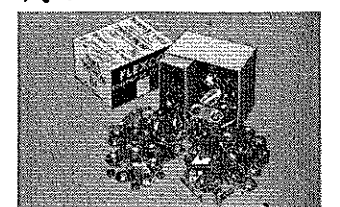


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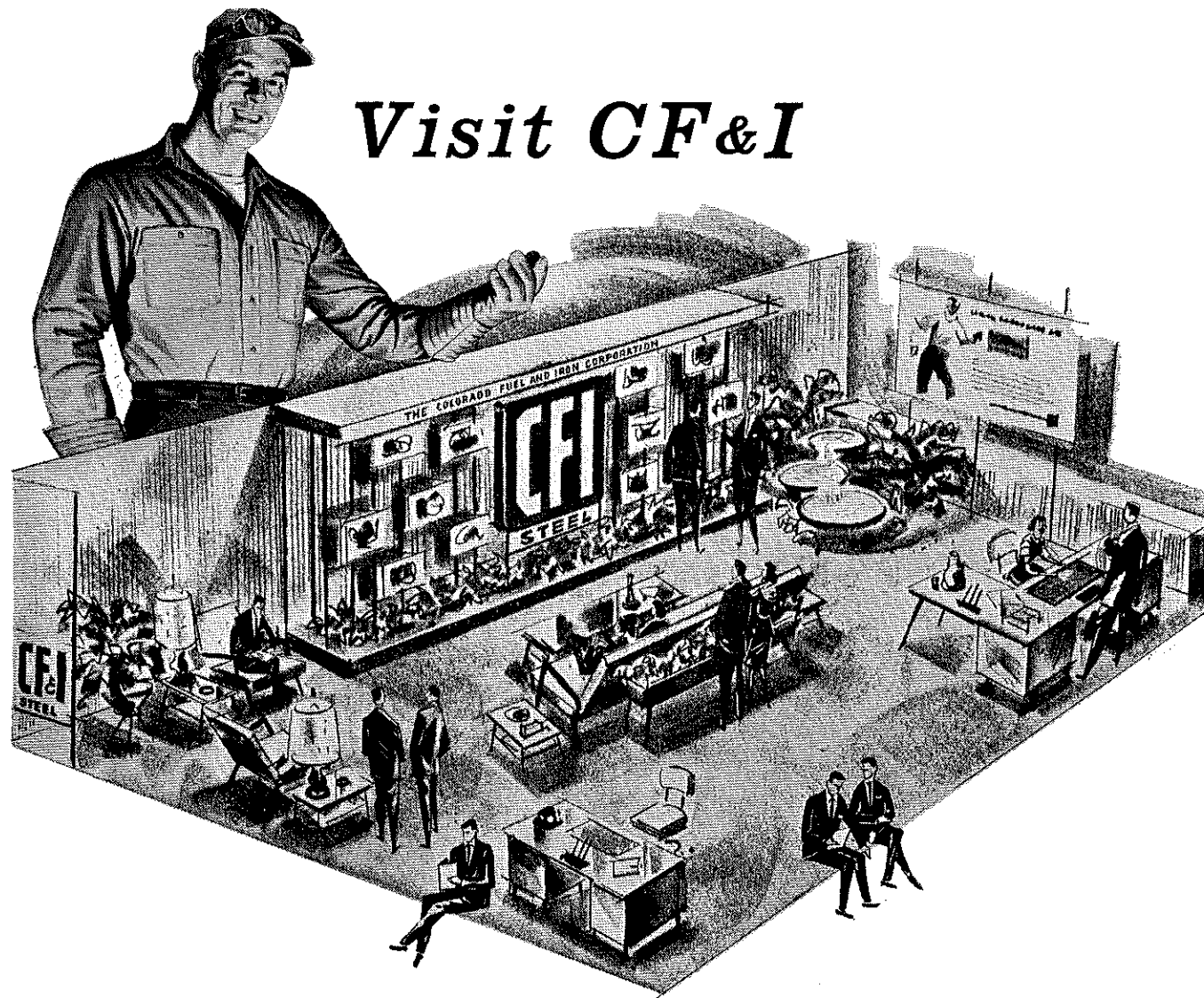
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THE MINES MAGAZINE

Volume L

September, 1960

Number 9

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This map, which is Figure 2 in Mr. Baxter's article "Interstate Highway West of Denver," shows the proposed interstate route from Denver to Cove Fort. See page 19.

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TECHNICAL SOCIETIES and ASSOCIATIONS

Mining Congress Convention Oct. 10-13 in Las Vegas, Nev.; Mines Luncheon Scheduled

Influential members of the U. S. Senate and House of Representatives and government officials, as well as mining industry leaders will have prominent roles in the 1960 Metal Mining and Industry Minerals Convention and Exposition of the America Mining Congress at Las Vegas, Nev., Oct. 10-13. The program for the meeting includes a score of sessions dealing with national policies and with metal and mineral production and processing methods.

The meeting will also feature the largest exposition of metal and nonmetallic mining machinery ever assembled. One hundred and ninety manufacturers will display the latest types of machinery and equipment used in mining, quarrying and mineral processing. The exposition will be housed in Las Vegas' new Convention Center.

The Colorado School of Mines Alumni Association will hold a luncheon at the Tropicana Hotel at 12 noon Oct. 11.

Mines Men Honored By National Societies

Colorado School of Mines men recently given recognition by National Societies are Dr. Ben H. Parker, '24, president of the American Association of Petroleum Geologists; Lloyd E. Elkins, '34, president-elect of the American Institute of Mining, Metallurgical and Petroleum Engineers, and Prof. John C. Hollister, '33, first vice president of the Society of Exploration Geophysicists. (See Alumni News stories.)

Petroleum Engineers of AIME Schedule 35th Annual Meeting Oct. 2-5 in Denver, Colo.

Seventy-four technical papers on petroleum drilling and production will be presented at the 35th Annual Fall Meeting of the Society of Petroleum Engineers of AIME in Denver Oct. 2-5. Registration, exhibits and technical sessions will be held at the Denver City Auditorium. Denver Section of SPE of AIME will act as host for the meeting.

Two concurrent sessions are planned for Monday through Wednesday with the exception of Monday afternoon (Oct. 3) when a third concurrent session is planned. A special feature of the program is a session on rock mechanics from 2:15 to 5 p.m. Oct. 3 at the Brown Palace Hotel. Luncheons, dinners and dances will take place at the Brown Palace and Denver Hilton hotels.

The Colorado School of Mines and the CSM Alumni Association will have a booth at which all alumni and friends of the school are requested to call. Provisions will be made to handle messages and appointments for all Miners who are attending the convention.

Denver Section of the CSM Alumni Association is sponsoring a dinner for alumni attending the SPE Fall Meeting. The dinner will be held at 8 p.m. Monday, Oct. 3, at the Denver Press Club, 1330 Glenarm Pl. Telephone the Alumni

Office, CR 9-3381, Ext. 251, for reservations.

Mines faculty members and alumni who will present papers at the SPE fall meeting are:

Lincoln F. Elkins, P.E., '40, manager, Production Research, Sohio Petroleum Co., Oklahoma City, Okla., "Spraberry Fracture Orientation from Pressure Interference;"

Peter C. Badgley, associate professor, CSM Geology Department, and W. C. Penttila, Geol. E., '56, formerly geologist with The Atlantic Refining Co. and now graduate student at the Colorado School of Mines, "Geologic Aspects of Fracturing Reservoirs;"

Dr. John S. Rinehart, professor and director CSM Mining Research Laboratory, and William C. Maurer, graduate student, CSM Mining Department, "Fractures and Craters Produced in Sandstone by High Velocity Projectiles;"

W. W. Owens, P.E., '47, Technical Research group supervisor, Pan American Petroleum Corp., Tulsa, Okla., "A Scale Model Study of Bottom Water Drives;"

Dr. Ben Habermann, P.E. '56, MSC. '57, DSC. '58, research engineer, Union Oil Co., Brea, Calif., "The Efficiency of Miscible Displacement as a Function of Mobility Ratio;"

Sylvain J. Pirson, DSc., '31, Petroleum Engineering Department, University of Texas, Austin, Texas, "Water Oil Determination From Well Logs in Fractured and Vuggy Formations" and "Quantitative Interpretation of Electric Logs in Oil-Wet Rocks—Proposed Procedure and Example Applications;"

Charles H. Thurber, Geol. E., '39, vice president, Empire Geophysical Inc., Odessa, Texas, "Strata-Log;"

Harry O. McLeod, Jr., P.E., '53, now a graduate student at the University of Okla., Norman, Okla., "Investigation of Natural Gas Hydrate Behavior at Elevated Pressures;"

James W. Jennings, Geol. E. '54, MSC. '58, research engineer, Gulf Research and Development Corp., Pittsburgh, Pa., "Results of Fracturing with the Single Point Entry Technique—Big Piney (Wyo.) and Bijou (Colo.) Fields."

The first national meeting of the Society of Petroleum Engineers ever to be held in the Rocky Mountain area is expected to attract some 3000 to 3500 engineers and wives from throughout the United States and many foreign countries.

Two new well logging devices will be introduced at the meeting—the cement bond log and the sata log. New improvements in the chlorine log, induction log and spectral gamma-ray log will be discussed by experts.

Drilling papers will discuss the effect of dog-legs, effects of speed and weight, and drill bit-tooth behavior. Economics papers will cover future supply of U. S. oil, well spacing and an economic criterion for planning workovers of older wells.

Secondary recovery tests involving injection of alcohol and steam will be explained, as well as recent results in the miscible displacement method of secondary recovery and water flooding.

In still other sessions papers will cover well completions, reservoir engineering, rock mechanics, oil recovery processes, fracturing, production operations and gas technology.

Bloody Mary Breakfast Oct. 5

A Bloody Mary Breakfast for all MINERS will be held Oct. 6 at the 6th Annual Rocky Mountain Minerals Conference in Salt Lake City Oct. 5-7. Ask at the Registration Desk for time and location.

Management Workshop Oct. 9-14 At Pennsylvania State University

Pennsylvania State University, through its Mineral Industries Continuing Education Services, will present its 9th Coal Industry Management Workshop Oct. 9-14, at the White Sulphur Springs Hotel, Mann's Choice, Bedford County, Pa. Central theme of the Workshop will be "Improving the Quality of Management."

Specialists from the Penn State staff and from the coal industry will lecture on management methods, the labor agreement and its applications, industrial engineering applications, economics of the coal industry, and communications.

The Workshop is open to all levels of executive and supervisory management of the coal mining industry. Hotel accommodations limit registration to 35.

Direct information may be obtained by writing to R. B. Hewes, 119 Mineral Sciences Building, The Pennsylvania State University, University Park, Pa.

National Association Of Professional Engineers Meet Oct. 18-21 in Denver

The National Society of Professional Engineers will meet Oct. 18-21 at the Denver Hilton. More than 25 exhibitors will have displays in the exhibition area of the Hilton. NSPE Executive Committee and national directors will hold a series of meetings at the hotel starting Oct. 18. The Professional Engineers of Colorado, state chapter of NSPE, has also scheduled several meetings and sessions.

Social events include cocktail parties, a dinner dance on Oct. 20 and a full day of activities in the Colorado Springs area on Oct. 21.

Sam Hawkins is general chairman of the fall meeting; Mrs. E. W. F. Peterson, ladies activities chairman.

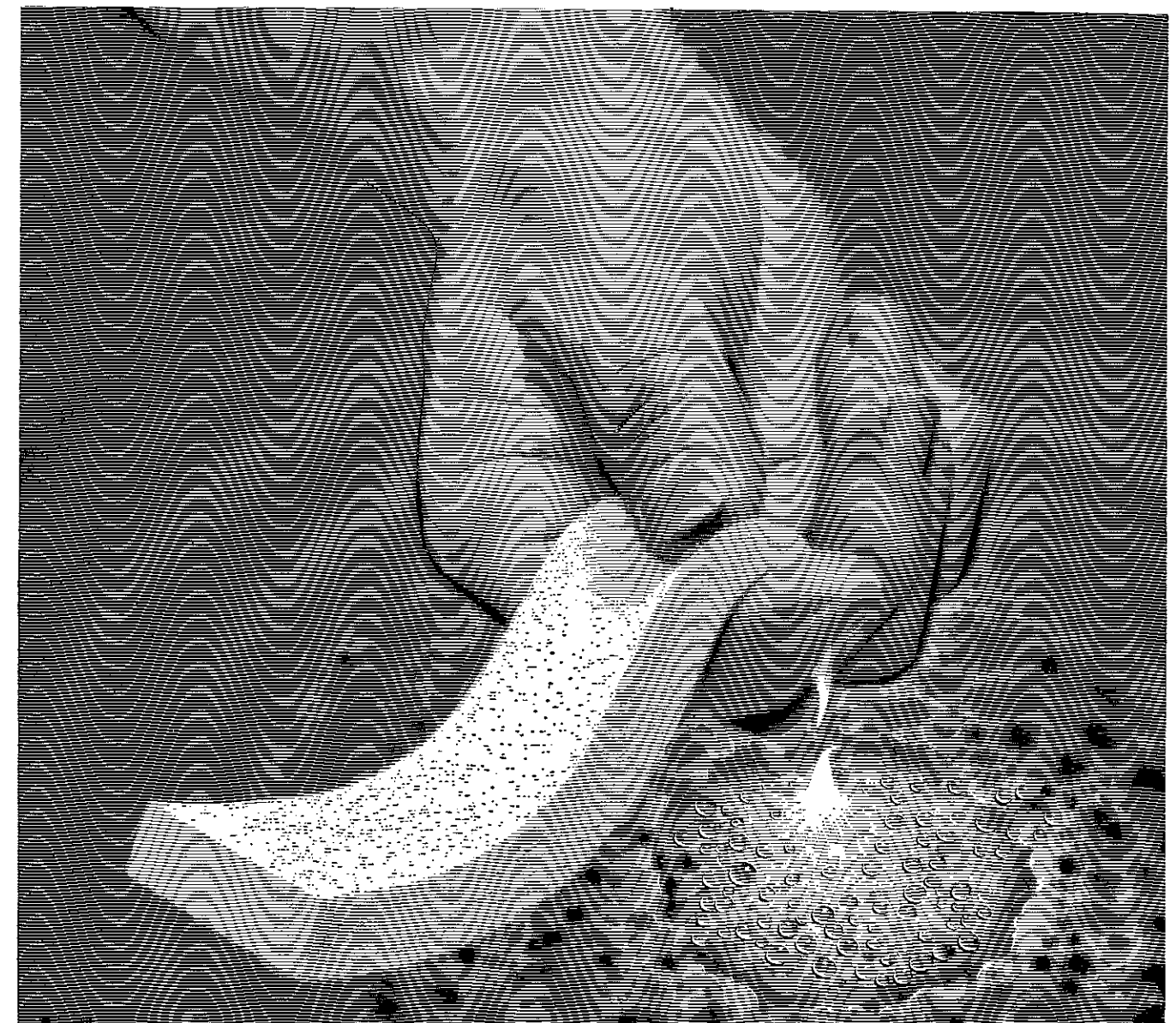
Concrete Institute Convenes Oct. 31-Nov. 2 in Tucson

"The Use of Epoxy Resins on Highways" and "Missile Base Construction Problems" are among 18 papers and reports to be presented at the American Concrete Institute's 13th Regional Meeting which convenes at the Pioneer Hotel, Tucson, Ariz., Oct. 31 to Nov. 2.

The meeting will also feature a joint research session of the ACI and the American Society for Testing Materials on Wednesday afternoon, Nov. 2. Dr. A. Allan Bates, president of ASTM and an ACI director, will speak at the pre-session luncheon. Dr. Bates is vice-president of research and development for the Portland Cement Assn., Skokie, Ill.

General Chairman Dr. Gene M. Nordby, head of the civil engineering department, University of Arizona, Tucson, said the three-day meeting is open to anyone interested in concrete construction, design, and research.

(Continued on page 30)



... a hand in things to come

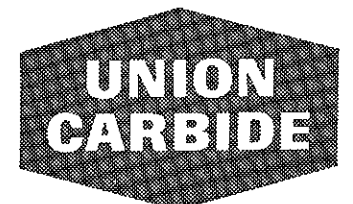
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Some ordinary-looking liquids are mixed together. In minutes they react, and the mixture foams and rises to become one of today's finest cushioning materials—light, tough polyether foam. This is the magic of chemistry.

People everywhere are enjoying the restful luxury of this new foam. It can be tailor-made for any use . . . soft enough for the cushioning of your favorite chair or automobile . . . firm enough to give restful support in a mattress . . . or even firmer for the safety padding on your automobile dashboard. In thin sections, it's being used as an interlining for winter clothing and insulation for sleeping bags. And because it contains countless tiny cells, this foam in rigid panels makes a highly effective insulation for walls and refrigerators.

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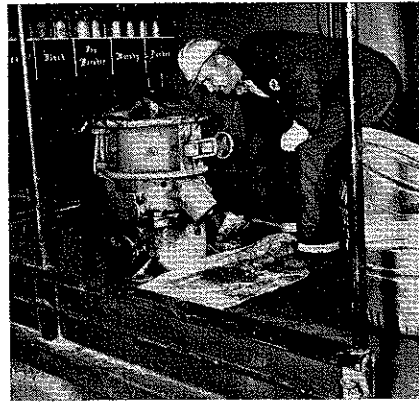


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WITH THE MANUFACTURERS

Coal Crusher-Sampler

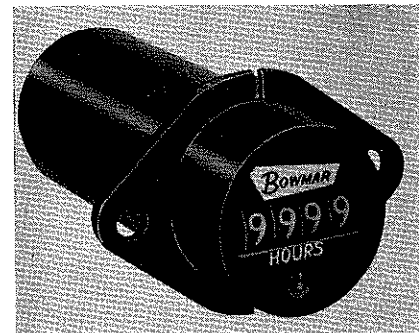
The Sturtevant coal crusher-sampler, long a standby in utilities and mines, may be destined for a new role in the service of coal forwarding firms, according to officials of Sturtevant Mill Co., Dorchester, Boston, Mass. The manufacturer's predictions are based on the experience of Fry Coal and Stone Co., Mercersburg,



Penn. which has mounted a standard crusher-sampler on a 3/4 ton pickup truck and is using it for sampling coal at points-of-use, mines and laboratories. Power for the unit is being supplied, not by the standard three horsepower motor usually provided, but by 15 horsepower obtained from power takeoff from the truck transmission shaft.

Elapsed Time Indicator

This new elapsed time indicator, displayed by Bowmar Instrument Corp., is the latest development in counting devices to monitor operating-hours of ma-



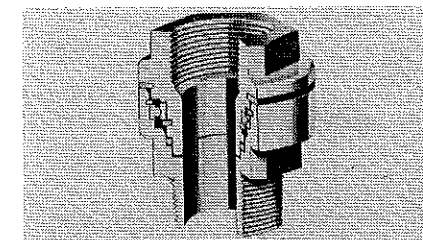
chinery. Only 1.8 ounces in weight and measuring slightly more than a half inch in diameter, the unit nevertheless has an unusually high numeral readability level, featuring 1/10th-inch white numerals on dull black background.

Push Feed Rock Drill



A compact push feed rock drill which can be manipulated into any position by handle-grip controls is being introduced by Thor Power Tool Co. of Aurora, Ill. Designated Model 330, the drill's balanced design permits the operator to manipulate drill, rotate feed leg pressure control valve to raise the drill and operate a push-button thumb control to lower the drill without removing his hand from the handle grip. The drill is available with manual (No. 335) or power-retracted (No. 333) interchangeable feed legs, which are attached to the drill with a single-adjustable tension nut.

Swivel



A new hose swivel, featuring steel ball bearing design, has just been introduced by OPW-Jordan. Used on liquid lines in general industrial applications where easy swiveling action is necessary, the new unit revolves freely at pressures up to 125 psi and temperatures to 225° F. The No. 20 Hose Swivel can be used to make piping and tubing flexible or movable, or as swivel connectors on hose to

eliminate damage due to twisting. Features, illustrations, prices, specifications and complete engineering information shown in 2-page Bulletin NP 20-E, OPW-Jordan, 6013 Wiehe Rd., Cincinnati 13, Ohio.

CLASS NOTES

(Continued from page 2)

WILLARD T. CHEVALIER, '36, may be addressed c/o McGraw Hill Publishing Co., Inc., 330 W. 42nd St., New York 36, N.Y.

DAVID S. WHITAKER, x-'36, 1747 E. Kentucky Ave., Denver 9, Colo., writes: "My family and I enjoyed Homecoming at Mines last year, and I had a good time at a few Press Club luncheons of the Denver Section."

JOHN H. ARMSTRONG, '39, has moved from Jeffrey City, Wyo., to Greybull, Wyo., where he may be addressed c/o General Delivery.

E. W. DISSLER, '40, has moved from Calgary, Alberta, Canada, to 3612 Henrietta Ve., Bartlesville, Okla.

MARVIN E. GANTZ, '40, production assistant, Alcoa, lives at 102 Longview Dr., Sherwood Hills, Cannonsburg, Pa.

JACK H. MCWILLIAMS, '40, employed in the Mining Division of Aluminum Co. of America, lives at 840 Foxland Dr., Pittsburgh 16, Pa.

GEORGE E. CROSBY, '40, staff engineer for Continental Oil Co., has moved from Corpus Christi to 3115 Duke, Houston 5, Texas.

S. REEVE M. DUHME, '40, formerly in Sacramento, Calif., may be addressed at Box 618, Winnemucca, Nev.

1941-'45

GLENN H. LANCASTER, '41, has moved from Riverton, Wyo., to 519 Avenue E, Powell, Wyo.

HOWARD C. PARKER, '41, may be addressed at P. O. Box 1212, Erie, Pa. Howard was living in Linthicum Heights, Md.

DR. I. MILTON LEBARON, '41, advises that his new address is c/o International Minerals and Chemical Corp., Old Orchard Rd., Skokie, Ill.

ANDREW T. PERRY, '41, has moved to 301 Bruce, Dumas, Texas.

E. M. PELOUBET, '41, has left Lake Mowhawk, N. J., for 19 Birch Pkwy., Sparta, N. J.

DOUGLAS L. PEARCE, '42, is general foreman, Solvent Refining, Dewaxing and Wax Sweating Dept., Standard Oil Co. (Ind.). He lives at 1681 Westridge Circle, Casper, Wyo.

JOHN G. ROESCHLAUB, '42, who was living in Tacna, Peru, is now living at 1435 S. Jasmine Way, Denver, Colo. He is employed in the Marcy Mill Division of Mine & Smelter Supply Co.

(Continued on page 9)

CLASS NOTES

(Continued from page 8)

BURTON T. WALTMAN, '42, has been transferred by New Jersey Zinc Co., from Hanover, N. M., to Mineral, Va.

FREDERICK L. DOTY, '43, lieutenant commander in the U.S. Navy, gives his address as 803 Terrace Dr., R.F.D. # 3, Peekskill, N. Y.

EDWIN S. RUGG, '43, geologist with Shenon & Full, lives at 4219 S. 3080 East, Salt Lake City 17, Utah.

T. WALTER BROWN, '44, formerly of Chattanooga, Tenn., is now living at Fleetwood Dr., Lookout Mountain, Tenn.

1946-'50

ALBERT C. LEVINSON, '47, formerly of Dayton, Ohio, is now living at 166 Edenhurst Dr., Centerville 59, Ohio.

THOMAS A. WARBURTON, '47, has moved from Glendora, Calif., to 51 Elena Ct., Walnut Creek, Calif.

MAJOR LYTLE B. WHITEFIELD, JR., '47, whose present assignment is Maag, Dalat, Vietnam, receives mail at 2369 Crabtree Dr., Littleton, Colo.

J. H. BRUNEL, '48, receives his mail at P. O. Box 229, Golden, Colo.

ROBERT F. EVANS, '48, who was living in Whittier, Calif., may be addressed at Box 431, Compton, Calif.

GEORGE W. HOFFMAN, JR., '48, has moved from Bellaire, Texas, to 3808 E. 28th St., Tulsa, Okla.

LEE M. MATHEWS, '48, lives at 800 Woodworth Dr., Findlay, Ohio.

ALAN L. STEDMAN, '48, formerly of Cheyenne, Wyo., receives mail at P. O. Box 458, Arvada, Colo.

JAMES E. HEPPELT, '49, requests that his mailing address be changed to c/o American Overseas Petroleum (Spain) Ltd., Av. del Generalissimo, 35, Madrid 16, Spain.

WILLIAM E. McCOOL, '49, is exploitation engineer for Shell Oil Co., Petroleum Bldg. Centralia, Ill.

ROBERT R. EDISON, '49, has moved from Denver to 731 Enterprise Ct., Chicago Heights, Ill.

FRANK A. FOLEY, '49, has moved from Huntington Park, Calif., to 7450 Via Amorita, Downey, Calif.

HUGH J. MATHESON, '49, is owner of Chandalar Mining Co., via Bettles, Chandalar, Alaska.

WILLIAM G. PARK, '49, senior geologist for El Paso Natural Gas Co., receives mail at P. O. Box 208, Uvalde, Texas.

PAUL LEO PLACEK, '49, is employed as an extractive metallurgist by the U.S. Bureau of Mines, 1600 East 1st South St., Salt Lake City 12, Utah.

DONALD H. BLAIRE, x-'50, party chief for Continental Oil Co., has been transferred from Slaton, Texas, to Lovington, N. M., where his P. O. Box is 635.

GARTH B. HARLAN, '49, is assistant chief, Planning and Reports Branch, U.S. Army Engineers District, Box 7002, Anchorage, Alaska.

PHILIP K. HOUSTON, JR., x-'50, receives mail at P. O. Box 66, New Market, Tenn.

H. J. KINGRY, JR., '50, receives mail at P. O. Box 590, New Orleans 7, La.

JOHN R. WEYLER, '50, is assistant to Division Manager, Pure Oil Co., 1700 Broadway, Denver 2, Colo.

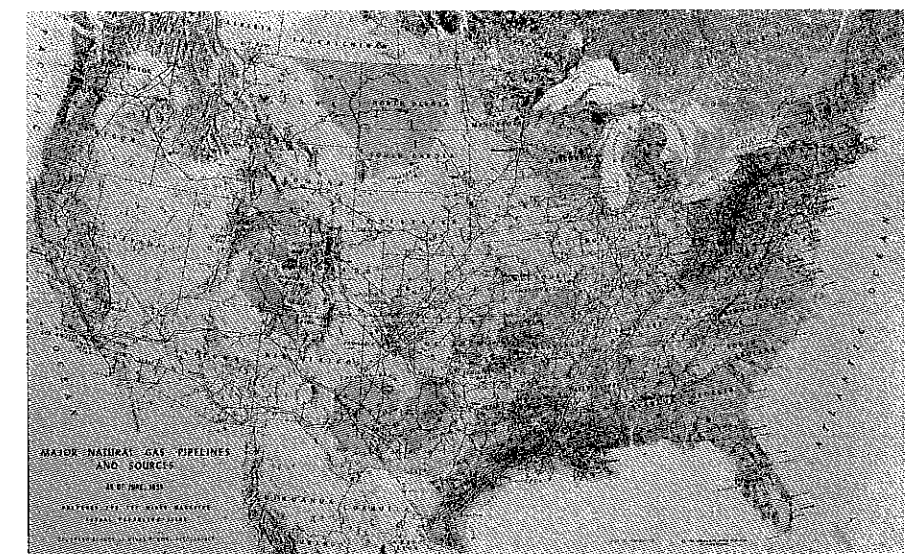
1951

D. G. COPPEDGE, geophysicist for Sohio Petroleum Co., has moved from New Orleans, La., to Houston 1, Texas, where his P. O. Box is 624.

J. I. MERCIER, formerly of Bakersfield, Calif., may now be addressed c/o Tidewater Oil Co., Apartado 548, Las Palmas, Gran Canaria, Spain.

RICHARD MILLER'S new address is 10331 Sandra Lynn Dr., Dallas 28, Texas.

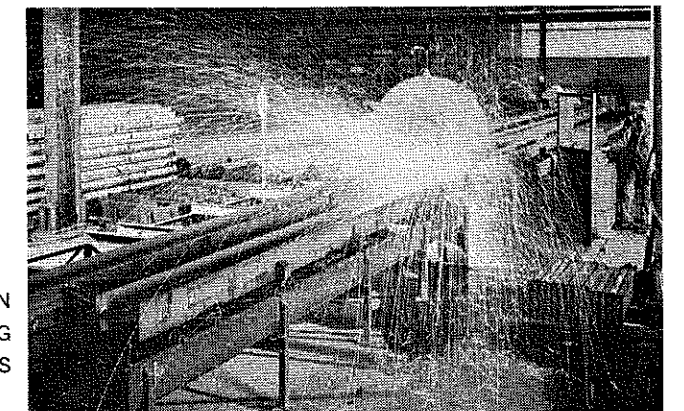
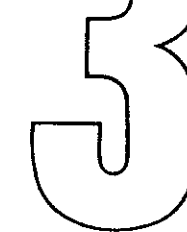
(Continued on page 10)



The November 1959 Petroleum issue is still available, although in short supply. This issue was devoted to "Natural Gas Business in the United States." In addition to coverage of this important theme, the magazine contains a separate map showing the Major Natural Gas Pipelines and Sources. Map is in three colors and reflects elevation. This map in itself is worth the price of the Magazine, \$3. Send your order to the MINES Magazine, Guggenheim Hall, Golden, Colo.

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Edward J. Brook, '23

P. O. Box 392
Breckenridge, Texas

Lloyd W. Madden, '41

CLASS NOTES

(Continued from page 9)

LARRY E. O'BRIAN, formerly of Casper, Wyo., receives mail c/o Phillips Petroleum Co., 1200 Denver Club Bldg., Denver 2, Colo.

ROBERT W. POWELL, metallurgist for Aluminum Co. of America, lives at 1628 Lincoln Rd., Bettendorf, Iowa.

RODERICK K. RAWLINS has moved from Billings, Mont., to 1648 W. Brande, Anaheim, Calif.

HOWARD C. WORZEL is production engineer, Hawkins District, Humble Oil & Refining Co., with mailing address 3314 Greg Lane, Tyler, Texas.

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1952

CURTIS D. CONLEY, geologist, Denver Research Center, Ohio Oil Co., lives at 3398 W. Monmouth, Littleton, Colo.

GUY HOUGHINS is senior geophysicist for Pan American Petroleum Corp., with mailing address 1033 N. Western, Liberal, Kans.

MARVIN A. KUNDE has moved from Denver, Colo., to 405 Cochran Rd., Pittsburgh 28, Pa.

DREXELL L. LEE, exploration engineer for Shell Oil Co., has been transferred from Denver to Billings, Mont., where his P. O. Box is 2547.

THOMAS J. PIERSALL, a 1952 petroleum refining engineering graduate of Mines, has been carried as "address unknown" for the past several years. Frequent rumors persist that Mr. Piersall died soon after graduation. If anyone has any knowledge of this, please write The MINES Magazine, so that Alumni records can be corrected.

LAWRENCE WILLIAMS has moved from Peoria, Ill., to 306 Miller Ave., Peoria Heights, Ill.

1953

L. E. BROW, geophysicist for Humble Oil & Refining Co., has been transferred from Miles City, Mont., to Tulsa, Okla., where his mailing address is 1408 E. 49th St.

WILLIAM E. BURNEY'S mailing address is P. O. Box 330, Fort Collins, Colo.

CARLOS CARROLL has left Guatemala and is now living at 3911 W. 24 Ave., Denver, Colo.

HAROLD P. DUNN is equipment engineer for Standard Vacuum Oil Co., with mailing address 22 Jennifer Lane, Port Chester, N.Y.

WILLIAM C. GARDNER, formerly of Climax, Colo., is living at 3409 S. Lincoln, Englewood, Colo.

EDWARD J. HAMMER is engineer for U.S. Gypsum Co. with mailing address 2546 W. Wilson Ave., Chicago 25, Ill.

A. HERBERT HARVEY is manager of Tex-Harvey Oil Co., Tex-Harvey Bldg., Midland, Texas.

WILLIAM R. PEAVY has moved from Cheyenne, Wyo., to 3285 S. Race St., Englewood, Colo.

H. RAY POULSEN, JR., has moved from Pollock Pines, Calif., to Outlook, Sask., Canada, where his P. O. Box is 506.

THEODORE SALIM, product engineer for B. F. Goodrich Aviation Products Co., lives at 19437 Anaconda St., Rialto, Calif.

CHARLES TRAUTMANN'S address is 410 Canner St., Apt. 412, New Haven, Conn.

1954

ROBERT C. BARTLETT is employed by Shell Oil Co. with mailing address VAN-Voorschotenlaan 14, The Hague, Netherlands.

CARL L. BLAZEL, program analyst for System Development Corp., lives at 1021 23rd St., Santa Monica, Calif.

(Continued on page 33)

A NEW DRILLING AND BLASTING COMBINATION

By JOHN A. BRANDON, '49

The trend in drilling and blasting in the mining industry in recent years has been to smaller, more efficient equipment. The replacement of leyners with jacklegs was a spectacular example of the trend, but a similar trend has gone all but unnoticed. This is the gradual reduction in blast-hole diameter, which has a great cost potential. As recently as 15 years ago, "conventional steel" was standard; most of the integral bits started at 2¼-2½ finishing at 1½-in. or larger gauge. The advent of the threaded jackbit made little change in the customary starting diameter. Not until the tungsten carbide bit appeared in general use did hole diameters decrease.

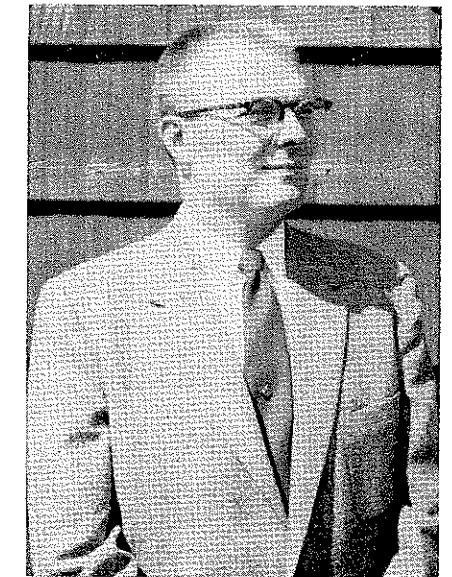
Within the past 10 years, the experience of many operators is that sufficient explosive can be packed into a cylindrical hole 1½-in. or less in diameter to reduce rock to manageable size. However many operators are still using 1⅝- or 1¾-in. carbide bits. The work of several specialists in the fields, such as Art Ruff at Cananea, George Huber at Stanford, and the State Water Board in Sweden, stirred the first feelings of doubt about the necessity for large quantities of explosives in blast holes for stoping.

Other Factors Significant

Their work indicated that although the magnitude of the shock waves induced in blasting is important, other factors not formerly considered important have significant effects. Among these, but certainly not limited to the ones listed, are exact hole placement, delay sequence, delay timing, and velocity of detonation. The Swedes carried their reasoning to the point where ⅞-in. holes were being blasted with ¾-in. diameter explosive cartridges without increasing the number of holes in their patterns—their only concession was to boost volume strength to 80 per cent or even as high as 90 per cent. This practice was familiar to Swedish miners as early as 1951.

Reasons for Larger Drill Holes

Several considerations have kept American operators, until recently, from following this trend. In the first place, hole diameters below 1¼-in. are not possible, or at least practical, with domestic equipment. Alloy steel has certainly been an improvement



JOHN A. BRANDON, '49

THE AUTHOR

John A. Brandon, who studied civil engineering at the University of Nebraska and Texas School of Technology before receiving his E.M. degree in 1949 from the Colorado School of Mines, is in charge of the Industrial Engineering Department of Hecla Mining Co.

From his graduation from Mines, he was employed for about four years by American Smelting & Refining Co. as plant metallurgist, miner and gypo, shaft boss and shift boss at Magdalena, Deming and Vanadium, N. M. For nine months during 1953 he was demonstrator for Atlas Copco Pacific in Colorado, Arizona and New Mexico. From 1953 to 1957 he was shift boss at AS&R's Page Mine, Kellogg, Idaho.

In 1957-58 he was superintendent of Hecla Mining Co.'s Livingston Mine at Clayton, Idaho, and relief foreman during the winter of 1958-59 of Hecla's Silver Mountain Mine, Mullan, Idaho. Since 1959 he has headed the company's Industrial Engineering Department at Burke, Idaho.

over carbon steel, but even its strongest advocates admit that when we get down to ⅞-in. stock both the manufacture and subsequent treatment are subject to occasional erratic results. In order to drill holes smaller than 1¼-in., drill steel must be ¾-in. or smaller across the flats. Also, at the present time no bits of domestic manufacture are offered below 1¼-in. gauge diameter.

Another reason for maintaining the larger hole size was the available selection of blasting agents. Fuse priming is more often used in stoping than electric delay priming, as normal interval delays make no more efficient use of explosive energy than do fused primers, while being more expensive. Thus, with 1-in. diameter cartridges the smallest powder conveniently available, and fuses ¼-in. in diameter, it was difficult to load holes smaller than 1⅝-in. Still another factor hindering the trend to smaller holes is the prevalent opinion that full value cannot be returned by a small carbide bit, because gauge wear will make it unuseable long before the insert shows appreciable loss of height.

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New Combination of Blasting Agents

All these considerations have a certain demonstrable validity, taken one at a time. However, a new combination of blasting agents and equipment holds out the promise of cost reduction for mine operators. Hecla Mining Co., at the Star mine in the Coeur d'Alene district of Idaho, has successfully developed such a combination. Its ingredients:

1. 3/4-in. hexagonal alloy drill steel with integral tungsten carbide chisel inserts of approximately 1-in. gauge.
2. Millisecond delay electric blasting caps.
3. Low-velocity, low-density explosives of the non-headache type in 7/8 x 16-in. cartridges.
4. Standard jackleg equipment of the 55-60 lb. hammer class.

Brief Review of Steps Taken

Interested operators will immediately have several pointed questions about the first three items. An attempt to foresee all the questions would be very difficult, but a brief review of the steps taken in developing the combination may indicate some of the answers.

The first item, drill steel, was subjected to a preliminary test for rigidity and elasticity. A 6 ft. rod was drilled 5 in. into a granite block, and a jackleg and machine were left hanging on it for 24 hours. No detectable permanent deflection occurred. (The same load on a 3/4-in. carbon steel rod developed a permanent 10° set in 5 minutes.) The rigidity of the steel is high enough that miners experience no difficulty drilling out with 8 ft. rods in hard, fine-grained quartzite—no short starter steels are needed. Quality is such that of the first 50 rods used, only two were "shanked" in drilling.

Small-Gauge Bit Wear Not Excessive

It was believed that gauge wear might render the small-gauge bits unuseable very rapidly, especially since gangue at the Star mine is highly abrasive. It came as a very pleasant surprise when only 1/64-in. gauge loss occurred at the ultimate footage, the point where all the supporting metal had been worn or ground away from the carbide insert.

The most probable explanation is that two factors are involved: penetration rate is from three to four times greater than with 1 1/2-in. gauge bits; and the effective abrasive area has been reduced 1/3. Abrading the bit 1/4 the former time against 1/3 less surface should produce approximately 1/6 the gauge loss experienced with 1 1/2-in. bits. The thought that this steel drills too fast to wear out may have a large measure of truth. Only normal control to prevent over-drilling is required.

Some Difficulty in Loading Rounds

The only difficulty encountered with small holes is in loading some of the rounds. Ravelly ground in some of the stopes necessitated working out a technique for "mudding" the holes. Drilling at slightly reduced throttle, restricting water flow to a trickle, and shutting off the water approximately 1/2-in. before bottoming a hole effectively cases even our most friable ground. Ground completely free of talc or gouge may not be amenable to this treatment.

Speculation about the necessity for more holes of the smaller diameter is certainly justifiable. The old adage that "it takes just so much powder to break a

ton of rock" is often quoted. However, none of the explosives experts or manufacturers has a completely reliable factor for underground blasting, so each operator is on his own. Our experience has been that with fused primers, the adage is more or less true, but blasting with millisecond delay primers throws out this rule.

Number of Holes Reduced 20 Per Cent

Rather than increasing the number of holes, we have been able concurrently to reduce the hole diameter from 1 1/2 to 1 in. while reducing the number of holes roughly 20 per cent. A curious fact has been proven in all three general types of rock occurring in the Star mine (penetration rates of 6, 12, and 40 in. per minute): the first row of holes next to the free face can have a burden of no more than 18 in., while all subsequent holes may have a spacing up to 40 in. and a burden of 30 in. (This applies only to ground being breasted down, and the rules change for development rounds.) Thus, a standard pattern independent of hole diameter or character of ground has been developed, varying only with the width and height of the face. The tremendous advantage of having dependable standard patterns is especially obvious to all supervisors.

Millisecond Delay Priming

Millisecond delay priming has also overcome the need for tamping powder. As we have achieved our best fragmentation by string-loading, we are able to keep the powder factor down and still load to within 12-16 in. of the collar by not tamping any except the last cartridge. Tamping the last stick is done solely to prevent pulling the explosive from the bottom of the hole while wiring up the round.

With millisecond priming, we have experienced the other beneficial side effects noted by most operators: improved fragmentation, better walls and back, and less powder in the muck.

No Experimentation with Powder

The brand of powder used was not subject to experimentation. The company has used the non-headache explosives (nitrostarch base) in all its operations for several years. The morale and effectiveness of a mine crew not handicapped by the sick headaches induced by nitroglycerine and its combustion products have a high value, no matter how great the difficulty of evaluating it in dollars and cents.

The only permissible variable was the strength. Our standard strength is 60 per cent by weight (45 per cent by volume), but we are currently trying some of 65 per cent weight strength. The low velocity (possibly 12,000 fps confined) is desirable for us. Our harder ground permits a considerable range of velocities, but our softer ground "potholes" and bootlegs with high-velocity explosives. Thus, the characteristics of this type powder (two comparable products are commercially available) combine to give us an excellent blasting agent. Incidentally, even considerable quantities of water cause no problem, provided it is not under pressure and that the primer stick is kept intact.

Three Makes of Jacklegs Being Used

We are using three makes of jacklegs at the Star Mine. Two of the manufacturers offer 3/4 x 4 1/4-in. chucks as standard equipment, and outside parts

(Continued on page 26)

Mining In Mexico*

By CLIFFORD R. PARLIMAN

Most prominent discovery and production of mercury was in the Opal area. Conditions leading to its discovery were unusual. Ignacio Martinez of Durango, Mexico, while prospecting for gold about 20 years ago encountered a sizable mountainous knoll covered with red rock. He found the red colored rock to be extremely heavy. Martinez cracked two of the red rocks apart and was surprised to see the vivid red color inside. He bagged a few of the rock samples, then sat on a large red rock to eat lunch. The red from the rock came off on the seat of his britches. He was neither a mining engineer nor a geologist but a prospector at heart with a yen to discover good pay-ore and with a belief that there was lots of gold to be discovered in the mineralized mountains of Durango.

The story is told that his wife was astonished at the sight of blood-red color on the seat of his pants and asked him what it was. This reminded him of his bagged samples. He had them assayed, and was highly elated to find the ore was of a high grade cinnebar. Since then, with courage and hard work, Ignacio Martinez has become the mercury king of Mexico and a very rich man.

Mercury Deposits Developed

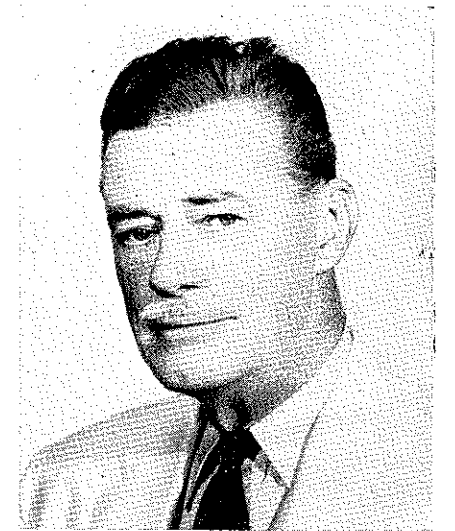
Don Ignacio Martinez has competently developed his vast mercury deposits, and today the casual observer is impressed by a huge array of equipment serving six big furnaces and by the elaborate village housing supervisors and laborers. He had the ore, but he deserves great credit in putting together his big mercury project at Opal. Starting from "scratch," he had to work out his problems in a hard-earned accomplishment that reflects the sterling character of the man who put it together.

In the same area adjoining his property, two other projects are also producing mercury with substantial profit. Another area in which mercury is being produced successfully is in the vicinity of Sombrerete.

Fresnillo and Avino

The silver mines of "Fresnillo" and "Avino," first discovered by Capt. Gines de Mercado were opened up by Capt. Francisco de Ibarra when he became governor of Durango. His richest workings at "Avino" was in his "El Tajo" mine, yet it ran only about 2 to

* This is the second in a series of three articles by Mr. Parlman entitled "Mining in Mexico." His first article (in the August 1960 issue) described iron mining; the second (in this issue), mercury and silver; the third (to be published in the October issue), gold mining.

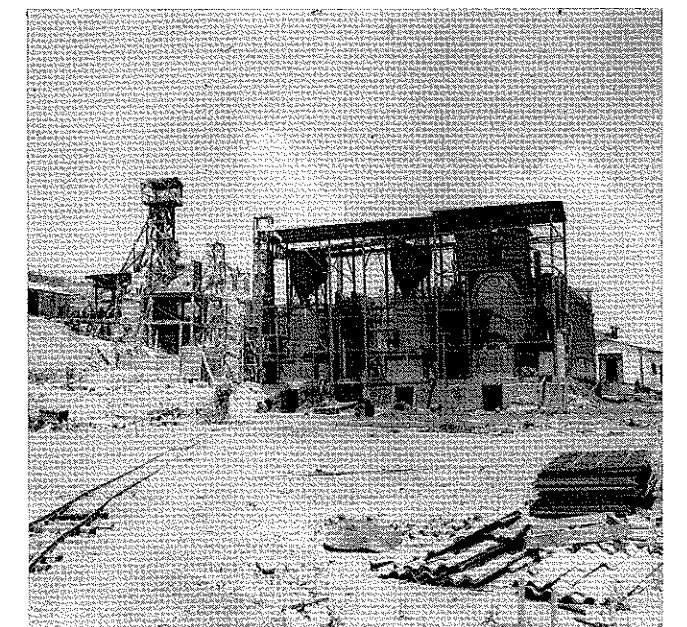


C. R. PARLIMAN

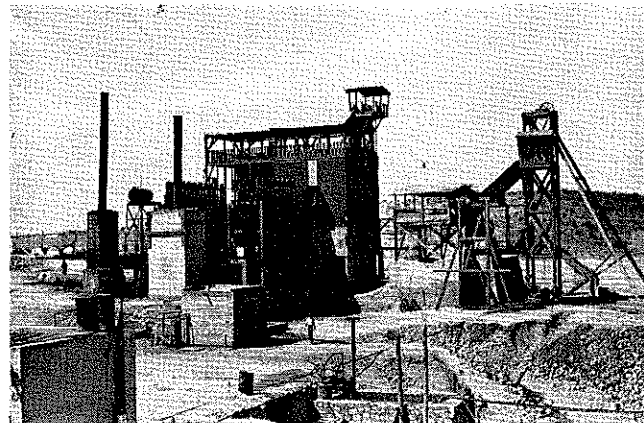
3 grams of gold and less than a kilo of silver per ton. It was not rich enough for him to handle personally, so he equipped it with machinery at his own expense and turned it over to Spanish families—with a proviso that they would build their homes and live at "Avino." Recently an American by name of E. B. Zachry acquired "Avino" and is reopening it.

"Fresnillo" was first opened up by Captain Ibarra's men, but finding the ore too low grade to suite them, they abandoned it. Later it was worked with considerable profit by other Spaniards down into the sulfides. Some 40 years ago, "Fresnillo" was taken over by American interests and operated by the Fresnillo Mining Co. Mrs. Potter Palmer of Chicago became one of the largest stockholders. Development of these old Spanish mines grew slowly but soundly into one of the largest producers of low grade ore in Mexico, with a production of about 2,000 tons per day.

There are today splendid opportunities for Americans to enter into mining activities in the state of Durango. However, a natural mistake often made is to seek advice from strangers who speak English. Such strangers—met in lobbies of hotels or banks or



▼ The "Nuevo Mercurio" one of the six furnaces of Martinez Mercury Mines at Opal, Mexico.



▼ The "San Jose" one of six furnaces of the Martinez Mercury Mines at Opal, Mexico.

in some restaurant—invariably have something they want to sell, hence have biased opinions. It is a wise procedure in any foreign country not to talk one's business, except with a reputable, informed source. When mining information is sought, there is no better place to make inquiry than at the offices of Fomento Minero.

Comision de Fomento Minero

Fomento Minero is the mining commission of the federal government, titled, "Comision de Fomento Minero." It has records of known ore deposits in every state of Mexico and maintains offices in the important ore-producing states. The directing head of each office is well informed as to the ore deposits of record within his state. The directing head of Fomento Minero, in the state of Durango, is Macario Munoz Collin, a graduate mining engineer who speaks English as fluently as he does Spanish. He has a wide background of practical mining experience and is well informed. He is both courteous and cordial to guests, yet seldom makes recommendation. But to a man seeking advice, Mr. Collin can be very helpful in giving facts.

A mining operation in Mexico can be a profitable undertaking and a pleasant adventure. On the other hand, as in drilling for oil, all mining is a gamble. A good mine must have the ore—no man can put it there. A discovery is only a discovery until exploration proves the ore body is worthwhile. However, in search for commercial ore deposits, surface outcrops are only an indication of what might lie below. It takes courage—with money and sweat, picks and shovels, air-compressors, drills, steel and dynamite—to determine the value of an ore deposit below ground.

Taxes on ore production in Mexico must be paid each month as they become due. Failure to pay the normal production tax to the Federal Hacienda automatically imposes a penalty on the delinquent producer.

There has been much "bunk" circulated about Mexican mining laws, but to those who know them, they have been found to be simple, rigid and very effective in protecting the owner's interests. There has been no record of an owner of a mining title ever losing his holdings if he lived up to the law. The minerals of Mexico are owned by the federal government. Concessions through an Expediente or mining title must therefore be secured through the state agent of the federal government in the state where the property is located. The agent for Durango is Ing.

Alfonso Salas Rivas, who gladly assists applicants in the proper steps required to secure title.

Mining Advantages in Mexico

With its present stable government, Mexico today has more mining advantages than it ever had before, partially summarized as follows:

- (a) *Labor*: The prevailing Mexican labor rate is about 21% of USA
- (b) *Taxes*: Taxes are variable—they approximate about 33% of USA
- (c) *Transportation*: Railroad ore cars—about 24% of USA
- (d) *Diesel Fuel*: Approximately 60% of USA
- (e) *Gasoline*: Ranges between 67% and 95% of USA
- (f) *Lumber*: Approximately 80% of USA
- (g) *Trucks*: Mexico's vital mistake that should be corrected to help mining. 1959 Mexican cost about 200% of USA
- (h) *Ore*: The highly mineralized areas of the state of Durango and part of adjoining states states of Zacatecas and Chihuahua possess a tremendous volume of ore yet unexplored.
- (i) *Old Spanish Mines*: Durango has numbers of old Spanish gold and silver mines that are available to finance and reopen. Most of these mines were abandoned by the early Spaniards, due to their inability to handle their bottom sulfides. Some have records of former production. The saving feature has been in the cost of dewatering and reopening.
- (j) *Ready Market*: Numbers of responsible smelters are located in easy railroad distance from mineralized areas. The smelters buy produced ore at prevailing rates, less smelter charges.
- (k) *Roads*: Many new roads have recently been constructed leading into mineralized areas. These add to mining advantages.

New Roads in Mineralized Areas

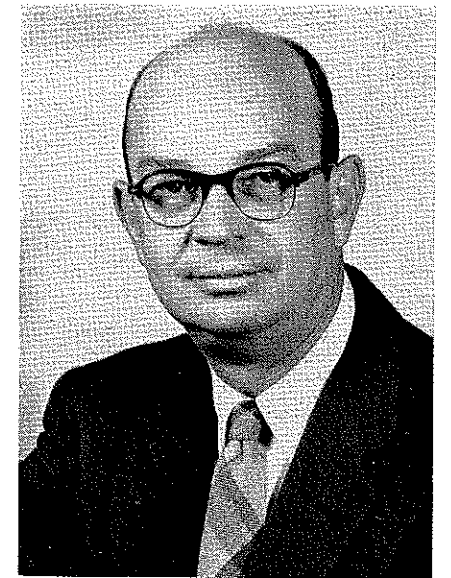
During the last three years, Lic. Francisco Gonzalez de la Vega, governor of Durango, built hundreds of miles of new paved roads into the state's mineralized areas. This was a rare present-day accomplishment that had repeatedly been promised by former governors but never done, until the advent of Governor Francisco de la Vega.

The new scenic highway over high mountains that now connects the city of Durango with Mazatlan is a gorgeous drive for motorists. The natural beauty of virgin pine timber stretching out both sides of this 200 mile drive is magnificently enhanced by its undulation and the variable elevation of the highway itself. The new highway from Durango to Santiago Papasquiario is complete, and its extension from Santiago Papasquiario to Tepehuanes is now under construction. An engineering survey was made in 1959 to construct a road from San Lucas to Coneto and surveys for three other roads into mineralized areas are now scheduled.

These new roads are a great improvement over the lack of roads in the past and an immense help for truck transportation. However, in almost every instance mine locations are off the paved roads some distance and a hauling or connecting road must be built from the mine to the pavement. Although such a road is roughly constructed, nevertheless the cost of its construction and the maintaining of it represents a definite cost to the mining operation that should not be overlooked.

Columbium at Powderhorn, Colorado

By ROBERT M. GROGAN



DR. ROBERT M. GROGAN

THE AUTHOR

Dr. Robert M. Grogan, manager of the Geology Division of Du Pont's Development Department, has been in geologic work since 1933. He started with the company in 1951 as a member of staff of the Development Department and was made manager of the newly formed Geology Division in March 1960.

Prior to joining Du Pont, Dr. Grogan was geologist for the Illinois State Geological Survey and did consulting work on limestone and fluorspar resources in Indiana and Kentucky. He was also a consultant to the Armour Research Foundation in connection with fluorspar deposits in Mexico.

Born at Mendota, Ill., July 17, 1912, he attended the public schools there and was graduated from the University of Chicago in 1935 with a bachelor of science degree. He received his master of arts degree in 1936 and his doctoral degree in 1940 from the University of Minnesota.

He has written a number of articles for scientific publications. He is a member of the American Institute of Mining and Metallurgical Engineers, the Geological Society of America, Mineralogical Society of America, the Geochemical Society, Philadelphia Mineralogical Society, Society of Economic Geologists, Sigma Xi scientific honorary society, and the Mining Club.

what of one of those ashtrays for pipe smokers, consisting of a bowl with a knob in the center

Attempts to Exploit Vermiculite

Two attempts to exploit vermiculite derived from biotite by weathering were made in the 1930's and at the outset of World War II, but both failed. Although the presence of columbium in the rocks of the area in greater than normal amounts had been observed and mentioned by earlier investigators, attention had been paid mainly to the rocks and minerals in the pyroxenite zone, while the carbonatite itself was generally ignored. As a matter of fact, the pyrochlore in the carbonatite is quite inconspicuous and difficult to see and it is no wonder that it was

Columbium occurs at Powderhorn, Colo. principally as the calcium columbium oxide mineral, pyrochlore, in a large carbonatite plug composed mainly of dolomitic marble. Pyrochlore is of great interest as a potentially commercial source of columbium metal because there seem to be many more tons of it available than there are of columbite, the standard ore of columbium, the reserves of which are so limited as to have discouraged metallurgists from planning expanded uses of the metal. Pyrochlore occurs in commercial amounts in other carbonatites and closely related deposits in Africa, Brazil, Canada, Norway, and Russia, and in granites in Africa and Canada, and is considered to be the most promising columbium mineral of the future.

Deposit Near Gunnison

The Powderhorn deposit is located 25 miles southwest of Gunnison, 200 miles southwest of Denver. It is in the area of alkalic rocks studied by Esper S. Larsen in 1912 and later years, and described in his 1942 U.S.G.S. Professional Paper "Alkalic Rocks of Iron Hill, Gunnison County, Colo."

More recently, J. C. Olson and S. R. Wallace of the U. S. Geological Survey made a study of the thorium and rare earth possibilities of the area, and published their findings in U.S.G.S. Bulletin 1027-0. Magnetite, vermiculite, and perovskite have attracted the attention of prospectors and developers to the area at various times, and there is even a group of patented old claims in the area which were patented in 1897, when William McKinley was president of the United States.

The carbonatite plug has a basal area of about 1½ square miles and forms two prominent hills, Big and Little Iron Hills, the highest of which rises 900 feet above the nearby valley of Cebolla Creek. Surrounding the plug on three sides is a horseshoe-shaped area of lower elevation which is underlain by a variety of less resistant rocks, the principal one of which is pyroxenite. The flat debris-filled valley of the Cebolla Creek is on the fourth side. High hills surround the pyroxenite area, and are composed of fenites grading outward into granite.

The topography of the area reminds one some-

overlooked until October, 1956, when the similarity of the Powderhorn rocks to those recognized as carbonatites in Africa was observed, and a successful search made for the pyrochlore which should have been there.

Du Pont Acquires Claims

Because of the potential importance of this deposit as a raw material source, the Du Pont Co. subsequently acquired by staking and by purchase of existing claims the mineral rights to close to 4,000 acres of land covering the carbonatite and the surrounding pyroxenite areas.

Intensive exploration was carried on in 1957 and 1958. Diamond drilling was attempted both years, with only moderate success. The carbonatite has been deeply weathered in some places and is honeycombed by solution enlarged joints and shear zones, so that water circulation is frequently lost in diamond drilling, and sludge returns are poor unless much time and money is spent on cementing. Recourse was soon made to dry drilling with air, using a regular Colorado Plateau-type drilling rig, consisting of a truck-mounted percussion drill and compressor. This rig weighed 13 tons and drilled a hole about 2½ inches in diameter. The sample was caught in a cyclone-type collector.

Over 15 miles of access roads were made with a bulldozer on which more than 600 air holes were drilled to depths ranging from 5 to 200 feet at horizontal spacings of 50 to 150 feet. Although the carbonatite can by no means be considered completely explored, enough of its surficial area has been sampled by drilling to indicate an ore reserve of considerably more than 100,000 tons of Cb_2O_5 in rock averaging at least 0.25 per cent Cb_2O_5 . An impressive amount of ore averaging 0.35 per cent Cb_2O_5 has been indicated in areas large enough to be mined by open cutting, and ore of still higher grade occurs in significant amounts. An engineering study of methods and costs of mining and concentrating made by Stearns-Roger Manufacturing Co. of Denver, including an ore dressing investigation by Colorado School of Mines Research Foundation, has defined an over-all economic picture which is encouraging.

Pyrochlores Described

The pyrochlore mineral is gray to cream or brown in color and is in octahedral crystals which are commonly half a millimeter to a millimeter in size. The largest ever found in the area is about one centimeter across. On weathered surfaces, pyrochlores can be seen sticking up like little hobnails. They generally are distributed in narrow zones of shearing in the rock, in which the dolomite crystals are elongated and where elongate apatite and blue amphibole crystals commonly accompany the pyrochlore. The pyrochlore contains a little thorium, but not enough that thorium radioactivity can be used as a guide to pyrochlore occurrence or abundance. Other thorium-bearing minerals are believed to occur in the rocks but have not been specifically identified in any of the Du Pont work to date. The apatite contains rare earths of the cerium group, the presence of which can be detected by using a hand spectroscope on specimens in sunlight in the field and observing the characteristic absorption lines of neodymium in the yellow region. Pyrite is widespread in the carbonatite, and has been altered to iron oxide to a notable extent. Magnetite is abundant locally, also mostly altered to

brown and red hydrated iron oxides. Jasperoid silica is prominent in places.

The carbonatite is characterized in many exposures by contorted banding, the bands striking generally in an east-west direction and having a near vertical dip. The bands consist of alternating darker mica-rich and lighter mica-poor phases of the carbonatite. The mica is biotite or phlogopite, brown to golden brown in color. In thin section, it can be seen that the mica was unstable in the carbonatite environment and underwent both chemical and mechanical breakdown. It occurs in little books that are split and frayed and that touch and bend around one another in fluid fashion. The ghost outlines of former mica books preserved in alteration products are visible in many of the lighter bands. This contorted banding, plus the presence of far-flung carbonatite dikes in the surrounding rocks indicate that the carbonatite is intrusive into the rest of the assemblage, and is younger than the pyroxenite and fenite.

Plans for Investigation

Plans for continued investigation of the pyrochlore deposit itself include driving a tunnel into a high-grade zone to check on the character and grade of ore at depth, and to prepare at that time a 50 to 100 ton bulk sample for later pilot plant ore dressing work. Although there is no desire or need to bring the deposit into production in the immediate future, Powderhorn does provide assurance of adequate domestic supplies for future Du Pont requirements, and long range plans for its development are under consideration.

Pyrochlore occurs in commercial amounts in carbonates and related rocks in Africa, Brazil, Canada, Norway, and Russia, and in granites in Africa and Canada. The world's largest in terms of columbium content, and probably the highest grade also, is reported to be the Araxa deposit in Brazil. The Norwegian deposit in the Fen area southwest of Oslo has been in commercial production for several years, yielding around 300 tons of pyrochlore concentrate annually. The Canadian deposits at Oka, Quebec, and near North Bay and Chapleau, Ontario have much promise and are currently undergoing much study. They are not in carbonatites, but are in fenites and various alkalic rocks which are characteristically closely related to carbonatites.

More Carbonatites in Africa

Africa appears to have more carbonatites than any other continent, some but not all of which contain pyrochlore. Two of these, Mbeya in Tanganyika and Sukulu in Uganda have been given a great deal of study and development, and several others such as Chilwa Island in Nyassaland have been investigated but to a lesser degree.

These carbonatites are geological oddities. All the work that has been done on them in recent years has helped to improve our understanding of them, but we are still a long way from knowing all we would like to about them. Certain group features are fairly clear:

- 1) Some carbonatites occur as the fillings of volcanic vents as at Kerimasi and Kapak in Africa.
- 2) Many occur in complexes in which the carbonatite is the central mass, ringed by a zone of felspathoidal and pyroxenitic rocks, which in turn is surrounded by a zone of character-

(Continued on page 27)

Interstate Highway West of Denver

By ROBERT A. BAXTER, '23

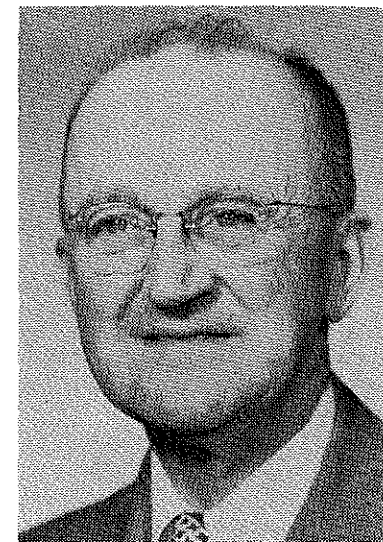
It may seem peculiar for a chemical engineer who has been a professor of chemistry to be talking about roads and tunnels, but I have dreamed of this road for so many years that perhaps I may be excused for celebrating the recent action of the Colorado Highway Commission in approving the route recommended by the E. Lionel Pavlo Engineering Co. of New York for the section of Interstate Highway from Empire Junction to Dotsero.

I first got into the problem of roads in this area about 24 years ago by protesting the decision of State Highway Engineer Charles Vail to build the highway over Shrine Pass and by suggesting that it might be better to go down Black Gore Creek. After about three years of discussion, he was persuaded to use the Black Gore Creek route over what has since become known as Vail Pass. Although there are several areas on the west side of Vail Pass where there have been slides, this has been a good choice for a road location and is still approved in the Pavlo report.

Highway Tunnel Locations

My next entry into the question of this road was in 1941, when Mr. Vail proposed to drive a highway tunnel under Loveland Pass. John T. Jones, who was a fireman at the School of Mines heating plant, objected and told the authorities that they would find very weak rock in the location they had selected. Unfortunately, Johnny Jones did not have any letters after his name, so the smart people would not believe him even when he described his experiences in mining mica in that area. He came to me, we got some other people interested and broke a story in the newspapers. Someone got in a panic and the contract for the pilot bore was let without any core drilling or other real testing. When the pilot bore was completed, it merely proved that Jones was right.

Having been thus drawn into the question of a highway tunnel under the Continental Divide, I studied USGS topographic maps and Forest Service maps and air-flight photographs. For this area, I depended most of all on USGS Professional Paper 178 "Geology and Ore Deposits of the Montezuma Quadrangle," by T. S. Lovering. In this paper Lovering pointed out the various rocks of the area and indicated that the ridge between the Loveland ski area and Straight Creek is made of the strong Silver Plume



ROBERT A. BAXTER

THE AUTHOR

Robert A. Baxter, a 1923 graduate of the Colorado School of Mines, retired last year with the title of Professor Emeritus after serving 37 years on the faculty of the CSM chemistry department. For 36 of those years he headed the School's division of organic chemistry.

A native of eastern Kansas, Professor Baxter attended the Kansas City schools and earned his degree in science at the University of Wisconsin, where he also received his professional engineering degree. Graduate work was completed at the University of Michigan and at the University of Colorado. He received his M.Sc. degree at Mines in 1923. During World War I he served with the Navy and was discharged with the rating of ensign.

A member of the American Chemical Society, American Gas Association, American Society for Engineering Education, and AIME, he has published articles in scientific and engineering fields and served for over 20 years as a collaborator for the Handbook of Chemistry and Physics. Since his "retirement," Professor Baxter has kept busy as a consulting engineer and as a director of the Golden Savings & Loan Association.

granite. On the basis of such studies, I wrote a letter to State Highway Engineer Mark Watrous on Aug. 12, 1947, suggesting that consideration be given to a tunnel under that ridge to Straight Creek. In spite of its name, this creek does run practically straight west to empty into the Blue River just below Dillon.

Over the intervening years, the merits of this route have been recognized by more and more people who have studied and compared it with all other proposed routes. The Straight Creek tunnel was recommended in the joint report in 1954 of the firms of Howard, Needles, Tammen and Bergendoff of Kansas City and New York and Singstad and Baillie also of New York.

Roads In and Out of Denver

When the Interstate Highway System was set up in 1956, two roads were to come into Denver from the east: one was to go through from north to south, but

no road was to go on west. There were several other sections around the country where the original 40,000 of proposed Interstate Highways did not seem to fill the needs, so in 1957 another 1000 miles were added, about half of which is for the Denver to Cove Fort link.

It was then decided that the Interstate would follow U. S. 6 and the Colorado River from Dotsero to the Utah line west of Grand Junction. It was also decided that it would go through Idaho Springs to Empire Junction. In 1958, the Pavlo company was hired to make a survey to determine the best possible route between Dotsero and Empire Junction. Its report was received in April 1960.

Before going into details concerning the area covered in the Pavlo report, we might think first about roads in general, then the Interstate System, next about roads through the Rocky Mountains, and finally the place of Colorado in the Interstate Highways.

Early roads followed streams in order to have water for the people and horses or oxen. Roads for motor driven vehicles in general still follow streams but only to take advantage of the easier grades which have been cut by the streams and to serve the people who live in the cities and towns on or near such streams. Motor driven vehicles not only make travel so rapid as to remove the need for frequent sources of water along the roads, but they also enable the use of cuts, fills, bridges and tunnels in the construction of more direct roads. Their high speeds and heavy loads require the elimination of sharp curves and steep grades.

Network of Roads Between Cities

A glance at the Interstate System shows that in the more densely populated eastern part of the nation,

these highways form a rather close network between cities not separated by many high mountains. The Rocky Mountains are a natural barrier to such an extent that the original plan of the Interstate System provided only four roads across the mountains, although there were seven roads across the plains and seven again west of the mountains.

The four roads through the mountains followed U. S. 10, 30, 66 and 80. The distance between 66 and 80 is not very great, that between 10 and 30 is more but not excessive, but that between 30 and 66 is very great. It also left Colorado the only state not crossed in a generally east-west direction by the Interstate System. This gap was eliminated by the designation across Colorado and southern Utah. This section between Denver and Cove Fort will not only bisect the large area between 30 and 66, but will also provide an all-weather scenic road centrally located and much more interesting than any of the other four. Since Colorado has most of the highest mountains in continental U.S.A., it was natural that the flat-landers should be afraid and try to go around. Let us now rejoice that highway planners are finally realizing that tunnels in a few high places will make it possible for travelers to enjoy the sunshine and scenery of the mountains and still go by a direct route. (See Figure 2 on Front Cover.)

There will be a considerable distance of new road to be built across Utah from Green River to Cove Fort, but this new section will shorten and straighten the road from Denver to Los Angeles. Perhaps we can help Utah best by not being greatly concerned about their internal problems and by hastening the completion of the Colorado section.

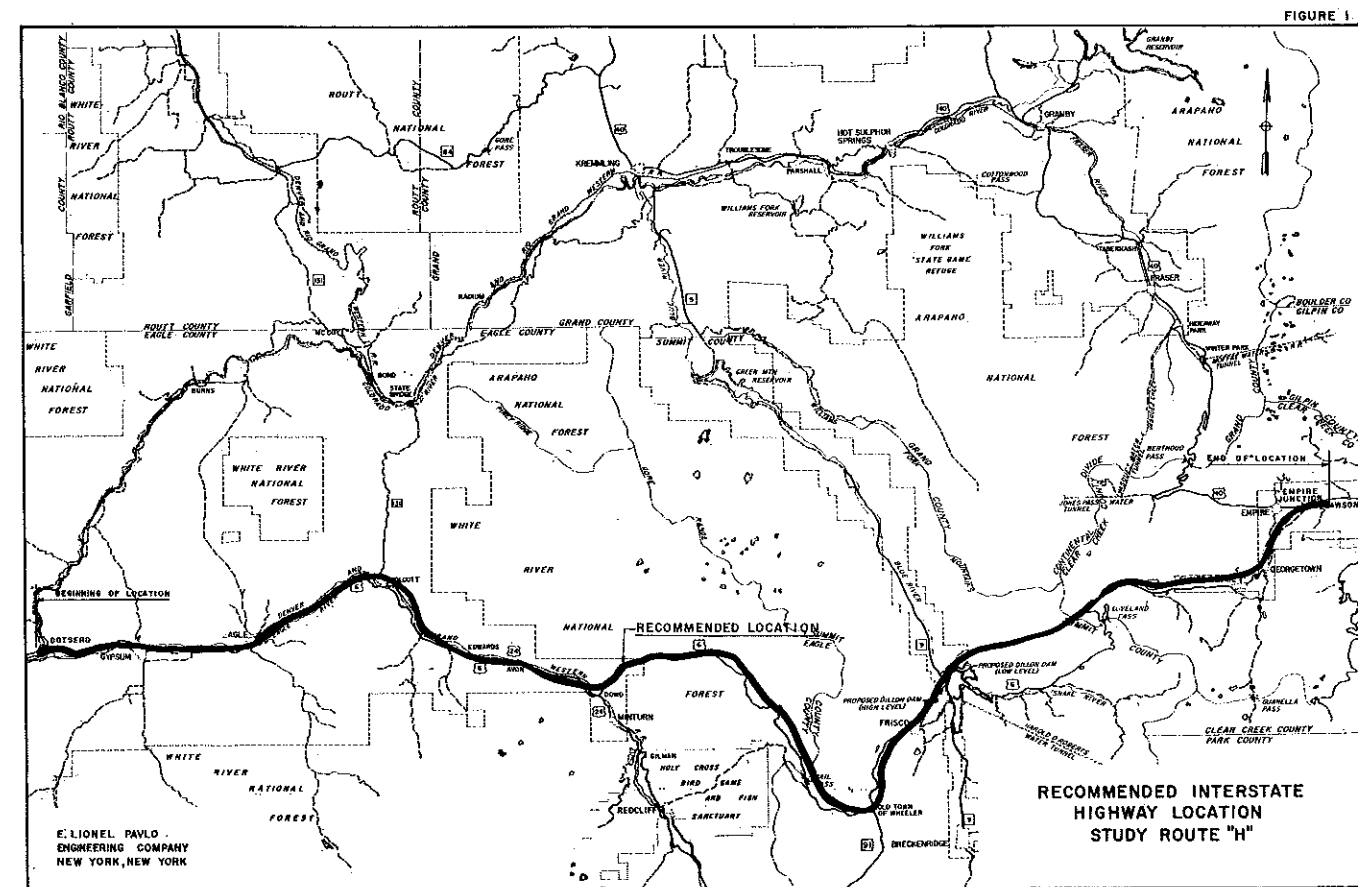


Figure 1. Recommended Interstate Highway Location Study Route "H."

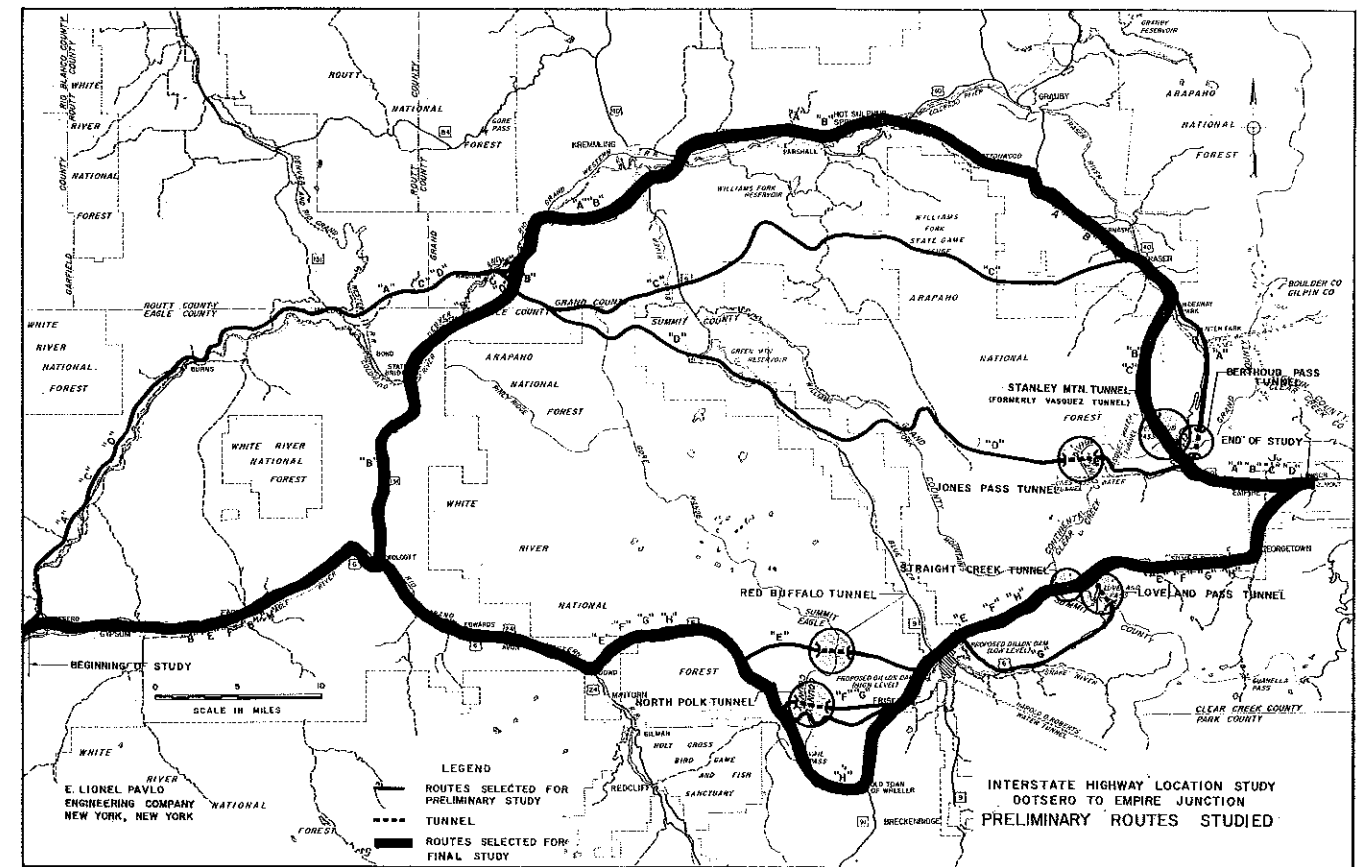


Figure 3. Interstate Highway Location Study, Dotsero to Empire Junction, Preliminary Routes Studied.

Dotsero to Utah Line

It was mentioned earlier that the route from Dotsero to the Utah line had been set via Glenwood Springs and Grand Junction. The Idaho Springs bypass has taken care of the worst bottleneck in the vicinity of Denver other than the perennial arguments about W. 48th Ave. Construction has started between Idaho Springs and the Floyd Hill interchange. Plans are completed for the section between Idaho Springs and Empire Junction.

This brings us to the area between Dotsero and Empire Junction as covered in the Pavlo report and shown on Figures 2 and 3. As shown on Figure 3, this study covered eight possible routes, of which all but two were rather quickly eliminated. The final route selected was generally along U. S. 6 as shown on the southerly line on Figure 3 and as simplified on Figure 1.

Eagle River Route Selected

First, the route up the Eagle River to the vicinity of Wolcott was chosen as against the route up the Colorado River, mainly because it would cost too much to build all the bridges, cuts, fills, and tunnels needed because the railroad in that canyon interferes more than the other rail line in the valley of the Eagle. Also considered and rejected were a Jones Pass tunnel route and a route generally west from Frazer. They are in generally high country and fail to serve the more populated areas along the valleys.

This left two possible routes for continued study. These were a rather extensively modified version of U. S. 40 through Hot Sulphur Springs and thence to the Wolcott area from a point east of Kremmling and a lesser modification of U. S. 6 to the same Wolcott area.

North Road Modifications

Several modifications and improvements on the north road were considered, especially a long tunnel from the valley of the West Fork of Clear Creek above Empire to the Vasquez Creek valley. This would not only cut off Berthoud Pass with all its hairpin turns on both sides but also the upper part of the road in the Frazer River Canyon above the mouth of Vasquez Creek. It also eliminated the often proposed long tunnel east of Berthoud Pass to the Frazer River. Another proposal was for a road over the hill west of Hot Sulphur Springs to by-pass the narrow Byers Canyon area. To get from the Kremmling area to Wolcott required major relocations of County 11 including a long curved tunnel to reach the State Bridge area and some modifications of State 131 from there to Wolcott. This route would be longer and much more expensive than the route along U. S. 6.

While considering the U. S. 6 route, attention was devoted to the tunnel under Loveland Pass, but it was rejected because the Straight Creek route is shorter and has much better rock for the tunnel. An effort was made to shorten the road west of the Dillion area but the alternate surface route went much higher than Vail Pass and neither of the two possible tunnel routes took off enough altitude or distance to justify their additional cost as compared to improving the present Vail Pass route.

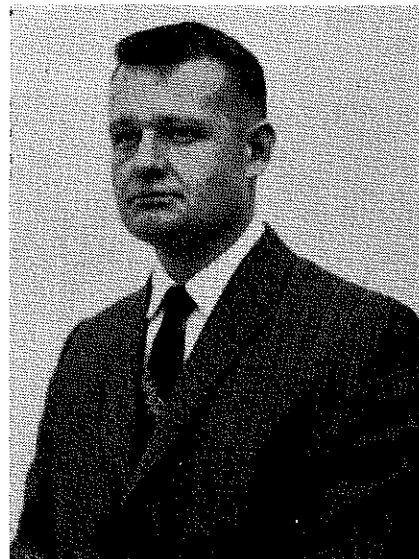
Gore Creek Tunnel Proposed

A short tunnel is proposed at the mouth of Gore Creek to eliminate the sharp curves at and near the present bridge over the tracks and the Eagle River.

(Continued on page 27)

CF&I Sunrise Mine's Safety Program*

By ROBERT W. MacCANNON, '51



ROBERT W. MacCANNON, '51

In order to describe the accident prevention and safety program at the Colorado Fuel & Iron Corp's Sunrise, Wyo. mine, I have divided the subject into the following 13 headings: Employee Selection; Training the New Employee; Safety Rules; Safety Clothing, Equipment, and Supplies; Proper Work Habits; Supervisory Responsibility; Safety Inspections; Handling Hazardous Jobs; Accident Reports; Accident Investigations; Safety Meetings; First Aid Training; Management's Policy.

Employee Selection

All personnel at Sunrise is hired by the mine superintendent. His decision on whether to hire an individual is based upon the appearance and attitude of the prospective employee. If the man in question is of local origin or has relatives working at the mine, the superintendent has additional information upon which to base his judgment. Sunrise management has found by experience that the "green" but willing man is a much better bet than the man with "lots of experience." The latter is frequently a floater and unsafe worker.

After a man has been accepted for employment, he must pass the pre-employment physical examination. This eliminates anyone with an obvious injury or condition that could lead to an accident. Those who pass are then sent back to the mine to report to the mine foreman.

Training the New Employee

Each new underground employee is taken on a tour of the mine by the safety engineer prior to being assigned to a job. During the tour, the new man is given an explanation of the practices and methods used in the mine. At this time the various applicable safety rules are reviewed, a copy of which the new employee has already received. Any questions that the man has are answered. The employee is next turned over to his assigned jigger boss.

The jigger boss then assigns the man to his job,

THE AUTHOR

Robert W. MacCannon was born in Denver, Colo., and graduated from East Denver High School in 1947. In 1951 he graduated from the Colorado School of Mines with a degree of Metallurgical Engineer.

From 1951 to 1953 he served with the U.S. Army Paratroops, Corps of Engineers in the United States, Japan and Korea as a lieutenant.

After returning to Mines in 1953 and receiving his E.M. degree in 1954, he went to work as a mining engineer for Colorado Fuel & Iron Corp. in Pueblo. He transferred to the company's Sunrise, Wyo., property in 1955. He is a junior member of AIME.

generally with an experienced employee and instructs him carefully in all phases of it. Continual checks are made until the boss feels that the man has learned the job.

Since the union contract has a seniority clause, a new man starts as "underground laborer" and then works up depending upon seniority and job openings on a bid basis. Some experience is gained in various jobs that the man may be put on temporarily as a fill-in or replacement for another worker.

Safety Rules

A copy of the *Sunrise Accident Prevention Rules and Regulations* booklet is given to each new employee before he goes to work. In it are a set of general instructions pertaining to everyone, and in addition each job classification has its own set of rules. The employee is cautioned that upon receiving a new or different position, he must study the safety rules pertaining to the new job class in order that he will be able to perform his assignment in a safe and orderly manner.

Safety Clothing, Equipment, and Supplies

Clothing worn by the men must be in good condition. Required safety apparel is as follows: a non-conductive safety hat, safety glasses, gloves, and

steel-toed shoes. Glasses must be worn from the lamp house on entering the mine back to the lamp house on leaving.

Grizzleymen are furnished with spats, which are made locally and consist of canvas, leather, and steel rods. These protect both the lower leg and instep from rock falls.

The Company furnishes repairs to the glasses including the free replacement of broken lenses. Scratched lenses are replaced at cost. Arrangements may also be made through the mine office to get prescription lenses at a price substantially lower than that charged by commercial firms.

Safety belts and life lines are used by the men working around an open shaft. These are checked periodically by the safety engineer for signs of wear or failure.

There are about 15 first aid stations underground which stock a complete line of bandages, splints, medicines, blankets, and stretchers. These are checked monthly by the safety engineer and the supplies restocked.

Proper Work Habits

For a number of years Sunrise Mine has improved its safety record, that is until January of this year when it slipped badly. Inside of two weeks' time there occurred a fatality, a broken back injury which will be a permanent disability, and several other fairly serious lost-time accidents. After investigation and discussion it was decided that bad work habits as much as anything were responsible. Both management and the workers were to blame.

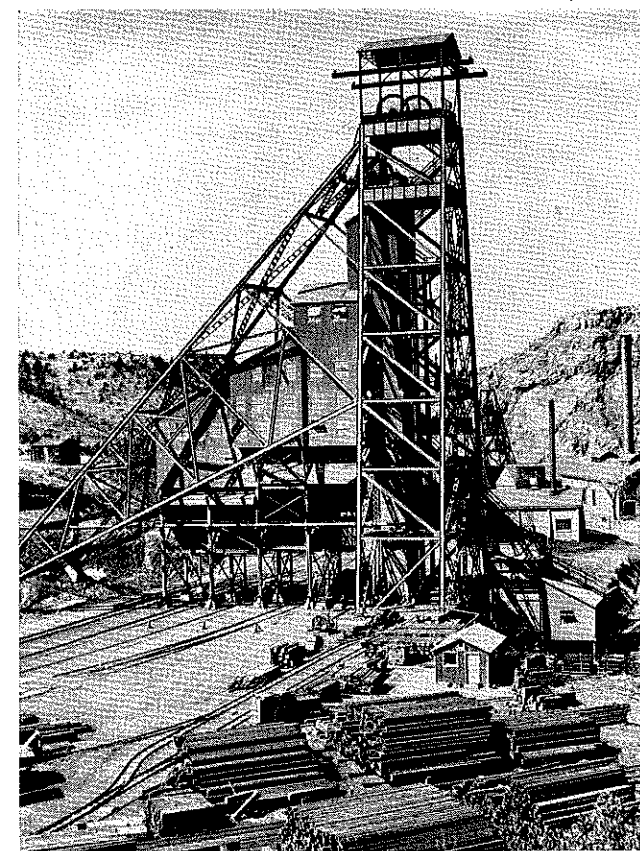
It was decided by management that possibly everyone had become too complacent and careless. To correct this situation, the Bureau of Mines was called upon to give its "Accident Prevention Course." This course, which is given in two-hour installments for five days, was well received and attended by over 80 per cent of the working force on a voluntary basis. In the course, representatives from both management and labor gave their suggestions and reports on various phases of the operations with which they were familiar. These discussions were channeled and moderated by the Bureau of Mines representative and brought out many excellent points which many may have known subconsciously but were not using in practice.

Various classifications of accidents were studied with slides and pictures illustrating correct and incorrect methods of doing a job. (An example—Two slides showing the wrong and right way to lift.) One session was devoted to a description of certain mining methods used by the Company and explained by a contract miner.

Little can be accomplished with a course of this type unless the men can be persuaded to participate actively. In this case, this was accomplished and the course was a success because (1) it was presented by an excellent impartial outside instructor who encouraged the men to think and talk about specific problems, and (2) the men were concerned about the poor safety record.

Supervisory Responsibility

A safety program is successful only if it has the full support and cooperation of the miners. Management asks for safety suggestions, and these are never forgotten or ignored, even if they are not practical or useful. Those that have merit are put into effect and



▼ Headframe of CF&I's Sunrise, Wyo. iron mine.

credit is given publicly to the man who made the suggestion. This builds morale and starts other men to thinking about safety improvements that they can suggest. Many of our best safety suggestions have come from the miners.

Supervisory personnel must maintain the habit of correcting any unsafe practice or rule violation on the spot. This is a difficult habit to maintain but pays big dividends. Supervisors must always set a correct example of safety practice, not to do so can destroy a safety program.

Safety Inspections

To keep the working places of the mine safe, inspections are made by competent people acquainted with the work. In the Sunrise safety inspection program, the safety engineer visits every part of the mine at least once a day. Anything that he finds wrong is reported to the appropriate jigger boss or foreman for action.

A joint union-management committee inspects the whole mine and surface facilities once a month. The committee is composed of six men, three management and three labor. The management members at the present time are the day shift boss, safety engineer, and chief chemist. The recommendations that they make are turned over to the superintendent and are either accepted or a reason given for not taking the suggestion.

Periodic inspections are made by Mr. Mike Dusik, the state mine inspector, accompanied by the assistant superintendent and the safety engineer along with members of the Union Safety Committee.

Handling Hazardous Jobs

All mining is hazardous but every once in a while

* Address at the Wyoming Mining Association Convention held June 10-11 at Jackson Lake Lodge, Wyo.

one of those nasty jobs comes up which make normal mining operations look like a picnic. At Sunrise, there is a mining condition in virgin ground that is relatively safe and fairly easy to develop. However, the salvage operations are more hazardous and consequently greater care must be taken to insure safe working conditions.

Without going into detail about the methods, the results of the problem that these bad conditions create are:

1. The speed of the development or repair decreases.
2. Larger mounts of material are used.

Generally within the provisions of the union contract, the mine foreman will try to assign reliable, safe-working men to a job which is hazardous or will become hazardous if not properly done. In a case such as block-holing chunks in a high raise, the slow, deliberate, thinking worker is a great asset. The two watchwords for a hazardous job are knowledge and deliberation.

Accident Reports

Accidents are a terrific expense to both the Company and the person involved. Even the cost of filling out accident reports is a substantial and time-consuming matter. At Sunrise, the procedure is as follows:

Suppose a man is injured seriously enough for medical attention. His jigger boss must make out a "Treatment of Injury Report" in quadruplicate. Two copies go with the injured man to the hospital, one copy goes to the office and one to the office of the safety engineer where it is filed. The attending doctor completes this report and one copy goes back to the mine office with the disposition of the case.

In addition to the aforementioned report, the jigger boss makes out a "Preliminary Accident Report" in duplicate. One copy goes to the mine office and one copy goes to the safety engineer. This is a short report giving the who, what, where, how, and type of injury.

Suppose the accident is lost time; that is, the man is sufficiently injured that he is not able to work his next regularly scheduled shift. A "Foreman's Accident Report" must be submitted giving additional information as to the accident and the man involved. In this report, the jigger boss must give answers to questions which try to pinpoint the cause of the accident. Witnesses' statements are also taken.

Then the office starts filling out forms. First the "Employer's Report of Accident" in quintuplicate. One copy goes to the Denver insurance office, two copies to the manager of mines, one copy to the state mine inspector, and one copy to the Sunrise files.

Next another kind of form is made for the insurance director in Denver and a copy goes to the manager of mines. This report includes information on the employee's job experience both with Sunrise and with any other mining operations where he has held a job.

The "Emergency Hospital Report" is the next one. This is a combination report of the patient's history upon entering the hospital and the doctor's personal injury report explaining the diagnosis and treatment. This report goes to the insurance office in Pueblo.

Finally, there is the United States Bureau of Mines "Employer's Report of Injury to Employee." This is sent to the manager of mines who uses it in his summary of accidents for the state compensation agency to be used for competition purposes.

There are seven different reports to be completed, and in addition the state compensation papers from the doctor must also be processed.

As a sidelight to this business of accident reports, the following is of interest. For the last year Sunrise has not had the services of a company doctor at the local clinic. Contrasting the accident statistics for this period of time against those previous has shown that when a doctor is present, the reportable accident rate is higher than when a doctor is not present. However when the doctor is not available, the lost-time accident rate increases.

Accident Investigations

An accident investigation is made by a committee of two union members of the Safety Committee plus the shift boss, jigger boss, and safety engineer on all lost-time accidents. This investigation is made on the job and the man's partner is questioned along with any other witnesses. A demonstration is re-enacted of how the accident occurred. Upon completion of the investigation, a report is made with recommendations for action to prevent similar accidents from taking place.

The safety engineer makes a drawing of the accident showing all pertinent details and copies are posted upon the Company bulletin boards on surface and underground. A copy of this drawing goes to the manager of mines and is used in the monthly *Safety Bulletin* put out by the mining department. In this bulletin are the reports of the lost-time accidents occurring at all of the mining properties of the Company. A description of the accident plus a sketch or picture is given for each case along with recommendations for prevention of similar accidents.

Also tabulated are the frequency and severity rate for each property along with the classification of accident types. Man-hours worked per lost-time accident are also shown for each property.

$$\text{Frequency} = \frac{\text{Number of lost-time accidents}}{\text{Million man-hours worked}}$$

$$\text{Severity} = \frac{\text{Number of shifts lost}}{\text{Million man-hours worked}}$$

Safety Meetings

Sunrise Mine has a Joseph A. Holmes Safety Chapter, and monthly meetings are held. During these meetings, a report is given by the safety director of all of the reportable accidents having taken place the previous month.

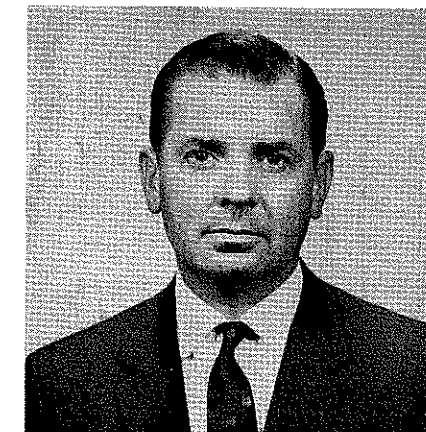
The educational director then has a short program on safety, possibly a film or outside speaker. Discussion is invited from the floor concerning unsafe conditions and notes are taken by the safety director for future action.

Unfortunately, a large turnout at these meetings is achieved only by having a drawing for prizes. Each member of the association pays 25 cents per month into the treasury and the Company donates \$32 per month additional. This \$32 is given away in \$4 amounts by drawing payroll numbers. Those members not present do not win. Drawing continues until all of the money is claimed. In addition, a \$10 jack-pot prize is awarded. Only one number is drawn and if the winner is not present, the jack pot increases by \$10 at the next meeting. The highest that it has ever gone is \$40 or four months. As you might expect, attendance increases as the jack pot grows.

(Continued on page 27)

A Brief History of Libyan Oil and Esso Standard

By M. M. TONGISH, '43



M. M. TONGISH, '43

THE AUTHOR

After his graduation as a petroleum engineer from the Colorado School of Mines in 1943, Melvin M. Tongish spent about six months as an experimental test engineer with Wright Aeronautical Corp. in Paterson, N. J. For the next three years he worked as a process design engineer with Foster Wheeler Corp.

In 1946 Mr. Tongish became associated with Standard Oil Co. of New Jersey as a petroleum engineer and was assigned to the Creole Petroleum Corp., initially in the Lake Maraciabo Area. During the next 13 years his assignments included all fields operated by Creole in Venezuela in petroleum engineering and management positions. In 1957 he attended the executive development program at Cornell University.

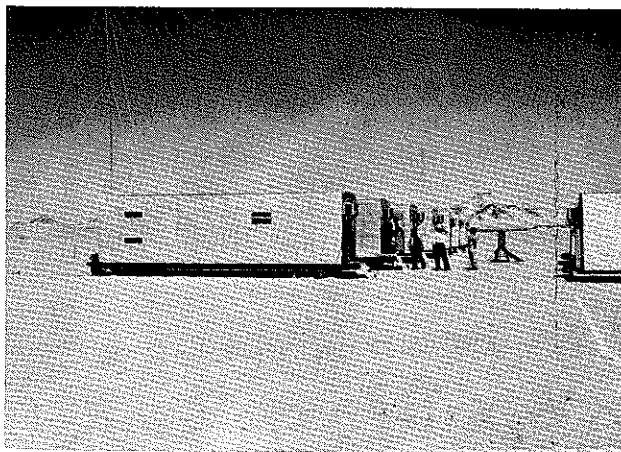
In December 1959 Mr. Tongish came to Libya with Esso Standard (Libya) Inc. as manager of the Benghazi District. At present he is in the process of establishing the operating headquarters in Benghazi for the Zelten and Esso Sirte Areas.

Libya is located on the north coast of Africa. It is bounded on the east by Egypt of the U.A.R. and the Sudan Republic, to the south by Equatorial Africa and to the east by Algeria and Tunisia. Libya became an independent country by the United Nation Charter on Nov. 21, 1951, after having been a colony of Italy and Turkey for more than 100 years. The country is divided into three provinces, Cyrenaica to the east, Tripolitania to the west and north, and Fezzan to the south and west. The Sahara Desert covers nearly all of the country with a "green belt" following part of the Mediterranean coast line from Tunisia to Egypt.

Oil activity in Libya is very recent. On April 21, 1955, the Libyan government passed a petroleum law which set forth the procedures and regulations governing oil companies desiring exploration concessions in Libya. This law also created a petroleum commission, consisting of a chairman and not less than three other members, which has been given responsibility for the implementation of the provisions of the petroleum law.

Petroleum Law Mutually Beneficial

The petroleum law is considered to be an outstanding example of a law which is mutually beneficial to both the government and the concession holder. The law incorporates the "50-50 principle", whereby the

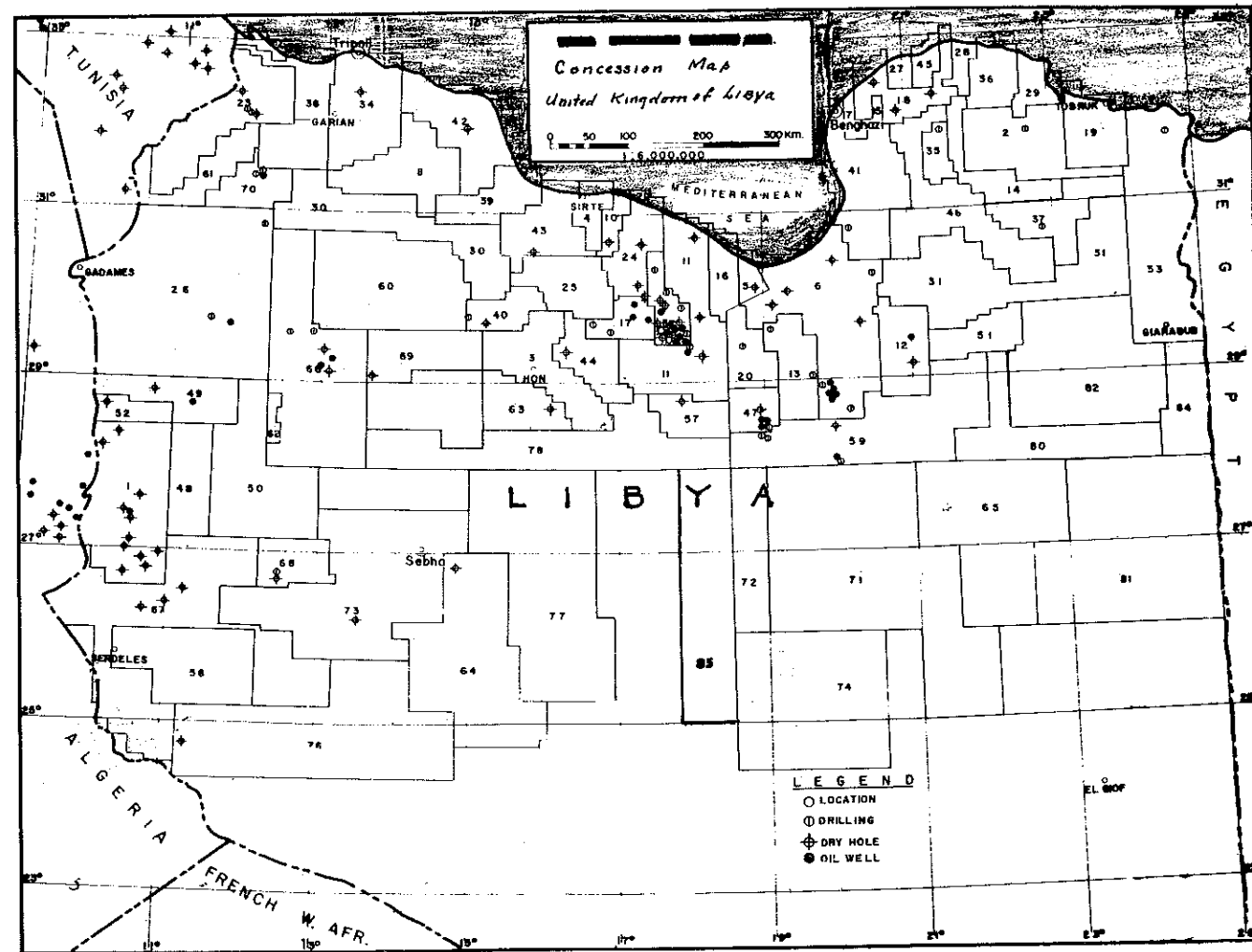


Partial view of a drilling camp located in Concession 20.

government and the concession holder divide the profits equally, and it is one of the few laws in existence, which specifically limit the country's share to one-half of the profits.

In addition, a percentage depletion allowance of 25 per cent of the gross income from production is provided, subject to a limitation of 50 per cent of net income. During the period prior to oil production, concession holders have been granted the option to either expense or capitalize exploration survey and drilling costs. Further, losses incurred in any year may be carried forward and deducted from profits of subsequent years up to a maximum of 10 years.

The first drilling was initiated by the Libyan-American Oil Co. in April 1956, and at the present time 16 companies representing American, British, French, German and Italian interests are in various stages of exploration and development. Inasmuch as Esso Standard (Libya) Inc., a wholly owned subsidiary of the Standard Oil Co. (N.J.), is one of the original companies and having made the first commercial discovery, its history closely parallels that of the industry to date.



▼ Concession map of United Kingdom of Libya. Numbers on the map refer to concessions held by 17 oil companies at the time the article was prepared.

Development of Oil Industry

Esso Standard (Libya) Inc. has played a significant role in the development of the petroleum industry in Libya. Prior to the time when Esso began its search for oil, little was known about the geology of Libya. Italian and French interests had carried out limited geological studies previous to World War II but with inconclusive results, and it is interesting to note that only one oil seepage area had been reported in the entire country.

With the issuance of exploration permits, the first Esso geologist arrived in Libya in February 1954. At that time the Libyan petroleum law had not yet been enacted, and Esso, together with a number of other oil companies, was in the process of carrying out preliminary surface exploration in order to determine whether there was sufficient sedimentary formations to warrant continued interest.

Geological Studies Carried Out

Each petroleum company was free to range widely throughout the entire country. Esso surface parties spent three months surveying in Tripolitania and four months in Cyrenaica. During the latter part of that same year, they moved into Fezzan. In a very real sense the men who carried out these early geological studies were pioneers, moving into unknown areas of a vast country and having to be self-

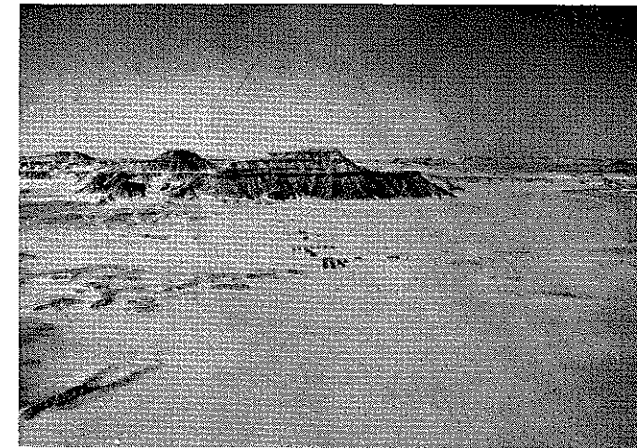
sufficient for weeks at a time. Surface parties in those days usually consisted of one or two geologists accompanied by several Libyan helpers. They travelled across the desert by Landrover and with one or two pick-up trucks which carried their supplies of food, water, and gasoline. They had no radio contact during those weeks in the field.

By March 1955, the exploration permits which had been granted to petroleum companies for carrying out their initial surveys in Libya had expired. During much of that year, the oil companies studied the geological information which they had collected preparatory to bidding for concession area.

Bidding for Oil Concessions

In the latter part of 1955 and early 1956, following the passage of petroleum legislation, the Libyan government opened up bidding for concessions. Initially, there were 112 "overlaps," that is, bids for the same concession area by two or more different oil companies. The companies were given 30 days in which to resolve these conflicting bids.

When the results of the bidding were announced, Esso Standard (Libya) Inc. had acquired 75,381 square kilometers. Subsequently, Esso received the grant of two additional concessions to bring the total for the country to 99,042 square kilometers. Concessions were granted at the same time to thirteen other



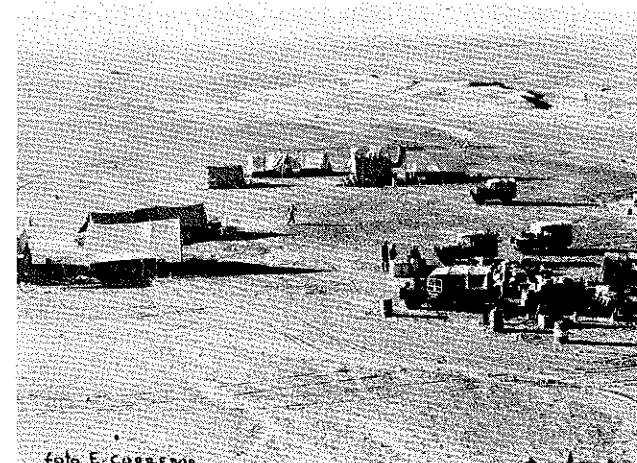
▼ View of desert in southern part of Concession 20. Hills behind the camp are about 700 feet high.

oil companies who received between them by the original grant a total of 877,141 square kilometers; later additional grants to two other companies brought the total under concession to approximately 950,000 square kilometers.

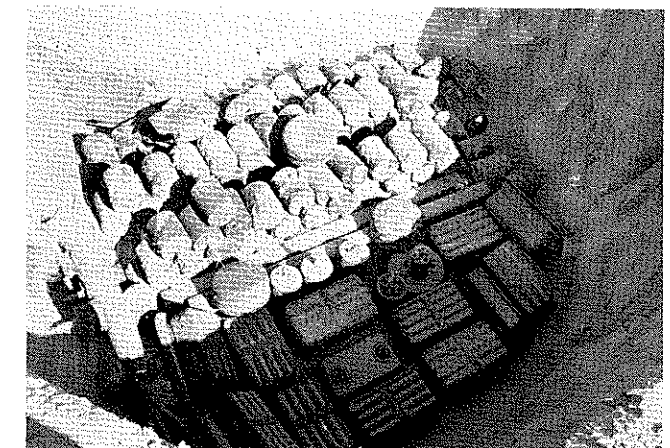
Esso Libya turned its attention first to Fezzan. No doubt this decision was in some measure due to the outgrowth of discoveries of oil in Algeria at Edjele, across the border from Esso's concession. Esso geologists had not previously studied this concession area in detail, and two field parties were sent to it to conduct preliminary surveys during April, May and June of 1956. During that summer no additional field work was attempted in the Fezzan area, but these two parties returned to the area adjacent to Algeria in October 1956 to continue their exploration. It was during this period that aircraft were first employed by Esso to fly geological parties to and from work sites in the desert. It was at this time, too, that field parties were first equipped with radiot.

Geophysical Exploration

In April 1956 geophysical exploration commenced with a double contract gravity meter crew who began work in Cyrenaica. Later a second double gravity meter party was added. These two parties covered Esso's concessions to the extent practical; results of these surveys served as a basis for further geophysical exploration. In March 1957 a contract reflection seismic party commenced operations in Cyrenaica. Later a second party commenced work in the concession adjacent to Algeria. In April 1958 an Esso



▼ Two geological field party camps, Atshan anticline, north end.



▼ Mines stacked in a pit prior to detonation.

seismic party set to work in Cyrenaica, mapping the Zelten structure pursuing an anomaly indicated by the earlier gravity work.

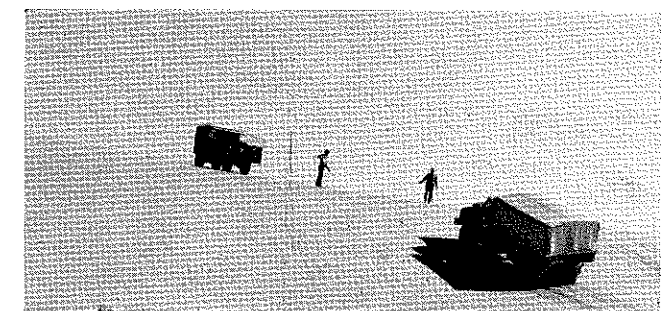
Libya's First Oil Discovery

Esso Libya sent its first drilling rig to the area adjacent to Algeria in June 1957. In December 1957, Atshan 2 in that area produced 500 barrels per day on test. This was Libya's first oil discovery. Although not large enough to be commercially interesting, this well served further to encourage drilling in this part of Libya.

Meanwhile, a second rig had been sent to Cyrenaica where it began drilling on Jan. 1, 1958. It is estimated that as of Dec. 31, 1958, the oil industry in Libya had spent over \$100,000,000 in their search for oil and had not found any commercial fields. Had not the oil companies had considerable experience in such explorations—coupled with a sufficient amount of capital, technical skill, and confidence—they might very well have been inclined to give up such a costly search. They did not, of course, and events of 1959 suggest that their faith in the future of Libyan oil was well founded.

Unique Logistic Problem

Moving heavy drilling rigs and complete trailer camps, together with the vast quantity of supplies required by them, across unchartered sand and rock areas presented a unique logistic problem to Esso's operations in all of its concession areas. This job was taken over by men who had previous experience in developing off-road transportation. Conditions for off-road transportation were found to be even more complicated than in other desert areas, because vehicles had to be developed which would work alteratively in sand and over hard rock with equal effectiveness.



▼ Through the passage of the Ubari Sand Sea northeast of Atshan with loaded Hanomag. First try.



▼ Geological field party.

Moreover, a special problem in Libya is that the sand dunes do not lie in definite patterns but frequently are completely random. Since the dune pattern normally is used to help in mapping the movement of vehicles in the desert, this condition further complicated planning of moves across the desert.

Travel across many parts of Libya presents a unique peril in the form of land mines left over from the fighting which took place during World War II. Extensive mine clearing operations must be made before men and material can move and work in many of the areas where Esso is operating.

Moving a drilling rig and other equipment into the concession adjacent to Edjele in Algeria provides an example of the complexity of these transportation problems. The caravan moved out of Tripoli and travelled 1,000 miles off-road, trails, and open desert, in order to reach the drilling site in Fezzan which is only 500 airline miles from Tripoli. This move was made in the short period of 17 days. In this move, it became necessary to cross a portion of Sand Sea. After surveying the problem, it was decided that the trip across Sand Sea was possible and the decision, based largely on confidence in vehicles and drivers, proved to be correct. The move was made without encountering any special difficulties. A similar move was made across the country to Zelten. This distance of 1,000 kilometers was made partly cross country, with the caravan often making new trails across the desert.

Although work in the area adjacent to Algeria failed to produce any oil discoveries during 1959, the situation was more encouraging in Cyrenaica. There in April 1959, Zelten-1 in Concession 6, approximately 100 miles from the Mediterranean coast, flowed at the rate of 17,500 barrels per day, and in June, Esso was able to report that Zelten-2 flowed at the rate of 15,000 barrels per day. Further drilling is continuing to evaluate these findings with Zelten-3 being completed in 1959. Zelten-4 and Zelten-5 were completed in 1960 and Zelten-6 is now being drilled. In addition, two rigs are operating elsewhere in the same concession.

In August 1958, Esso negotiated the assignment of 50 per cent undivided interest in three of the five concessions held by Libyan-American to Esso. Esso Sirte (Inc.) was organized in 1959 to handle the exploration and development of these concessions. At present, two rigs are engaged in exploratory drilling in these concessions, and to date three commercial wells have been drilled.

Since 1954, Esso Standard (Libya) Inc. has expanded from its original field parties and exploration staff to a complete organization with a six man board of directors, five of which reside in Libya. R. A. Eeds was elected president in 1959 following re-

tirement of J. A. Clark (Mines, '21). H. W. Brown, the previous general manager, was elected executive vice president. Personnel for Esso Standard (Libya) Inc. has for the most part come from Jersey affiliated companies from many parts of the world representing all of the specialities required for an operation such as is being conducted in Libya.

In January 1960, about 60 geological and geo-



▼ Geological camp in Concession 8.

physical field parties were active in all parts of Libya. In addition to the five drilling rigs operated by Esso, 27 rigs are being operated in Libya by 10 companies with the bulk of activity concentrated in Cyrenaica and Tripolitania provinces. The activity is increasing rapidly with equipment, skilled and technical personnel arriving every week. Eleven companies drilled 353,000 feet completing or spudding-in 62 wells in 1959. It is expected the 1959 figures will approximately double during 1960.

This activity is due not only to favorable prospects for oil in Libya but also to the strategic location to European markets. The oil which has already been discovered brackets the country with Venezuela and West Africa as one of the most important discoveries in the past few years. The final test is yet to come, and it is conceivable that the fields will produce less satisfactorily than presently considered. However, on the basis of the present and proposed levels of activity in the various oil provinces of Libya, it is apparent that the optimism is high as a result of the preliminary results to date.

A NEW DRILLING AND BLASTING COMBINATION

(Continued from page 12)

manufacturers supply a chuck for the third machine. With the $\frac{3}{4}$ -in. hex steel, chuck life has increased 60 per cent, and no greater piston wear has been found—the smaller wearing and striking surfaces have been offset by the shorter drilling time for the same footage.

We have been using this combination in part of our stopes since January of this year. The reduction in the cost of equipment and supplies has been striking. And the full potential of the extremely fast drilling, while not yet fully exploited, offers a hope for marked further reductions in over-all production costs.

(Editor's Note: Both the author and *The MINES Magazine* will welcome comments on this article.)

CF&I SUNRISE MINE'S SAFETY PROGRAM

(Continued from page 22)

Sandwiches or rolls and coffee are served prior to the start of these meetings as an additional inducement for attending.

Awards are given to every man at the meeting the month following his birthday who has not had a lost-time accident for the previous year. This year the awards consist of a combination vinyl billfold with keycase and card case inscribed, "Sunrise Holmes Safety Association—One Year Award—No Lost Time Accident—Your Safety Is Up To You." Last year ball point pens were given.

Competition is promoted between the various crews on surface and underground on the basis of man-shifts worked without a reportable accident. The winning unit for each month is awarded cigars.

First Aid Training

At the Holmes safety meetings, the safety engineer takes a few minutes to go through a first aid procedure such as loading and unloading a patient into and out of a stretcher, artificial respiration, etc. Formal first aid training is held approximately every two years. It is mandatory for the supervisory and management personnel and the men are strongly encouraged to take it. Most of the supervisors hold instructor cards in first aid.

Management's Policy

The policy as far as safety is concerned can be summed up as follows: There are two ways of doing a job. The safe way and the wrong way. Safe in this instance means creating conditions which are the least apt to cause an accident. This calls for analyzing the job. To do this, management considers the four M's.

Man: Worker, operator, supervisor, and other individuals concerned.

Method: The working procedure.

Machine: The number, type, tools used, etc.

Materials: The articles other than the tools used in the process.

Each unit is examined to determine which if any can be responsible for the occurrence of accidents.

At the present time management is writing a description for each job following this outline, so that everyone will know just how a standard job should be done and the hazards peculiar to it.

All supervisory personnel have a two-to-three hour meeting once a month at which time various plans, policies, and instructions are reviewed. The subject of safety occupies about half of these meetings.

Production is naturally the goal of our operation, but management knows that it can not have production without safety. Motto of the Sunrise management is "The Right Way Is the Safe Way."

COLUMBIUM AT POWDERHORN, COLORADO

(Continued from page 16)

istically altered country rocks in which the degree of alteration decreases away from the central area.

- 3) There is a group of characteristic essential minerals in addition to the carbonates such as apatite, magnetite, mica, and vermiculite, and a group of rare accessory minerals carrying columbium and rare earths.

Origin of Carbonatite Complexes

On the basis of these and certain other features,

a good deal of thinking and speculation has been done as to the origin of the carbonatite complexes.

Many, perhaps most, students of the problem now believe that a mass of molten carbonate was formed by some means deep in the earth and was intruded into the crustal rocks, frequently as part of a volcanic episode. Carbon dioxide, water vapor, and fluids or gases rich in K, Na, F, Fe, Mg, and P left this molten magma and invaded the wall rocks and SiO₂ left the wall rocks and entered the carbonate melt. This resulted in the formation of the felspathoidal and pyroxenitic rocks adjacent to the carbonatite and the fenitized country rock some distance away. Generally there was remobilization of some of the rocks so that they melted or softened and moved in fluid or plastic fashion to higher levels nearer the surface and developed, complex structural relations with one another. Finally erosion took place and uncovered these complex structures to greater or lesser degree, so that in some cases we still have the volcanic rock surrounded by lava flows and ash, in others the volcanic debris and form have been removed down to a level just not quite exposing the carbonatite, as perhaps in the Canadian occurrences, and in others erosion has laid bare the whole ringed structure with carbonatite in the center as at Powderhorn and Mbeya.

There are still many rough spots in this sketch, and many things yet to be learned. It is a pleasure, however, to have in the case of pyrochlore both an interesting new mineral to work with from a technical standpoint, and fascinating problems in igneous geology and ore formation.

INTERSTATE HIGHWAY

WEST OF DENVER

(Continued from page 19)

Other moderate improvements are proposed further down the Eagle River. Alternate routes are provided at the Dillon Dam area to carry the road either on the dam or on a bridge below it, with the latter recommended. A major improvement in the Georgetown area is the elimination of the hairpin turns combination on the road up to Silver Plume.

Tunnels on Possible Routes

Both tunnels on each possible route are planned as twin tunnels with the eastbound and the westbound traffic each having two lanes in the separate tunnels. For the Straight Creek tunnel there is a grade of just less than 1 per cent for the 9000 foot length from east portal elevation of 11,023 to west portal elevation of 11,100 feet. Both tunnels will be properly lighted and ventilated and will be so located as to give minimum interference to the Loveland ski area.

As originally planned, any tunnels driven were to be financed by tolls. That method of financing is to be preferred although the possible military uses of the Interstate System may justify its construction with public funds. The Pavlo report recommends the driving of a pilot bore for the Straight Creek tunnel. Since this method removes most of the uncertainty in estimating the tunnel cost, it will probably save more than it costs. Therefore, I agree with this recommendation and urge that the pilot bore be driven as soon as possible.

PLANT NEWS

Stauffer Plans Soda Ash Production in Wyoming

Stauffer Chemical Co. has completed plans to build a major soda ash production facility near Green River, Wyo. Construction will begin at once with completion scheduled for late in 1962.

Production will be based on an extensive, high-grade trona deposit which has been charted by a two-year test drilling program. The project involves driving a mining shaft and an air shaft, building a railroad bridge to span the Green River, a railroad spur, highway, and a refinery. The company's engineering department will be in charge.

The as-mined trona contains some shale and carbonaceous material. Stauffer has developed a process to refine the trona to yield top quality soda ash. Initial capacity of the soda ash refinery will be 150,000 tons to 200,000 tons annually. Output will be marketed nationally. Stauffer currently produces soda ash at Searles Lake, Calif. The new Green River plant will approximately double the company's output of soda ash.

McKee & Co. Acquires Western Machinery Co.

Arthur G. McKee & Company, Cleveland, Ohio, has agreed to acquire The Western Machinery Co., with headquarters in San Francisco, it was announced by the presidents of both concerns.

H. E. Widdell, president of McKee, and Jack H. How, president of Western Machinery, said the transaction will be accomplished through the use of cash and notes and will not involve issuance of any additional McKee common shares. Western Machinery will be operated as a McKee subsidiary with no changes in present management or personnel, they said.

Further information about the acquisition will be announced as soon as details of the agreement are settled, the two executives said.

McKee is an international engineering and construction company for the steel, petroleum and chemical industries. Its common shares are traded on the New York Stock Exchange.

Western Machinery, a privately owned firm with assets in excess of \$10 million is engaged in: the manufacture of equipment for the processing of minerals, chemicals, and other materials; engineering and construction, mainly in the nonferrous metals field; and sale of a wide variety of materials handling machinery.

Completion of Oil Well In Dahra Field Reported

Completion of an oil well in the Dahra field of Libya which flow-tested at the rate of 11,500 barrels per day is reported by Amerada Petroleum Corp., Continental Oil Co., and the Ohio Oil Co. Located in Concession 32, the F-9 well is the largest yet brought in by the group. It is the third largest ever completed in Libya. The well, flowing 40-degree gravity crude, extends the Dahra field two and one-quarter miles southeast from the group's F-2 well which has tested at the rate of 8,000 barrels per day.

Keeping pace with the increased tempo of their Libyan operations, the three U. S. oil companies have announced a corporate reorganization to handle future activities in that North African country. The companies have made public the organization of a new Libyan-based company known as Oasis Oil Co. of Libya, Inc., to conduct the exploration, development and transportation operations of their Libyan interests. The new company will not engage in refining or marketing operations.

Simultaneously, Ohio Oil announced a change in the name of the present Oasis Oil Co. of Libya to Ohio Oil International of Libya, Inc., which will retain its present officers and continue to hold title to the Ohio Oil Co.'s one-third interest in the 62,000,000 acres of Libyan concessions.

The reorganization plan has received the tacit approval of Libyan officials, since it fulfills the Libyan government's desire for more direct management in Libya.

T. A. van Griethuysen, recent president of Paria Operations, Inc., in Venezuela and former president, Continental Oil Co. of Venezuela, was elected president of the new Oasis company.

Susquehanna Corp. Subsidiary Enters Missile Program

Development of the new Titan II, advanced model intercontinental ballistic missile being produced by the Martin Co. for the Air Force, has been speeded by a series of "electronic test flights" while the missile is still on the drawing boards.

The Martin Co., principal contractor for the Titan, and Computer Engineering Associates, Inc., Pasa-

dena, Calif., subsidiary of The Susquehanna Corp., Chicago, jointly disclosed the project. This was the first disclosure that Susquehanna, owner of uranium and chemical producing operations, now has entered the missile program.

Through the use of its unique Direct Analog Computer, CEA scientists re-created the missile electronically and simulated certain conditions it will face in actual flight, according to Dr. Gilbert D. McCann, founder of the firm and head of the Electrical Engineering Department and Computer Laboratory at California Institute of Technology.

Allis-Chalmers Acquires Half Interest in Electronic Systems Engineering Firm

Agreement on joint ownership of an electronic systems engineering firm located in California by Allis-Chalmers Mfg. Co. and Bell & Howell was announced late in June.

R. S. Stevenson, president, Allis-Chalmers and Charles H. Percy, president, Bell & Howell in a joint announcement, said that Allis-Chalmers would acquire 50 per cent of the common stock of Consolidated Systems Corp., Monrovia, Calif., a wholly owned subsidiary of Bell & Howell's Consolidated Electrodynamics Corp.

Consolidated Systems Corp. employs more than 525, one-third of which are technical personnel. Operations include administrative, engineering and manufacturing facilities located in a 68,000 sq. ft. building completed in 1958. The plant is located on a 10-acre site near Los Angeles.

The Joint ownership venture integrates Allis-Chalmers capabilities as a major manufacturer of heavy industrial equipment with the technical resources of a firm which has pioneered in the development of the "systems" engineering concept.

"In recent years application of electronic instrumentation to industrial processes, including power generation, has increased tremendously," Stevenson said. "Many of our customers are now looking for us to provide them not only with industrial equipment, but also the systems control necessary to automate their processes.

"Consolidated Systems Corp., which has designed and constructed hundreds of custom-engineered systems for scientific, military, and industrial use, within the past six years, will provide an important new service to Allis-Chalmers equipment users," Stevenson said.

CATALOGS and TRADE PUBLICATIONS

Send your publications to The Mines Magazine, Guggenheim Hall, Golden, Colo., for review in these columns. Please mention The Mines Magazine when requesting publications from the manufacturer. Publications are free.

ACRALYZER. The Scientific and Process Instruments Division of Beckman Instruments, Inc., announces the marketing of its Model K-1006 Portable Sulfur Dioxide Acralyzer (Automatic Chemical Reagent Addition Analyzer), an instrument designed to monitor and record low concentrations of sulfur dioxide in the atmosphere. The Model K-1006 is particularly useful in the field of air pollution control, and can also be used to detect sulfur dioxide in tunnels, subways, chemical plants, and refrigeration plants. Further details can be obtained by writing to the Technical Information Department, Beckman Scientific and Process Instruments Division, Fullerton, Calif., for Bulletin K-4028.

CONVEYOR-SCALE SYSTEMS. Weighing & Control Components, Inc. Hatboro, Pa., has issued Bulletin No. 60 entitled "Unitized Conveyor-Scale Systems." The Bulletin explains that W-C Conveyor-Scale Systems are used for in-transit weighing of bulk materials in connection with conveyor line systems, flat-belt or trough-type, fixed or variable speed. On the basis of in-motion weight measurement, they provide a continuous readout of material feedrate and totalized thruput. This information, expressed in weight per unit of time, can be utilized for a diversity of control functions in processing and formulating operations, such as flow-rate control, inventory control, and ingredient proportioning.

MOLE-DRIL. Three sizes of the versatile "Mole-Dril" are now being offered by Gardner-Denver Co. Ranging from 4" to 6" diameter, they are AM4, AM5 and AM6. Designed and engineered for hard rock drilling in construction, quarry and mining operations.

The "Mole-Dril's" simple construction cuts "down time", due to reduced wear and trouble. With just 3 moving parts; the valve, hammer and piston, there is easy disassembly and a minimum of maintenance. For further information write to the Gardner-Denver Co., Quincy, Ill.

RECLAIMING ALUMINA. How a firm, without increasing mining operations, boosts its alumina yield by a highly specialized reclaiming process that extracts the precious powder from refuse mud, is the subject of a new bulletin (ER-10-1) offered by Fuller Co., Catasauqua, Pa.

Complete with illustrations, the four-page report sets forth in detail each step of the system, now in operation at the Aluminum Co. of America's Bauxite, Ark., Bayer plant.

The report, designated ER-10-1, traces the reclaiming process from disposal of the sludge (containing small amounts of aluminum oxide), through the remixing and sintering action in a giant rotary kiln heated to 1800 degrees F. Highlighted is how Alcoa, with the installation of a direct, air-quenching inclined-grate cooler, is cooling the material fast enough so that it can progress to the next refining phase.

Added benefits of the cooler are enumerated; including savings in time and labor, low maintenance factors, and the maximum recovery of heat during com-

bustion afforded by the cooler's design.

RESPIRATORY EQUIPMENT. An industrial gas mask canister selector table, using 62 most common industrial gas and vapor hazards is included in the latest Willson flyer on respiratory protection equipment. Opposite each hazard are listed recommended canister, color guide, Bureau of Mines approval where applicable. More information may be obtained from Willson Products Division, Reading, Pa.

SPRINGS. A comprehensive, new brochure covering the manufacture of a wide variety of springs for use in industry has been published by ALCO Products, Inc. It contains formulas, drawings, data and illustrations for all types of hot- and cold-wound springs. There also is a section outlining such considerations of spring design as working stress, modulus and design stress, with an accompanying table setting forth the physical properties of spring materials.

The new brochure, entitled "ALCO Springs for Industry," is available from ALCO sales offices and agents in the United States and Canada, or may be obtained by writing to ALCO Products, Dept. 906-R, Box 1065, Schenectady, N.Y. TRAXCAVATOR. Described as the machine that "never stops moving," the new Caterpillar 977H Traxcavator is the subject of a two-color eight page booklet (Form 33790) by the manufacturer, Caterpillar Tractor Co., Peoria, Ill.

Features of the new unit, according to the publication, include a new turbo-charged engine with horsepower raised to 150 from 100, a new power shift transmission coupled with a speed range selector to give four speeds forward or reverse, a new dry-type air cleaner, and a hydraulic system producing 27 per cent greater pry-out force than earlier models. TRACTOR. "The New Work Styled D6" is the title of a two-color booklet just published by Caterpillar Tractor Co. Features of the new D6 Series B Tractor described in the 12-page brochure include a new diesel engine rated at 93 flywheel horsepower with 25 per cent more lugging ability, a new dry-type air cleaner, the exclusive Cat oil clutch, lifetime lubricated track rollers and idlers, and an operator's compartment designed for convenience, comfort, and operating efficiency. Also listed are specifications, and attachments and tools for logging, agriculture and other applications.

Copies of the booklet may be obtained through Caterpillar Dealers or by writing Caterpillar Tractor Co., Peoria, Ill., and requesting "The New Work Styled D6," form 33611.

FLEXIBLE TUBING. New methods for handling air, liquids and light solids with nonmetallic flexible tubing are now available to plant engineers and product designers.

Recent technological breakthroughs in the construction of flexible products have resulted in the creation of an entire new industry offering many cost-cutting opportunities.

A basic manual explaining the new industry (the first of its kind) has been published by the Flexible Tubing Corp.

of Guilford, Conn. Called "The Facts About Flexible Tubing," the manual provides a full description of the varied forms, major advantages and uses of flexible tubing. The manual is available at no cost, by writing Flexible Tubing Corp., Guilford 2, Conn.

FOUR-BEARING SCREEN. A flyer setting forth the structural features of Allis-Chalmers four-bearing screen which provide smooth starting, running and stopping has been released by the company.

Designed to handle high tonnage at low cost, the heavy-duty screen is available in 5 x 10, 5 x 12, 5 x 14, 6 x 12, 6 x 14, and 6 x 16-ft. sizes, single or multiple deck, cable suspended or floor mounted.

Copies of the leaflet, 26B9140, are available on request from Allis-Chalmers, Milwaukee 1, Wisc.

FLOTATION REAGENTS. Mineral Dressing Notes No. 25, an informative 48-page booklet, contains a thorough run-down on all commercially available Cyanamid Mining Chemicals plus helpful data on their use in processing various types of ores. Expanded and completely revised since its last printing in 1954, it now includes valuable facts about new Cyanamid flocculants as well as new authoritative information on copper-lead and copper-moly separations. The booklet is available to readers of MINES Magazine by request to American Cyanamid Co., Explosives and Mining Chemicals Dept., 30 Rockefeller Plaza, New York 20, N. Y. INFRARED SOURCE THEORIES. Technical Bulletin 59-220, 8 pages, objectively discusses infrared source theories and laws; prediction of quantity and quality of radiation from heated sources; color blindness; and other technical points. For free copy, write Fostoria Corp., Infrared Division, Department 41, Fostoria, Ohio.

NUCLEAR POWER PLANT. The spring-summer issue of the ALCO REVIEW, a product publication of ALCO Products, Inc., carries an article on the new nuclear power plant PM-2A. Recently delivered to the U. S. Army Engineers, PM-2A is the world's first skid-mounted air transportable nuclear reactor. The plant will be installed in ice tunnels at Camp Century, Greenland later this year in accordance with agreements reached between the governments of United States and Denmark.

The spring-summer issue of the REVIEW describes in detail the features of the new nuclear plant and includes plant design data, engineering experiments conducted and tests performed on various components. Copies of the ALCO REVIEW are available from ALCO Products, Inc., P.O. Box 1065, Schenectady, N. Y.

SHEET METAL EQUIPMENT. Niagara Machine and Tool Co. Booklet 203 illustrates and describes the advantages, features and capacities of the many Niagara power operated machines for plate and sheet metal work. In addition to Booklet 203, Niagara Bulletins 55 and 91 are available upon request from Mine and Smelter Supply Co., P.O. Box 9041, Denver 16, Colo.

(Continued on page 45)

MINERAL INDUSTRIES

(Continued from page 3)

Quantrol Assay System Developed by Anaconda

Developed by the metallurgical research department of Anaconda Co. under the direction of Francis Holdreedy, the new Quantrol X-ray for assaying concentrator products marks the only place in the world using this assay system in copper smelting.

The unit assays 13 different samples of five different family groups, reporting an assay on each sample every 15 to 30 minutes. A density gauge makes corrections for fluctuations in the solids content and a computer instrument combines this information with the X-ray readout to deliver the correct assay.

Remote indicators inform operators of the flotation circuit out in the plant and of the assay of their feed, concentrate and tailings. The operator, with an almost constant flow of information, can quickly take any corrective action which the assay reports show to be necessary.

U. S. Manganese President Announces Improvements In Rhodonite Treatment

Improvements on the process for making manganese from rhodonite have been announced recently by Albert M. Garbade of New York City, president of U.S. Manganese Corp. Tests have been run and another test to prove the economy of separation will be run sometime this fall.

Standard Metals in Silverton, Colo., will use one of several proven processes for treatment of rhodonite but has not announced which method is to be used. Studies are being speeded up to be timed with actual mining of rhodonite in the Silverton area by Standard Metals to begin next year.

During the past few years, U.S. Manganese linked with Vitro Corp., has done extensive diamond drilling on claims in the Eureka-Animas Forks district. The area, together with the Sunnyside, is said to be the largest known rhodonite deposit in the United States.

AEC Signs Contract to Buy Uranium From Petrotomics Co.

The Grand Junction Operations Office of the Atomic Energy Commission signed a contract on Aug. 12 with Petrotomics Co. for the purchase of uranium concentrates derived from ore developed in the Shirley Basin area in Carbon County, Wyo. Petrotomics Co., with principal offices in

Oklahoma City, is a general partnership comprising Kerr-McGee Oil Industries, Inc., Tidewater Oil Co., Skelly Oil Co., and Getty Oil Co.

The contract, extending through Dec. 31, 1966, provides for the purchase of appropriate quantities of U_3O_8 derived from controlled eligible ore reserves pursuant to the Commission's announcement of November 24, 1958, together with provisions for ore production in the pre-1962 period which the Commission can direct to existing mills.

The contract also provides that Petrotomics may, at its option, build a mill for the production of U_3O_8 covered by this agreement in the 1962-1966 period, or make arrangements with existing mills for such recovery. In either event, a flat \$8.00 price per pound without amortization will be paid by the Commission for the concentrates produced after April 1, 1962.

Tiny Electronic Tube Developed

A tiny, powerful electronic tube has been developed by Westinghouse Electric Corp. Called an Astracon, the light-amplifying tube is said to be so sensitive that it makes visible every individual elementary particle of light that triggers its ultra-sensitive output, increasing the light-gathering ability of even the largest telescopes by many times.

Muted Gasoline-Powered Lawnmower

Muted gasoline-powered lawnmower, based on new-component design, has been announced by William C. Sperry, physicist at Armour Research Foundation of Illinois Institute of Technology. S-shaped cutting blade, domed engine cover lined with sound-absorbent material, and improved muffler reduce noise level without affecting grasscutting efficiency. Non-quieted mower of same model must be three times as far away from listener as new model to sound as quiet.

(Editor's Note: Although this may not be of earth-shaking consequence, the silencing of the gasoline-powered lawn mower on Sunday morning in suburbia is of supreme interest, particularly to the rising young executive just recovering from a night at the Country Club or on the town. The early riser, with a feeling of virtue, starts his old-fashioned mower, and says, "To heck with those guys who don't have sense enough to behave themselves on Saturday night. Let them suffer.")

TECHNICAL SOCIETIES

(Continued from page 6)

Schneeberger in Australia

Dr. Werner F. Schneeberger of Ball Associates, Ltd., Denver, Colo., left Aug. 1 for Australia on behalf of American and British interests. Dr. Schneeberger previously worked in Australia for Royal Dutch Shell and the Bureau of Mineral Resources of the Commonwealth Government of Australia.

Battelle Metallurgists Suggest Potential Uses Of Depleted Uranium

Potential uses of depleted uranium, particularly in the iron and steel industry, are suggested by Battelle Memorial Institute metallurgists Vincent Barth and George Rengstorff in the July issue of the *Battelle Technical Review*. These uses may provide the solution to the problem of what to do with the huge stock of depleted uranium—uranium with the fissionable isotope U235 removed—currently accumulating at a rate of tens of millions of pounds a year.

According to the authors, depleted uranium shows promise as an alloying element for tool steels, as a scavenger for impurities in steels and other metals, as a spheroidizing agent in making nodular iron, and as an agent for strengthening metals by dispersion hardening. It could also be used as a gamma-ray shielding material and as a constituent of bearing metals, high density-alloys, and alloys of various metals.

The Battelle metallurgists emphasize that much research is still needed to supply all the data required to use uranium effectively in steel. In addition, the price of uranium is still too high to make it competitive with the metals now in use.

However, new technical developments which would result in the increased use of uranium would bring the price down by lowering the cost of preparation. "It is reasonable to believe," say Barth and Rengstorff, "that the price would be in the range of \$2 per pound of contained uranium if a market develops. This would be in the price range of tungsten and molybdenum additions for steel."

Students Publish Scientific Journal

While educators and statesmen ponder how they can spur young minds on to scientific achievement, some young Americans have taken the ball and are showing that they can carry it themselves.

These young high school and college scientists across the country and beyond its borders are publishing their own scientific journal. It's called *Particle*, and its aim is to serve as an outlet for "free expression and exchange of ideas" among science students, according to publisher Dunbar Aitkens, a physics major at the University of California.

Aitkens got the idea for the magazine when he attended a science fair in San Francisco and found that other science students had plenty of ideas but no means of communicating them.

With his Air Force mustering out pay, Aitkens and Lloyd Prentice, a high school senior then, got out the first issue of *Particle* two years ago. It is published quarterly from a leaky loft over a garage at 2531 Ridge Road next to the Berkeley Campus of the University of California.

FROM THE EXECUTIVE MANAGER'S DESK



COL. WENDELL W. FERTIG

October Issue

We are completing the planning for the October issue of The MINES Magazine, which will mark the 50th anniversary of the publication of No. 1, Volume I. In the limited space in that issue we will review some of the changes that have taken place in the past 50 years. Of course, the changes are those that appeal to our staff or those that are suggested by our readers. If you have any suggestions, get them in at once, for our deadline for that issue will be September

25th. Of course if you send us an ad for that number, we could hold the deadline for a few days. Money makes a difference.

November Issue

The November issue is shaping up and should be exceptionally good. The response to our request for original articles has been very good. We have articles on nearly every phase of Secondary Recovery. There will also be pictures of each instructor in the Petroleum Engineering and Petroleum Refining departments, together with a brief biography. Pictures will be shown of new equipment that may have been added since you were in school. Each of the two departments featured in this issue are responsible for preparation of their own material to be used in the November issue. This issue will be the 25th, Silver Anniversary Issue, of the Annual Petroleum Number. See that your company is represented in it by an ad. The more advertising, the more fine articles we can include.

Homecoming

Planning for Homecoming is at a standstill until the fall term begins, but you should have received the letter from Fritz Brennecke about the annual Alumni season tickets. Those tickets are a real bargain, and particularly so if you plan on being here for Homecoming. You geologists cannot afford to miss the fine program arranged for that weekend prior to the Denver Meeting of the Geological Society of America.

Report on First Six Months

This report is in the form of comments on the first six months that I have been with the Association. There is no attempt to present a factual survey of our progress (?) for there is neither the time or personnel to prepare it. Rather it is a general comment on what has taken place during the period.

Membership. In some respects this has been quite satisfactory for we have gained 371 new members, i.e. alumni who were not members in 1959, although a few of this number had been members in 1958, but others had not been members for many years. Breaking this down by 10 year totals we have:

TEN YEAR TOTALS

From - To	New Members	Total Graduates	Percentage New Members
1900-1909	9	360	2.5%
1910-1919	12	377	3.2%
1920-1929	18	707	2.5%
1930-1939	36	886	4.1%
1940-1949	49	1230	4.0%
1950-1959	157	1957	8.0%
1960 only	85	150	
		(undergraduates)	63.0%
Grand Total	366	5667	6.5%
1961			4*
1962			1*

* Junior Members

On the surface this looks fine, we have shown a 6.5 per cent increase in new members, or in other words 6.5 per cent of alumni who previously were not active members have paid their dues and become active. On the other hand 403 members who were active in 1959 have not yet paid their dues. I am quite sure that they intend to pay them, for most have been active ever since leaving school. Yet we cannot use their intentions to pay the bills as they come due. It may take another letter or two to keep the majority active in 1960, and that means at least 10 days of my time will be lost to constructive work.

Aside from those above there are nearly 2000 alumni who are not active and show little interest in becoming active. They disregard the letters mailed to them, and our last mailing to them was all first class (cost \$86.70 for postage alone) so they could not complain that they were getting more junk mail from the Alumni Association.

What is the solution? As suggested last month, you, the individual active member who receive this magazine must help share the burden by recruiting the classmate who is not active.

Help out in this effort, and in your own case be sure that you mail your check without further delay. Don't worry about the dues card, just put the check in an envelope and mail to The CSM Alumni Association, Golden, Colo.

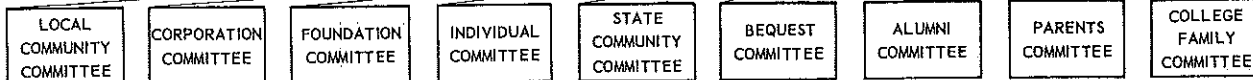
Advertising

It is just beyond my capabilities to build up the Association by increasing the number of members and at the same time solicit advertising. Since we had available a long-time former Executive Manager and Managing Editor of The MINES Magazine, the Executive Committee decided to ask Mr. Frank C. Bowman, '01, to solicit advertising for the Magazine. Mr. Otto Highfield started to do this, but has since moved to Sun City, Ariz., and cannot handle the solicitation as readily from there as from Denver. Mr. Bowman has been designated as Advertising Manager for The MINES Magazine. He will need your help, just as I do, for this must be a team effort.

General

I suppose we can say that we are making progress, but when you gain 366 new members and lose 405 former active members, the forward advance is hard to measure.

CSM FOUNDATION, INC.



Horizon Plan Looks to the Future

The Horizon Plan looks toward a time when the Colorado School of Mines will be 100 years old. By 1974 it is hoped that Mines will have achieved specified goals in its aim to serve the mineral industry.

To this end many people have been involved in projects that will bring Mines nearer its goal. Many of these people are volunteers who give of their time because they believe as alumni that the program deserves support.

However, one of the newest projects is one that is being undertaken almost exclusively by the administration. This is the effort being made to provide scholarships so that deserving, properly qualified young men can study at Mines.

U. S. Scholarship Program

Some historical perspective is necessary to see the direction of the administration's thinking. For a quarter of a century Mines operated a United States Scholarship program under state legislative support.

Simply stated this meant that Mines offered a scholarship each year to every state in the Union. While not every state had a qualified candidate to offer for the scholarship each year, some 25 or 30 young men entered engineering education here because of the scholarships. Others came because their attention was focused on Mines as a result of the public awareness the program generated.

As the demands on the legislature for appropriations for higher education increased, the program became hard to justify to legislators with their consciences attuned to the use of the Colorado public purse. In 1956 the scholarships were discontinued. The cumulative effect of the scholarship program has been apparent in the last several years as engineering enrollment began to drop around the nation and was reflected accordingly at Mines. True, there are other reasons why enrollment is waning, but the discontinued scholarship program has taken its toll.

President Vanderwilt Appeals to Industry

In an effort to reinstate the scholarships so badly needed, President Vanderwilt has appealed to industry for support of the program. He is on solid ground as he looks to industries employing mineral engineers for this support.

If Mines, among other mineral education schools, does not turn out trained engineers for industry, the already apparent shortage of men will become more acute. He has offered this logic in presenting his case.

Talk It Up Whenever You Can

This is a self-help effort which the administration has launched to supplement the labors of all volunteer Development Committee workers. Miners can help by remembering the effort and by keeping informed of the School's needs and efforts. In plain words, talk it up whenever you can. This is the practical way to make sure of "Building a Great Future for a Great College."

Tax Advantages of Living Trust

THE BEQUESTS COMMITTEE suggests that many alumni would be favorably surprised if they spoke with their lawyers about the tax advantages of establishing a Living Trust in favor of the Colorado School of Mines Foundation, Inc.

For example, with a Living Trust established with securities that have gained in value, a donor pays no capital gains taxes, he may realize income tax advantages, and his estate will be benefited by distinct savings in estate or inheritance taxes. Letters of inquiry to Harvey Mathews or to the Development Office at the School are welcomed.

Professional...

CARDS

E. L. Anders, Jr., M.S., '50

Consulting Petroleum Engineer
327 First National Bank Building
Abilene Texas

BALL ASSOCIATES

Douglas Ball, '43
Peter G. Burnett, '43
Ralph L. Boyers, '50
Richard Fulton, '50
Werner F. Schneeberger
Alan M. Bieber
Oil and Gas Consultants

C. A. Johnson Bldg.
Denver 2, Colo.
ALpine 5-4878

BROWN & ROOT, INC.

Engineers - Constructors
P. O. Box 3 Houston, Tex.
GEORGE R. BROWN, '22
Mining and Metallurgical Division
One Wall St. New York, N. Y.
DOMINGO MORENO, '22

W. W. Cline, Ex-'29

The Sun Drilling Company
Sun Marine Drilling Corp.
2975 Wilshire Boulevard
Los Angeles 5, Calif.

James Colasanti, '35

Metal Treating & Research Co.
Commercial
Heat Treaters
Consulting
Metallurgical Engineers
GE 3-1914 GE 3-4843
4110 Fox St. Denver 16, Colorado

A. W. Cullen, '36

and
K. C. Forcade, '36
Consulting Geologists
420 C. A. Johnson Bldg.
Keystone 4-5385 Denver, Colorado

Eugene E. Dawson, '38

American Independent Oil Co.
Kuwait, Persian Gulf

Ronald K. DeFord, '21

Graduate Adviser
Department of Geology
The University of Texas
Austin 12, Texas

LETTERS TO THE EDITOR

DAN KALJIAN, x-'61, thanks us for the Alumni News item (in the June 1960 issue of The MINES Magazine) about his undergoing flight training as a Marine aviation cadet. He adds that it is still his hope to complete his education at Mines and that it is encouraging to be thought of during his absence. He is now undergoing further training at the United States Naval Air Station, Pensacola, Fla.

A. FRANK AUSANKA, '42, manager of Operations for Artex Oil Co., Wichita Falls, Texas, was kind enough to write that "the magazine is a tremendous improvement."
(Editor's Note. Thanks, Frank, we appreciate the good word.)

RONALD K. DeFORD, '21, professor of Geology and graduate adviser at the University of Texas, Austin, Texas, wrote: "My address during most of August will be Box 87, Van Horn, Texas, although I will not stay right there. I am going into the field as far as Central Chihuahua and Northern Coahuila. However, we will be back in Austin in time for the opening of the semester in September."

WILLIAM N. Lyster, '53, 204 Woodside Dr., Baytown, Texas, writes that he is resigning this fall as senior chemical engineer, Solvents Section, Humble Oil & Refining Co., to attend the University of Houston to work on his Ph.D. in chemical engineering on a full-time basis. He received a National Defense Education Act Scholarship for three years of study and decided to take advantage of this opportunity for a little higher learning. He plans to work for Humble during the summer months and to return to the company after he receives his degree.

Assuming that we have the permission of all concerned, we want to print ARTHUR H. YARBERRY'S ('50) reply to the letter which Walter E. Heinrichs, '40, wrote concerning the problems of blasting in metropolitan areas. The letter follows:

"I was quite pleased to receive your letter of June 29. It was good of you to write; however, I was disappointed you know of no practical method for high tonnage rock breaking along the lines of 'silent' shooting.

"Our whole problem appears to hinge on the fact that we make noise with blasting. We assess all damage claims by seismograph and have failed to find a single instance where we were even near the damage area.

"Dr. L. Don Leet of Harvard, Mass., is our consultant and photo interpreter and offers some interesting alternatives to our present mining methods; however, as he says, we will still be shooting.

"Dr. Leet is working with the 'crater effect' and 'plastic flow' in our rock. We still don't know the answers, and Montreal Limestone appears to be complicating the analysis."

DAVID C. BROWN, '53, 21841 Central Park, Park Forest, Ill., writes that he was pleased to learn that D. F. "Dusty" Boyd, '53, had given him a gift subscription to

The MINES Magazine. He adds: "I should have joined long ago."

David is working as a research metallurgist in welding research at the Armour Research Foundation of the Illinois Institute of Technology in Chicago. He has been there since November 1958. Prior to that he was welding engineer at Chemstron Corp. in Louisville, Ky.

His closing comment is: "Our class reunion is only a couple of years off and I'm planning to come to Golden for that. Hope to see you then."

CLASS NOTES

(Continued from page 10)

RICHARD O. DIMIT has moved from Cody, Wyo., to 5525 E. Exposition, Denver 22, Colo. He is petroleum engineer for Arrowhead Exploration Co., Mile Hi Center Bldg.

MARK G. SPAETH is construction engineer for the U.S. Bureau of Reclamation. His mailing address is Box 2061, Page, Ariz.

ERIC NEWMAN'S new address is 285 La Paloma Dr., Rawlins, Wyo.

DAVIS A. PARKER is engineer for Smoot Sand & Gravel Corp. of Washington, D.C. His home address is 3214 Fayette Rd., Kensington, Md.

DONALD O. RAUSCH's new address is 2737 Apple Blossom Lane, Salt Lake City 17, Utah.

FRANK P. TROSETH has been transferred by Mobil Oil Co. from New Orleans, La., to Roswell, N.M., where his P. O. Box is 662.

1955

CHARLES A. FISHER has moved from Sharp Park, Calif., to 7834 Robindell Way, San Jose, Calif.

ROBERT H. B. RATTON, seismic party chief for Mobil Oil Co., receives mail at P. O. Box 168, Starkville, Miss.

HAROLD J. HEDLUND has moved from Golden, Colo., to Farmington, N.M., where his P. O. Box is 1717.

SIDNEY A. JOHNSTON, engineer with Riley G. Maxwell Inc., lives at 1901 Duncan, Pampa, Texas.

A. J. MANCINI, geologist for Texaco Inc., lives at 2416 Howard Ave., Billings, Mont.

JOHN C. OWINGS has moved from Livermore, Calif., to 142 High St., Middletown, Conn.

JOHN W. PARKER, JR., is assistant group leader, Process Development Section, Phillips Chemical Co. He lives at 1143 Elmore Dr., Borger, Texas.

DAVID L. RICE's new address is 1713 Benton St., Bakersfield, Calif.

ROBERT EDWARD SMITH is civil engineering assistant with Los Angeles County, not county engineer as erroneously reported in the July issue of the magazine. His home address is 7458 Cleon, Sun Valley, Calif.

FRED J. GRUBERTH, who recently received his M.B.A. degree from the Harvard Business School, is now employed by Continental Oil Co. His address is 9701 Warwana Rd., Houston, Texas.

1956

HADJI S. ADNAN is consulting engineer with mailing address at 2340 S. Broadway, Denver 10, Colo.

(Continued on page 35)

FROM THE LOCAL SECTIONS

Minutes of Section Meetings should be in the Alumni Office by the 15th of the Month preceding Publication.

ALABAMA

Birmingham Section
 Pres.: Joseph Hohl, '25
 Sec.: Richard White, '42
 249 Flint Dr., Fairfield

ARIZONA

Arizona Section
 Pres.: Bob Thurmond, '43
 V. Pres.: Gene Klein, '43
 Sec.: John H. Bassarear, '50
 c/o Pima Mining Co., Box 7187, Tucson
 Annual meetings: First Monday in December; 3rd Sunday in May (annual picnic).

Four Corners Section
 See New Mexico for officers

CALIFORNIA

Bay Cities Section
 Pres.: John D. Noll, '51
 V. Pres.: Ralph D. Eakin, '48
 Treas.: Herbert D. Torpey, '51
 Sec.: Charles G. Bynum, '26
 2810 Loyola Ave., Richmond

Southern California Section
 Pres.: R. E. "Ray" McGraw, '53
 Treas.: J. R. Leonard, '42
 Sec.: H. David Squibb, '34
 2215 E. Sycamore St., Anaheim

COLORADO

Denver Section
 Pres.: Ronald F. Lestina, '50
 V. Pres.: Hugh Wallis, '28
 Sec.-Treas.: Patrick C. Brennan, '53
 1893 S. Leyden, Denver 22
 Office: AC 2-2060

Regular luncheon meetings will be held weekly—every Tuesday at 12:00 noon, Denver Press Club, 1330 Glenarm Pl., beginning Sept. 20th. During the football season, films of the previous Mines game will be shown.

Denver Section

Denver Section is sponsoring a dinner for alumni and their wives attending the 35th Annual Fall Meeting of the Society of Petroleum Engineers of AIME in Denver Oct. 2-5. The dinner will follow a cocktail party and will be held at 8 p.m. Monday, Oct. 3, at the Denver Press Club, 1330 Glenarm Pl. For reservations telephone the Alumni Office, CR 9-3381, Ext. 251.

Four Corners Section
 See New Mexico for officers

Grand Junction Section

Pres.: John Emerson, '38
 V. Pres.: Tony Corbetta, '48
 Sec.-Treas.: Joe Hopkins, Ex-'37
 1235 Ouray Ave., Grand Junction

DISTRICT OF COLUMBIA

Washington, D. C. Section
 Pres.: Charles T. Baroch, '23
 V. Pres.: Vincent G. Gioia, '56
 Sec.-Treas.: Thomas E. Howard, '41
 9511 Nowell Dr., Bethesda 14, Md.
 Luncheon meetings held every 2nd Thurs. noon at Sphinx Club, 1315 K St., N.W.

ILLINOIS

Great Lake Section (Chicago)
 Ray Watson, c/o Standard Oil Co., 910 So. Michigan Ave., Chicago 80, Ill.

KANSAS

Kansas Section
 Pres.: Francis Page, '39
 Sec.: James Daniels, '51, AM 5-0614
 205 Brown Bldg., Wichita
 Meetings: Called by Sec. Contact Sec. for date of next meeting

LOUISIANA

New Orleans Section
 Pres.: George Burgess, '49
 V. Pres.: Emory V. Dedman, '50
 Sec.-Treas.: Thomas G. Fails, '54
 6334 Essex Ct., New Orleans 14

MINNESOTA

Iron Range Section
 Pres.: Paul Shanklin, '49
 V. Pres.: Leon Keller, '43
 Sec.-Treas.: James Bingel, '53
 50 Garden Dr., Mt. Iron, Minn.
 Exec. Com.: Wm. Gasper, '43 and Robert Shipley, '52

MISSOURI

St. Louis Section
 Pres.: Earl L. H. Sackett, '33
 Sec.-Treas.: H. A. Dumont, '29
 227 Crane St., Edwardsville, Ill.

MONTANA

Montana Section
 Pres.: John Suttie, '42
 V. Pres.: John Bolles, '49
 Sec.-Treas.: Wm. Catrow, '41
 821 W. Silver St., Butte

NEW MEXICO

Four Corners Section
 Pres.: Dick Banks, '53
 V. Pres.: Tony King, '57
 Sec. Treas.: Tom Allen, '41
 2104 E. 12th St., Farmington

NEW YORK

New York Section
 Pres. & Treas.: Ben F. Zwick, '29
 Sec.: H. D. Thornton, '40
 Union Carbide Olefins Co.
 30 E. 42nd St., New York City

OHIO

Central Ohio Section
 Pres.: Roland Fischer, '42
 Sec.-Treas.: Frank Stephens, Jr., '42
 Battelle Mem. Inst., Columbus

Cleveland Section
 Pres.: Charles Irish, '50
Pennsylvania-Ohio Section
 See Pennsylvania for officers

OKLAHOMA

Bartlesville Section
 Pres.: R. C. Loring, '37 and '39
 V. Pres.: C. T. Brandt, '43
 Sec.-Treas.: W. K. Shack, '51
 4726 Amherst Dr., Bartlesville

Oklahoma City Section
 V. Pres.: Clayton Kerr, '30
 Meetings the 1st and 3rd Tuesday of each month at the Oklahoma Club

Tulsa Section
 Pres.: Chester H. Westfall, Jr., '52
 V. Pres.: Brook Tarbel, '50
 Sec.-Treas.: Charles J. Diver, '52
 528 S. New Haven, Tulsa 12

PENNSYLVANIA

Eastern Pennsylvania Section
 Pres.: Samuel Hochberger, '48
 V. Pres., Sec.-Treas.: Arthur Most, Jr., '38
 91 7th St., Fullerton

Pennsylvania-Ohio Section
 Pres.: L. M. Hovart, '50
 Sec.-Treas.: George Schenck, '52
 7130 Thomas Blvd., Pittsburgh
 Meetings upon call of the secretary

TEXAS

Houston Section
 Pres.: Jack Earl, '53
 V. Pres.: John C. Capshaw, '54
 Sec.-Treas.: Nick Shiftar, '40
 5132 Mimosa St., Bellaire, Texas

Houston Section
 Nick Shiftar, '40, writes that Houston Section held its regular monthly luncheon at the Houston Club on Aug. 3. A limited canvass over the telephone by Bob Turley and Jack Earl resulted in a large turnout at the luncheon. A list of all known Mines men in the area was distributed to each man present. Beginning next month, luncheon meetings will be held at the Lamar Hotel.

Miners attending the Aug. 3 luncheon were:

Albert G. Wolf, '07; C. Donald Beeth, '24; Jim Ballard, Donald Davis, '25; Don I. Gahagan, '27; I. G. Burrell, '31; Nick

Shiftar, '40; G. E. Anderson, '48; J. N. Warren, Art Dickinson, M. Malek-Aslani, '50; C. A. Lehnertz, Jr., Bob Turley, R. W. Gallagher, Ira E. McKeever, '52; Jack F. Earl, '53; John Capshaw, '54.

South Texas Section

Pres.: James Wilkerson, '31
 V. Pres.: Edward Warren, '50
 Sec.-Treas.: Richard Storm, '53
 1007 Milam Bldg., San Antonio

UTAH

Four Corners Section
 See New Mexico for officers

Salt Lake City Section
 Pres.: Robert B. Ingalls, '48
 Vice Pres.: Edwin T. Wood, '48
 Sec.-Treas.: Major W. Seery, '56
 260 W. 1200 North, Bountiful, Utah
 Regular luncheon meeting second Thursday of each month at the Ft. Douglas Club.

WASHINGTON

Pacific Northwest Section
 Pres.: Wm. Douglass, '11
 Sec.: C. Ted Robinson, '53
 16204 S.E. 8th, Bellevue

WYOMING

Central Wyoming Section
 Pres.: M. Rex Curtis, '48
 Vice Pres.: Martin Hegglund, '41
 Sec.-Treas.: James F. Huff, '53
 806 W. 13th St., Casper

CANADA

Calgary Section
 Pres.: R. F. Zimmerly, '47
 V. Pres.: J. S. Irwin, Jr., '54
 Sec.-Treas.: G. L. Gray, '50
 1304 4th St. S.W., Calgary
 Luncheon meetings held 3rd Monday of each month in Calgary Petroleum Club; visiting alumni welcome.

PERU

Lima Section
 Pres.: Richard Spencer, '34
 V. Pres.: Martin Obradovic, '53
 Sec.-Treas.: Norman Zehr, '52
 Casilla 2261, Lima
 Meetings first Friday of each month, 12:30 p.m., Hotel Crillon (April through December), or on call.

PHILIPPINES

Baguio Section
 Pres.: Francisco Joaquin, '26
 V. Pres.: Claude Fertig, x-'27
 Sec.: P. Avelino Suarez
 Balatoc Mining Co., Zambales

Manila Section

Pres.: Anselmo Claudio, Jr., '41
 V. Pres.: Rolando Espino, '41
 Sec.-Treas.: Edgardo Villavicencio, x-'40

TURKEY

Ankara Section
 Alumni visiting Turkey contact either:
 F. Ward O'Malley, '42, Explr. Mgr., Tidewater Oil Co., Kumrular Sokakb, Yenisehir Ankara; Tel. No. 21328.
 Ferhan Sanlav, '49, Turkiye Petrolleri A. O. Sakarya Caddesi 24, Ankara; Tel. No. 23144.

VENEZUELA

Caracas Section
 Pres.: William A. Austin, Jr., '27
 V. Pres.: G. V. Atkinson, '48
 Sec.-Treas.: T. E. Johnson, '52
 c/o Phillips Petr. Co.
 Aptdo 1031
 Asst. Sec.-Treas.: R. L. Menk, '51
 c/o Creole Petr. Corp.
 Aptdo 889

CLASS NOTES

(Continued from page 33)

PREM S. ADVANI has moved from Port Neches, Texas, to Wilson Park Manor, Apt. 16, Conroe, Texas.

JACK E. CAIN, field engineer for Halliburton Co., lives at 5300 N. Washington St., Odessa, Texas.

ROBERT T. FOREST has moved from Rico, Colo., to 625 Jefferson, Grants, N. M.

JOE LOGAN, formerly of Whittier, Calif., is now living at 3834 Glen Arbor Blvd., Apt. 1A, Houston 25, Texas.

CHARLES D. MANN is engineer for St. Joseph Lead Co. with mailing address 134 Twin St., Bonne Terre, Mo.

ROBERT W. MILAM, 435 Vernon St., Oakland 10, Calif., is with Bechtel Corp. in the Refinery & Chemical Division. He is presently assigned to a Project Engineering Group.

GEORGE E. REEVES' address is 25 Crossland Ave., Salem, N. J.

ANTONIO V. N. SEGOVIA may be addressed c/o Dept. of Geology, Pennsylvania State University, University Park, Pa.

ALBERT E. WARD, formerly of Tucson, Ariz., is now living at 445 Clinton Ave., Rockville Centre, N. Y.

1957

LEROY V. BEVEY has moved from Farmington, N. M. to Lafayette, Calif., where his P. O. Box is 688.

BARRY L. BURKE, formerly of Grants, N. M., is living at 8937 W. 54th Pl., Arvada, Colo.

GARRY L. ENGLISH receives mail at 2054 Quitman St., Denver 12, Colo.

GILBERT H. SCHOONVELD has moved from Granite City, Ill., to 2270 Newark St., Aurora, Colo.

DAVID E. SMINK has left Houston, Texas, for 1307 E. 6th St., Mt. Pleasant, Texas.

JAMES SUNDQUIST is seismologist for Geophysical Service Inc. of Dallas, Texas. His mailing address is 839 W. 5th St., Loveland, Colo.

DONALD K. THISTLEWOOD has moved from Golden, Colo., to 2800 20th St., Boulder, Colo.

ANTHONY L. VASSILAROS (TONY L. KING) is mining engineer and geologist for Icombra s/a, Caixa Postal 547, Victoria, Brazil.

1958

DENNIS A. EVANS, employed as an engineering geologist in the Office of the County Engineer, Los Angeles County, gives his address as 4620 N. Coney Ave., Covina, Calif.

JEROME F. GAMBA is field geologist for Ideal Cement Co. with mailing address Box 531, Ft. Collins, Colo.

2ND LT. DONALD E. GIER, 076946, may be addressed at 273 Eastwood Dr., Jacksonville, N. C.

WHITLOCK JONES has moved from Santa Margarita, Calif., to 3632 Lawnwood Ct., San Luis Obispo, Calif.

BOBBY GENE KERR, formerly of Anaheim, Calif., lives at 3138½ Pickwick Lane, Houston 21, Texas.

HERBERT A. KROEGER lives at 2650 Williams, Glenview, Ill.

KARL E. NIELSEN is metallurgical engineer for Union Carbide Nuclear with mailing address RFD Route No. 1, Glenwood Springs, Colo.

ROLAND H. SHUBERT, formerly of Lyman, Nebr., lives at 536½ 18th St., Huntington 3, W. Va.

STEPHEN F. TURNER has moved from Sunnyside, Utah, to Eagle Mountain, Calif., where he picks up mail c/o General Delivery.

DONALD E. WILSON has moved from Pecos, Texas, to 1090 Locust St., Denver 20, Colo.

1959

JOSEPH R. ANZMAN, formerly of Wheat Ridge, Colo., may be addressed at P. O. Box 904, Ely, Nev.

F. DAVID BAILLY has moved from Crowley, La., to 9285 4th St., New Orleans 23, La.

LESLEY O. BOND is junior field engineer for Schlumberger Well Surveying Corp. with mailing address Box 308, Falfurrias, Texas.

DEAN O. GREGG, formerly of Climax, Colo., receives mail at 1430 Normandy, Golden, Colo.

C. HOWARD HAMILTON has left Norwalk, Calif., for 14130 Bellflower Blvd., Bellflower, Calif.

WARREN W. HILDEBRANDT, formerly of Loveland, Colo., lives at 8608 John Dower Rd., No. 8, Tacoma 9, Wash.

JOSEPH R. HILLER has moved from Golden, Colo., to 2800 20th St., Boulder, Colo.

CRAIG S. MARTENSON, formerly of Framingham, Mass., lives at 1531 31st St. N. W., Washington, D. C.

MICHAEL D. MCGUIRE, who had been in the Army for six months, is now employed as a mining engineer by the Anaconda Co. His mailing address is 715 8 St., Butte, Mont.

LT. WILLIAM R. MILLS, JR., has been transferred from Pensacola, Fla., to E Co., 3-60 BC, MCS, Quantico, Va.

DONALD E. MICHELS, engineering aide for the Bureau of Mines, lives at 17250 W. Colfax Ave., Golden, Colo.

JAMES L. PAYNE, geophysicist for Standard Oil Co. of Calif., lives at 3708 Brave Ave., Bakersfield, Calif.

ALI M. SAIDI may be addressed c/o Petroleum Engineering Laboratory, Stanford, Calif.

WILLIAM HENRY SMITH gives his address as c/o Phillips Petroleum Co., P. O. Box 2066, Westover Branch, Morgantown, W. Va.

RICHARD M. SWERDFEGER has moved from Aberdeen, Md., to Boulder, Colo., where he may be addressed c/o 844 15th St.

FRANK J. UCCIARDI is methods engineer for U. S. Steel Corp. with mailing address Box 924, Lynch, Harlan County, Ky.

(Continued on page 41)

IN MEMORIAM

Frank W. Millard

Frank West Millard, prominent engineer of eastern Nevada for more than half a century, died July 8 in Phoenix, Ariz. Born April 22, 1880, in Burden, Kans., Mr. Millard graduated from Colorado Springs High School in 1897 and received his E.M. degree in 1901 from the Colorado School of Mines. He made his way West with his parents in 1902 and opened an engineering and assay office in Ely, Nev., in 1903.



FRANK WEST MILLARD, '01

During his 56 years of private and consulting practice, he was the first city engineer of Ely. As a registered architect in Nevada, he designed and supervised construction of many public and private buildings in Ely and in White Pine County. In recent years he patented bentonite, perlite, and barite lode claims and sand and gravel placer claims as U.S. mineral surveyor.

In 1959 he was chosen "Engineer of the Year" by the Nevada Society of Professional Engineers. Mr. Millard was a charter member of the Eastern Nevada Chapter of that state organization, a member of the National Society of Professional Engineers, a land surveyor, state water right engineer, and a member of AIME.

From 1917 to 1920 he held the position of general superintendent of Consolidated Coppermines Corp. at Kimberly, and as an owner of the Lincoln Construction Co. he built the original state highway over Robison Summit west of Ely.

Mr. Millard is survived by his wife, Anna Miller Millard, 614 High St., Ely, Nev.; his son, Robert, who is continuing the engineering business in Ely; his daughter, Mrs. Mary M. Taw of Culver City, Calif., and five grandchildren.

George McCrory Lee

George McCrory Lee, who received his Met. E. degree in 1910 from the Colorado School of Mines, died July 22 at his home in Toronto and was buried July 27 at Crown Hill Cemetery in Denver.

Born Feb. 10, 1886 in Des Moines, Iowa, he attended East Denver High School. At the School of Mines, he and another student won the Stoiber Prize for their construction of an electric furnace. After graduating from Mines, he was employed by Granby Consolidated Mining & Smelting Co., later becoming smelter superintendent of their plant at Anyox, British Columbia. He was responsible for many improvements which helped to cut costs and simplify copper smelting and sintering.

When Granby shut down in 1935, Mr. Lee went with Ontario Nickel Co., and in 1941 joined Ventures Ltd. Obtaining a leave of absence in 1947, he was employed by Macalder Mines in British East Africa to solve operational problems. On his return to Canada he rejoined Ventures Ltd. where he helped design and plan Frobisher's mill and smelter for Kilembe Mines in Uganda, BEA. In 1956 he went to Africa to put the plant in operation, but ill health forced his return to Canada in 1958. After 1958 Mr. Lee was a semi-invalid although for a while he continued to go to the office for a few hours each day.

Survivors include his wife, Ethel Shotwell Lee, 65 Leacrest Rd., Apt. 1, Toronto 17, Ontario; three daughters: Barbara Wood of Kelowna, B. C., Jean Carol McCammen of Denver, Glenna Berto of Edmonton, Alta.; and seven grandchildren.

John Nicholas Teets

John Nicholas Teets, who graduated from the Colorado School of Mines in 1915 with a mining engineering degree, died May 25 at Santa Monica, Calif.

Born Nov. 17, 1890 at Junction City, Ky., he graduated from high school in Newton, Ill. and in 1912 entered Mines where he was an active member of SAE fraternity. Soon after his graduation, he opened a commercial assay office in Red Cliff, Colo., and in 1916 became associated with James E. Dick, '12, in Akron Mines Co., White Pine, Colo.

Mr. Teets enlisted in the U.S. Naval Air Corps during World War I, and after the war was employed by Midwest Oil Co. in Colorado and Wyoming.

In 1921 Mr. Teets moved to Santa Monica, Calif., where he became a partner with Merle W. Wilkinson, '13, in the Wilkinson Company, engaged in making alloys of precious metals for use by the dental industry. Later the partnership was joined by Mr. Teets' brother, Charles W. Teets. When the company was incorporated in 1946, John N. Teets retired from active business involvement. His son, Leland, a UCLA graduate, now heads the Wilkinson Company.

Survivors are his wife, Marie C. Teets; a son, J. Leland; a brother, Charles W.; a sister, Mabel Teets; and two grandchildren, all of Santa Monica, Calif.

Mortier F. Barrus

We have just learned that Mortier F. Barrus, who received a geological engineering degree from the Colorado School of Mines in 1943, died January 1959 from a head injury received in an accident near Yuma, Ariz. At the time of his death, Mr. Barrus was owner and president of Rexco Chemical, Laminex Inc., and Minex companies of Costa Mesa, Calif. He is survived by his wife, Helen Barrus, Santa Ana, Calif.

Edmund W. Westervelt

Edmund W. Westervelt died from a heart attack at his home in Los Angeles, Calif. on Thursday, Aug. 4, at the age of 76. Following services in Los Angeles the remains were sent to Rochester, N.Y. for burial.

After graduation from Worcester Academy and the University of Rochester, Westervelt became interested in mining and took special post-graduate work at the Colorado School of Mines in 1911-1913. For the next 20 years he was engaged in mining engineering in the United States, Mexico and South America.

In 1932 he came to Los Angeles where he was associated with the Security First National Bank as a real estate executive until his retirement in 1949. After retirement he traveled extensively in Europe and Central America.

He is survived by two sisters-in-law, Mrs. Helene M. Lipscomb of San Francisco, and Mrs. Ann J. Brandt of New York City.

Westervelt was a member of Delta Kappa Epsilon fraternity, and various professional organizations.

ALUMNI NEWS



▼ This photograph was taken just before the Harry F. McFarland family sailed for Indonesia. Shown left to right are Nanette, Mr. McFarland, Harry, Jr., Carol, Myles, Nela, Mrs. McFarland and Anita.

H. F. McFarland, '32, Teaches At Bandung Technical Institute

Harry F. McFarland, a 1932 mining engineering graduate of the Colorado School of Mines, will teach mining engineering for the next two years at the Technical Institute of Bandung, Indonesian Republic. His classes will be attended by some 40 top level Indonesian college students. Besides teaching mining engineering, he will train instructors and select Indonesians to do advanced engineering work. He will be one of nearly 30 U.S. instructors teaching at Bandung.

Professor McFarland, who likes the challenge of new climes and the excitement which seems to turn up in foreign assignments, recently returned to Denver after a two-year hitch at the Burma Technical Institute in Rangoon.

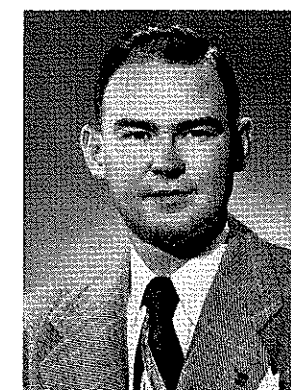
Mr. and Mrs. McFarland and five of their children—sons Harry Jr., 12, and Myles, 6, and daughters, Nell, 11, twins Nanette and Anita, 10—left Los Angeles Aug. 19 by boat via Hawaii, Japan, Hong Kong, Singapore, Manila and Jakarta to arrive one month later in Bandung, Java, where altitude is 3000 feet with a maximum temperature of 90 degrees and a minimum of 60 degrees. The children will attend school staffed by University of Kentucky teachers. Another daughter, Carol, 17, will live in Manila, Philippines, and attend school there.

The McFarland family may be addressed c/o William A. Dunlap,

Kentucky Contract Team, Institut Teknologi Bandung, Kotak Pos 312, Bandung, Java, Indonesia.

J. W. Brown, '52, Appointed College Relations Coordinator For Texas Instruments

Jackson W. Brown, a 1952 graduate in geophysical engineering from the Colorado School of Mines, has recently been named college relations coordinator of Texas Instruments, Inc. His responsibilities include coordinating the college relations and recruiting programs throughout all TI divisions.



JACKSON W. BROWN, '52

Brown joined Geophysical Service Inc., a wholly owned subsidiary of Texas Instruments, in June 1952. GSI assigned him to the Rocky Mountain area as computer and later as party chief. After a brief separation from the company in 1955, he was assigned as safety director and responsible for the accident prevention program of GSI's world-wide geo-

physical activities. In 1958 he was reassigned as employment director.

Mr. and Mrs. Brown and their three children reside at 13866 Birchlawn Dr., Dallas 34, Texas. (See Visitors to Alumni Office.)

Quinn, '48, Appointed General Sales Manager Of Denver Equipment Co.

The appointment of James E. Quinn, '48, as general sales manager of Denver Equipment Co. was announced recently by W. T. Ahlberg, executive vice president of the firm.

Quinn, a native of Denver, lives at 2500 Bellaire St. He joined Denver Equipment Co. in 1948 following his graduation from the Colorado School of Mines. After serving as an engineer in the pricing and estimating division and then as sales engineer in the export and domestic sales divisions, he was named manager of the Western division which includes Colorado and 10 other Western states. He has also been in charge of the company's uranium processing equipment sales division and is a recognized authority on treatment of uranium ore.

As general sales manager, Quinn will direct the world-wide sales activities of the Denver-based company which, in addition to dealer organization and company sales offices in New York, Bluefield, W. Va., and Tucson, Ariz., has manufacturing subsidiaries in Toronto, London, Johannesburg, Lima, Peru, and Mexico City.

S. W. Towle, '54, Receives M.Sc. Degree at UA

Stewart W. Towle, a 1954 metallurgical engineering graduate of the Colorado School of Mines, this spring received a Master of Science degree in metallurgical engineering from the University of Arizona. Title of his thesis was "A Study of the Rate of Reaction Between PbO and PbS in the Solid State." Dr. T. M. Morris, head of the UA department of metallurgy, was his major professor.

After graduating from Mines in 1954, Mr. Towle worked as an engineer for Worthington Corp. in Harrison, N.J. He enlisted in the U.S. Army Corps of Engineers in 1955 and served two years, principally in the U.S. 7th Army stationed in Germany. After his discharge from the Army, Mr. Towle joined the staff of Douglas Reduction Works, Phelps Dodge Corp., Douglas, Ariz., as assistant test engineer, in which position he is currently employed.

**J. C. Hollister, '33, Elected
First Vice President of SEG**



PROF. JOHN C. HOLLISTER, '33

Prof. John C. Hollister, '33, head of the department of geophysical engineering at the Colorado School of Mines since 1949, has been elected first vice president of the Society of Exploration Geophysicists. Other SEG officers elected were Dr. J. P. Woods, president; R. C. Kendall, vice president, and F. A. Hale, secretary-treasurer. New officers will take over at the society's 30th annual international meeting to be held Nov. 7-10 in Galveston, Texas.

Before coming to Mines in September 1949, Professor Hollister served as vice-president and general manager of Heiland Research Corp. (now the Heiland Division of Minneapolis-Honeywell). He attended the University of Oregon before transferring to Mines in 1929. He joined Plains Exploration Co. in 1933, as a geophysical engineer, leaving in 1934 to become co-founder of the Heiland Co.

Organizations in which he holds memberships include Tau Beta Pi, Society of Exploration Geophysicists, AIME, American Geophysical Union, European Association of Exploration Geophysicists, and Denver Geophysical Society. He has served as secretary-treasurer and on various committees of SEG, as an associate editor of *Geophysics*, and as president of the Denver Society.

**Two Mines Men Elected
Officers of Lions Club**

Two Mines men were installed recently as officers of the Denver Lions Club. They are Graham R. Miller, first vice president, and Keppel Brierly, secretary.

Mr. Miller, a 1924 mining engineering graduate of the Colorado School of Mines, is assistant superintendent for Business Services, Denver Public Schools. Mr. Brierly graduated from Mines in 1934 with an E.M. degree and is president of J & K Construction Co. of Denver.

**Pozzo, '52, Vice President
And Manager of Pylon Co.**

Robert M. Pozzo, who received a Met. E. degree in 1952 from the Colorado School of Mines, has accepted a position as vice president and general manager of the Pylon Co., a small, aggressive and growing manufacturer of specialty connectors for the new electro illuminent lighting industry.

While a student at Mines, Mr. Pozzo received the American Smelting & Refining Co. scholarship given to a senior in metallurgy. After graduating from Mines, he was a trainee for General Electric's Chemmet program. Later he was placed in the metallurgical products department for a six-month course in market training. In 1954 he was assigned as a junior sales representative in metropolitan New York. Two years later he was promoted to senior sales representative and given the responsibility of organizing the New England and upstate New York territory for the sale of Carboloy and Hevimet for structural applications. In 1958 Mr. Pozzo resigned to enter Harvard Graduate School of Business Administration, completing his studies with a degree of Master of Business Administration in June 1960.

Mr. Pozzo's new address is 938 Belmont St., Watertown 72, Mass.

**M. M. Judy, '60, on Staff
Of Scientific Laboratory
At Los Alamos, N. Mex.**



M. M. JUDY, '60

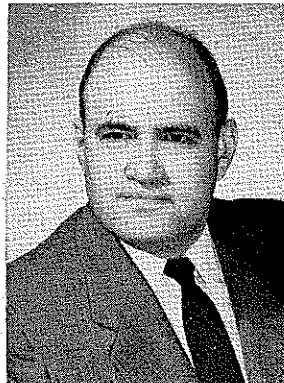
Millard M. Judy, a 1960 metallurgical engineering graduate of the Colorado School of Mines, became a staff member of Los Alamos Scientific Laboratory in July. He is a physical metallurgist in the CMB Division, Group 6., and his Section leader, Thomas I. Jones, is a 1949 graduate of Mines.

After attending elementary and secondary schools in Redlands, Calif., Mr. Judy studied a year at San Ber-

nardino Valley College, then served on the staff of Patton State Hospital before joining the U.S. Air Force in 1952. For the next four years he was an instructor in the School of Aviation Medicine, Air University, Gunter AFB, Montgomery, Ala. During this time in service, he also attended the University of Alabama Extension in Montgomery in order to accumulate enough credits to enroll at Mines. As a student at Mines, his extracurricular activities included student member on Board of Publications, senior class treasurer, Metallurgy Exhibit chairman for E Day Committee, ASM, and AIME.

Mr. Judy, his wife Jean, and their two children—Steve and Gregg—are living at 2797-C Gold St., Los Alamos, N.M.

**Dr. Risser, '37, Now IGS
Principal Mineral Economist**



DR. HUBERT E. RISSER, '37

Dr. Hubert E. Risser, who received his E.M. degree in 1937 from the Colorado School of Mines, has been appointed principal mineral economist of the Illinois State Geological Survey. As principal mineral economist, Dr. Risser will direct the mineral economics group in economic studies of the production, distribution and uses of minerals and mineral products with particular emphasis on their relation to the economy of Illinois and the upper Mississippi Valley.

After graduating from Mines he joined the staff of Alabama By-Products Co. in Birmingham as assistant engineer and was made resident mining engineer in 1938. From 1941 to 1946 he served with the U.S. Army in the Corps of Engineers, attaining the rank of major. Among his assignments during this period was locating engineer for the 93rd Engineer Regiment engaged in the construction of a section of the Alaskan Highway.

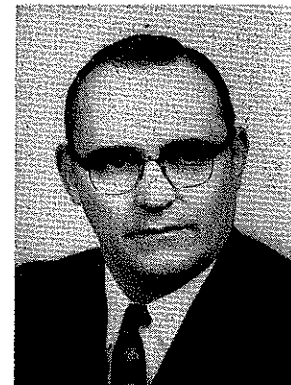
Upon his discharge from the Army, he was appointed staff engineer of the coal mining section of the National Safety Council. In 1947 he

rejoined the Alabama By-Products Corp. as mine superintendent. Three years later Dr. Risser was appointed assistant professor of mining engineering at Kansas University, where he had previously received a Master's degree in mining engineering and a Ph.D. in economics. He served in that capacity and as a mining engineer and mining consultant for the Kansas Geological Survey from 1950 to 1957 when he joined the staff of the Illinois State Geological Survey.

Dr. Risser is the author of a book (*The Economics of the Coal Industry*) and numerous articles on mineral economics. He is a registered engineer of Alabama and Kansas and a member of AIME, Illinois Mining Institute, Sigma Xi, Tau Beta Pi and Sigma Tau.

Dr. and Mrs. Risser and their two daughters—Nancy and Rita—live at 808 W. Nevada, Urbana, Ill.

**Lloyd E. Elkins, '34, Named
President-Elect of AIME**



L. E. ELKINS, '34

Lloyd E. Elkins, a 1934 petroleum production engineering graduate of the Colorado School of Mines, has been nominated president-elect of the American Institute of Mining, Metallurgical and Petroleum Engineers. The new president-elect will take office as president in 1962. AIME, with 36,000 members, is the nation's largest mineral engineering organization.

Following his graduation from Mines, Mr. Elkins joined the Standard Oil and Gas Co. (now Pan American) in Tulsa, serving as roustabout, apprentice engineer, field engineer, junior engineer, senior petroleum engineer, petroleum engineering supervisor, assistant chief production engineer, chief production engineer, chief engineer in the Producing Department, and finally since Jan. 1, 1949 as production research director.

An active member of many civic, fraternal and social groups, Mr. El-

kins is a member of such technical organizations as Tulsa Geological Society, Engineers Club of Tulsa, Oklahoma Society of Petroleum Engineers, American Petroleum Institute, AIME, Drilling Research, Inc., American Association of Petroleum Geologists, and Petroleum Club of Tulsa.

**Captain R. C. Jensen, '34,
Subject of Magazine "Profile"**



CAPT. R. C. JENSEN, '32

U.S. Navy Captain Ralph C. Jensen, who received his E.M. degree from the Colorado School of Mines in 1932, was the subject of a "CEC Profile" in the March 1960 issue of *The Navy Civil Engineer*. Quoting from the magazine story:

"Captain R. C. Jensen, CEC, USN, Officer in Charge, U.S. Naval School, CEC Officers (CECOS) Port Hueneme, Calif., for the past 40 months, has been ordered to Omaha, Nebr., where he will serve on the staff of the Commander, U.S. Naval Reserve Training Command.

"Born in Holmestrand, Norway, of American parents, Captain Jensen graduated from Mines in 1932 and pursued graduate work in geology at the University of Hawaii and at his alma mater. He also did graduate work in civil engineering at George Washington University and by extension at the University of Wisconsin. He is a graduate of the Industrial College of the Armed Forces, class of 1948. His early years were spent in the Canal Zone where he attended grammar school and was graduated from high school.

"Following his graduation from college, he returned to the Canal Zone where he was employed for several years in the Dredging Division of the Panama Canal as a field engineer . . . From 1937 to 1941 he was employed by the Ralston-Purina Co. in their cereal division at Battle Creek, Mich. During this period he designed food processing machinery and in collaboration with another

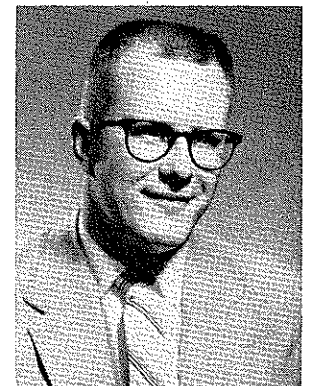
process engineer developed the small shredded rice biscuit now marketed under the name of Rice-Chex.

"Early in 1941 he entered the Navy as Lieutenant (jg), CEC, USNR. He transferred to the Regular Navy at the close of World War II. . . . His major peacetime billets following World War II included duty on the faculty of the Industrial College of the Armed Forces, Washington, D.C., service on the staff of Director, Naval Petroleum Reserves, Denver, Colo. During the latter assignment he became associated with the Navy's arctic oil exploration program in Northern Alaska, and he spent a year in Fairbanks and Point Barrow, Alaska, in charge of the field operations of this program. He also spent two years on the staff of Commander, Service Force Pacific Fleet during which time he traveled extensively throughout the Pacific Ocean area . . .

"Captain Jensen has lectured extensively and has written articles on technical matters . . ."

Captain Jensen writes that his tour of duty as Officer in Charge of CECOS (the counterpart of the Engineer's School at Ft. Belvoir) was a rare experience and the most satisfying of his naval career. In fact, it was so satisfying that he has decided to request retirement in the spring (of next year) and take up teaching, the desire for which has actually haunted him ever since he was an undergraduate at Mines.

**Penttila, '56, to Present
Paper at Oct. 2-5 Meeting
Of Petroleum Engineers**



WILLIAM C. PENTTILA, '56

William C. Penttila, graduate student in geology at the Colorado School of Mines, is one of several Miners who will present technical papers at the 35th annual fall meeting of the Society of Petroleum Engineers of AIME in Denver, Oct. 2-5. More

than 3,000 engineers are expected to attend.

"Geologic Aspects of Fracturing Reservoirs," as Penttila's paper is called, was co-authored by Peter C. Badgley, CSM associate professor in geology, and J. K. Trimble of The Ohio Oil Co.

Penttila, a native of Roberts, Mont., received his degree as geological engineer from Mines in 1956. He joined The Atlantic Refining Co. in Dallas where he was employed until he reported for a six month tour of active duty with the U. S. Corps of Engineers. He returned to The Atlantic Refining Co. as a geologist in the Four Corners area, headquarters in Durango, Colo. Before returning to Mines he spent a summer in Canada's Northwest Territories doing geological reconnaissance.

A member of the APPG and the Four Corners Geological Society, he presently resides with his wife and child at 2200 Jackson St., Golden, Colo.

Dr. Ben H. Parker, '24, Named Frontier Senior Vice President

Dr. Ben H. Parker, '24, has been named a senior vice president of Frontier Refining Co., it was announced by President M. H. Robineau, '23. Dr. Parker, who has been a vice president, will continue in charge of production and as assistant secretary of Frontier.

Visitors to the Alumni Office

We were fortunate to have so many visitors during the past month. We are short of furniture, yet the light and airy offices are a complete change from the small quarters at 1612 Illinois St. Remember that our new offices are in Guggenheim Hall, and our telephone is CRestview 9-3381, Ext. 251, which is the telephone number of the Colorado School of Mines. When you are in Denver, or just passing through, please call us if you cannot come out to see us.

DONALD I. ANDREWS, Geol. E., '50, is still in New Orleans, where he lives at 4611 St. Ferdinand Dr., but he is now a geological associate with Rodgers, Seglund and Shaw Associates. (Editor's note—Sorry that I missed you, but I was under the weather that day but now recovered and back on the job. Come see us again.)

W. BRUCE BARBOUR, P.E., '37, consultant, still has his office at 911 Bank of Southwest Bldg., Houston 2. Bruce has been active in the Houston Section. As a result of our conversation and at the suggestion of the officers of that section, we are mailing out a list of all MINERS living in the area. With the help of the local section, we expect to increase the percentage of active members substantially. It is almost axiomatic that where you have an active local section, the percentage of active members is above

the norm for all areas. (Editor's note—I love that kind of help. wwf)

A. DAVID BOVEE, P.E., '58, is living at 2399 So. Gilpin St., Denver. He has just recently returned to Denver and would like to find something in this area. Although we do not operate the Placement Service, we do assist Dean William Burger, and have been able to place many of the MINERS who have sought our help.

HUGH E. BRADLEY, P.E., '50, assistant pipeline superintendent, Anderson-Pritchard Corp., lives at 1422 North A, Arkansas City, Kans. Hugh was back to visit his folks here in Golden.

JACKSON W. BROWN, Geoph.E., '52, has a new position, as reported recently in the Alumni News of The MINES Magazine, as college relations coordinator, Texas Instruments. In this position, he is responsible for seeing that all contacts with undergraduates at the various engineering and scientific schools by recruiters from Texas Instruments are coordinated thru his office. His home address is 13866 Birchlawn Dr., Dallas 34, Texas.

GLEN D. CHENEY, P.E., '58, is living at 820 Simms St., Golden. He has left Ingersoll-Rand and hopes to find something in his option in the Denver area.

JOHN D. CLOSS, Geol.E., '50, has just returned from Colombia, S. A. and may be reached at 4231 Jerry Ave., Baldwin Park, Calif. He wants to try life in the States, particularly the California area, for his next tour. (Editor's note—I think the soldier's term for the U. S. is hard to beat—"The land of the big PX". Welcome home, John and I hope that we can help you find something here—wwf)

S. NORMAN DOMENICIO, Geol.E., '48, D.Sc. Geoph.E., '51, is division geophysical supervisor, Pan American Petroleum Corp., Calgary, and lives at 1020 31st Ave., N. W. Calgary, Alberta, Canada. Norm says that his company continues its long range program of exploration and development. In his own opinion, the big boom in the oil business in Canada is still in the future. Costs are high, the climate, as they move further north is atrocious, but the oil is there.

GLEN E. FASSLER, E. M. '29, was visiting old friends here in Golden. He is still employed by Holliman Drilling Co., Dallas, Texas, but continues to spend most of his time in South America. His permanent mailing address is at his sister's home in Freeport, Texas, P. O. Box 1056. (Editor's note—Sorry I missed you Glen, for I returned last year from a long visit with my brother, Claude, in the Philippines. wwf)

ROBERT L. FROEMKE, P.E., '43, professor of Business Administration at Florida State University, Tallahassee, Fla., and whose home address is 1516 Argonne Rd., Tallahassee, called at the Alumni Office with his two young nephews. He stopped over in Denver while taking the long way home from New York, where he had been teaching summer school at Columbia University as he has done for the past seven years. Bob's mother, brother and sisters are living in Denver so he tries to visit here every few years.

PHIL H. GARRISON, Geol. E. '39, district exploration superintendent, Pan American Petroleum Corp., P. O. Box 266, New Orleans 9, La., was in Golden to

visit his mother. There are many MINERS in New Orleans at this time.

EDGAR T. GAULKE, Geoph. E., '53, party chief, Western Geophysical Co., is living at 933 N. La Brea, Los Angeles 38, Calif. However his work brings him into this part of the country frequently, so we may see him more often.

BEN W. GEDDES, P.E., '37, research director, Esso Research and Engineering Co., Linden, N. J., and whose home is at 12 Harvey Dr., Short Hills, N. J. says that he has become a confirmed Easterner, appreciating the lovely green countryside of New Jersey. He has several MINERS working for him and there are several more in other divisions of ESSO.

JOSEPH H. HOHL, E.M. '25, plant manager, Universal Atlas Cement Co., was back on the campus for the first time in more than 30 years. It was my pleasure to point out the many changes and to invite him back more frequently. He reported that ARNOLD KACKMAN, E.M. '54 is working as a project engineer for the same company. Mr. Hohl said, "In my opinion the Engineer of Mines degree still offers the best preparation for anyone entering the field of mineral industries." He was accompanied by his daughter and sister-in-law.

GARTH B. HARLAN, Geol. E. '49, is assistant chief, Planning and Reports Branch, U. S. Army Engr. District, Alaska, Anchorage. Garth says that statehood has increased the problems of Alaska without offering an immediate solution. Being a resident of Anchorage, he was unhappy over the results of the defeat of the proposal to move the capital from Juneau to Anchorage. His mailing address is P. O. Box 7002, Anchorage, Alaska.

ROBERT E. HUDSON, Geol. E. '50, has resigned from Sinclair Oil Co., and is now working as an independent geologist. His address is still 2245 Fairway Dr., Billings, Mont., but he plans to move to Casper, Wyo., in the near future.

WILLIAM J. JOHNSTON, P. E. '51, has been promoted to senior engineer, Long Range Planning Group in the General Office of Humble Oil & Refining Co. in Houston. Bill was visiting his wife's parents in Denver and his own in Lamar. (Editor's note—Happy to see you making headway. wwf.)

GEORGE W. LEMAIRE, P. E. '26, professor of Petroleum Refining, lives at No. 9 Mines Park. George has been working on a study of Mines Alumni to determine their distribution among employers, the position occupied, and whether or not the graduate remains in his own option. The study will be extended to include a representative sample of graduates and will trace them through their position changes to see what pattern may emerge. Further the study will provide a great many statistics that will be invaluable to The MINES Magazine in soliciting advertising, since it will provide information on the quality of our readership.

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GEORGE E. LUSA, Met. E. '54, metallurgist, Armco Steel Co., Middletown, Ohio, was in Denver with his wife, who was a Dayton girl. They are living at 2220 W. Schantz Ave., Dayton. George has been involved in a special galvanizing program that will pre-treat steel to be used in automobiles and thus increase its resistance to corrosion. (Editor's note—Remember the Annual Metallurgical Issue in February 1961. We can use an article. wwf)

LLOYD C. MASON, Met. E. '38, 5155 Umatilla St., Denver 21, is an insurance broker. In addition, he is distributor for a hand-calculator that is capable of doing all that can be done with a desk-size Monroe-type machine.

H. BOYD MORELAND, E.M. '56, is a petroleum engineer, Texaco, Inc. His home address is 1531 S. Delaware Pl., Tulsa 4, Okla. Boyd reported that he has completed all the work for his Master's degree except the oral examination. This was done at the University of Tulsa under a Fellowship from Sinclair. The same fellowship was previously held by William J. Yopp, '56. (Editor's note—We have not heard from Bill since September 1959. Is he still in Libertyville, Ill.? wwf)

HENRY T. PUTZ, E.M. '32, and his wife were here from their home in Ocala, Fla. (229 N. Tuscawkla St.) where Henry is employed as a mining engineer with Tennessee Valley Authority. Mrs. Putz is from South Africa where Henry spent 17 years prior to returning to the U. S. (Editor's note—The opportunity to talk to people from far away places is part of the compensation for this job. wwf)

ENRIQUE RUIZ-WILLIAMS, E.M. '45, has left Cuba to enter the Graduate School of the Mining Department, Colorado School of Mines. He will return from a trip to Florida in time to enter this fall.

BURLEIGH P. SHEPARD, Geol.E., '51, exploitation engineer for Shell Oil Co. at Farmington, N. M., returned to the campus for the first time in nine years. Although originally interested in exploration, he has been in engineering and production since joining Shell.

RALPH C. STITZER, E.M., '51, P. O. Box 234, Telluride, Colo., has spent all the time since leaving school in underground mining operations. Like most of us, he thinks that it is time to try the other side of the hill, and would like to try his hand at open pit mining.

LYLE R. VAN BURGH, E.M. '17, said that he was retired but still acts as a consultant to the Bureau of Internal Revenue. His home address is still 3731 Chaffin St., Houston, Texas.

RUSSELL L. WOOD, E.M. '49, assistant general manager, Standard Metals Corp., was in Denver on business. He said that the Rio Grande Railroad would not abandon the Silverton Branch out of Durango, thus guaranteeing rail service into the San Juans for the present. He brought a fine specimen of almost pure pitchblende from the Standard Uranium property at Moab, Utah.

RICHARD F. ZIMMERLY, Geol. E. '47, chief geophysicist, Texaco Exploration Co. of Canada, was in Golden for a vacation from the North. Our weather delivered with a record-breaking heatwave. The Zimmerlys live at 1928 Glenmount Dr. Calgary, Alberta, Canada.

CLASS NOTES

(Continued from page 35)

RONALD L. WELLS is graduate research assistant at the Denver Research Institute, University of Denver, Denver, Colo. His home address is 2429 S. Gaylord St., Denver, Colo.

ROWLEY L. YOUNG may be addressed c/o Western Electric Co., Dept. 8770-4, Winston-Salem, N. C. 1960

WILLIAM A. ANDERSON has moved from Santa Barbara, Calif., to 2601 Bishop Dr., Apt. 3, Bakersfield, Calif.

BRADLEY K. BOYD's address is 2810 Ely Pl., #B, Kennewick, Wash.

THOMAS M. CARROLL has moved from Denver, Colo., to 309 Park St., Jonesville, Mich.

ALBERT L. DUGGER, formerly of Baltimore, lives at 8414 Greenway Pl., Apt. D, Towson 4, Md.

JAMES F. GREEN, JR., has left Ft. Morgan, Colo., for 13607 Osborne, Arleta, Calif., where he is a metallurgical engineer for Collins Radio Co.

CLYDE W. FROST's address is 1626 Hollywood Dr., Pueblo, Colo.

ALBERT S. GRIFFIN, JR., is employed in the Engineering Department of National Tank Co. His work is in the field of natural gasoline recovery. His address is 911 N. Osage Dr., Tulsa 6, Okla.

MILLARD M. JUDY, formerly of Redlands, Calif., has been employed by the Los Alamos Scientific Laboratory (Los Alamos, N. M.) as a metallurgist in the CMB Division.

ROBERT H. KARLSSON has moved from Jamestown, N. Y., to 1913 North Ave., Parma 34, Ohio.

QUENTIN T. MCGLOTHLIN is junior sales engineer for Humble Oil & Refining Co. His home address is 2118 Bancroft Lane, Houston 27, Texas.

RICHARD R. SEVERNS, formerly of Walden, Colo., has moved to 4340 W. 5655 South, Kearns 18, Utah.

WILLIAM R. MORGAN is student engineer for Northern Illinois Gas Co. with mailing address 319 Bevier Pl., Aurora, Ill.

DENNIS B. O'NEIL has moved from Kelseyville, Calif., to 203 Connecticut St., Washington, Ill.

ROGER H. OSBORNE is process engineer for Skelly Oil Co. He lives at 2215 W. 2nd Ave., El Dorado, Kans.

JACK H. PIZANTE, formerly of Park Forest, Ill., is employed by Baumgartner Oil Co., 1700 Broadway, No. 517, Denver 2, Colo.

M. L. REDHAIR and family have moved to 14361 Terryknoll Dr., Whittier, Calif. He says he looks forward to receiving the magazine and the 1960 Yearbook and Directory.

C. WALLACE WADE has moved from N. Arlington, Va., to 513 Fair Oak Ave., South Pasadena, Calif.

GLENN A. WALTON, manager trainee for Inland Steel Co., lives at 483 East End Ave., Calumet City, Ill.

JACK C. HAPTONSTALL gives his address as c/o Cerro de Pasco Corp., La Oroya, Peru, S.A.

PAUL J. HARRISON is employed by Texaco, Inc. and lives at 4550 Alcott St., Denver, Colo.

JAMES R. HEAVENER, assistant research geophysicist for Geophysical Service, Inc., lives at the Kappa Sigma House, Southern Methodist University, Dallas 5, Texas.

S. BRUCE HEISTER is production assistant, Kaiser Steel Corp. He lives at 2052 Linden, Apt. CC, Riverside, Calif.

GORDON R. HERSEY is employed by Ingersoll-Rand and lives at 715 8th St., Marysville, Calif.

JAMES A. HILEMAN's address is 3394 Newport, Denver 7, Colo.

ROBERT F. HINSHAW lives at 140 Kline Blvd., Frederick, Md.

GEORGE W. HOAGLAND's address is 7701 Westview Dr., Lakewood, Colo.

WILLIAM N. HOUSTON is civil engineer with the U.S. Bureau of Reclamation, Federal Center, Denver, Colo. He lives at 5840 Carr, Apt. 11, Arvada, Colo.

LAWRENCE E. JONES gives his address as 48 Bowdoin St., Millinocket, Me.

GEORGE C. KANE, metallurgical engineer with Aluminum Co. of America, is living at 222 Vernon St., New Kensington, Pa.

ARVI KIVI is project engineer, Procter & Gamble Manufacturing Co. He lives at 400 Huntington Rd., Kansas City 13, Mo.

JON R. KIRKPATRICK is living at 11083 Corona Rd., Cincinnati 40, Ohio.

WALTER I. KNUDSEN, JR., is civil engineering assistant, Los Angeles Flood Control District. His address is 601 N. Chandler, Apt. M, Monterey Park, Calif.

BURKE B. KRUEGER, 502 Exchange St., Emporia, Kans., is employed by Tennessee Gas Transmission Co.

LAWRENCE E. LONG, JR., will be employed by Intermountain Chemical Co., Green River, Wyo. His mailing address is R.F.D. 1, Bethel, Conn.

FORREST G. LOPER may be addressed c/o International Mining & Chemical Corp., Box 867, Bartow, Fla.

WILLIAM C. MAURER, who received his M.Sc. in mining at the Colorado School of Mines, is a graduate student for a doctorate degree at Mines. He lives at 619 14th St., Golden, Colo.

LARRY L. McCUNE is tram and quarry engineer for U.S. Gypsum Co. at Empire, Nev.

HARRY E. MCCARTHY'S address is 7521 Locust, Derby, Colo.

WILLIAM C. McCLAIN, 704 Ash, Ottawa, Kans., is enrolled in the graduate school, Kings College, University of Durham, Newcastle Upon Tyne, Britain.

JERRY P. McKNIGHT, 401 N. Roosevelt, Fullerton, Calif., is employed by Richfield Oil Co.

LESTER H. MELTZER lives at 5133 S.W. 1st St., Miami, Fla.

DELMAR V. MILEY's home address is 930 Nile St., Aurora, Colo.

JAMES E. MONTGOMERY's mailing address is 35 Prospector Park, Golden, Colo.

RODERICK J. MORRELL, engineer for Peter Kiewit Sons' Co., lives at 3390 S. Pearl St., Apt. 3, Englewood, Colo.

DAVID W. MORSE may be addressed at 160 Glendale Rd., Scarsdale, N.Y.

(Continued on page 43)

CARDS

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Paul M. Hopkins
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 Mining Geologist and Engineer
 2222 Arapahoe Street P. O. Box 403
 Crestview 9-2313 Golden, Colorado

Howard E. Itten, '41
 President
 Empire Geophysical Inc.
 6000 Camp Bowie Blvd. Ft. Worth, Texas

William Crowe Kellogg, '43
 Kellogg Exploration Company
 Geologists—Geophysicists
 3301 N. Marengo Altadena, California
 Sycamore 4-1973

**John F. Mann, Jr., '43
 and Associates**
 Consulting Groundwater Geologists
 945 Reposado Drive La Habra, Calif.

CAMPUS HEADLINES

Captain Lammie Awarded Army Commendation Medal For Meritorious Service

Capt. James Louis Lammie, Corps of Engineers, United States Army, an assistant professor of Military Science at Colorado School of Mines for the past three years, has been awarded the Army Commendation medal for meritorious service during his tour at the School of Mines.

Capt. Lammie, a West Point graduate, was assigned to the ROTC faculty at Mines in the summer of 1957 after completing a one-year tour at Purdue University, Lafayette, Ind., where he earned the degree of Master of Science in Engineering. During his tour at the School of Mines, he taught freshman, sophomore, and junior ROTC subjects, acted as public information officer for the ROTC Instructor Detachment, and participated in numerous other campus and community activities.

Capt. Lammie is presently assigned to the Engineer School, Fort Belvoir, Va., where he is scheduled to attend the Engineer Officer's Advance Course this fall.

CSM Cadets Score Highest At ROTC Summer Camp

Twenty-nine Mines men, including 20 new second lieutenants, scored the highest over-all average final score of any other competing school in the entire 5th Army area at the six weeks' summer camp at Fort Leonard Wood, Mo. The Mines men also captured the Camp Athletics Activities Trophy.

Standouts in the Miners award winning group were Kenneth Lee Spaulding of Monterey Park, Calif., and Terril Wilson of Colorado Springs, Colo. Spaulding, one of the 20 cadets receiving commissions as second lieutenants at the end of camp, was awarded the Fort Leonard Wood ROTC Camp Silver Medal for Excellence in Military Activities and was cited as outstanding cadet of his training company. Wilson, who will be a senior at Colorado School of Mines this fall, aided his group's record by demonstrating his superior physical condition by scoring 445 out of a possible 500 points on the Army physical fitness test, thereby achieving one of the highest scores registered by the 493 cadets at the camp.

Lt. Col. Bruce D. Jones, Colorado School of Mines PMS, praised the individual and collective efforts that made possible the exemplary record attained by the School of Mines cadets.

Alumni Dinner, Oct. 3

Colorado School of Mines alumni and their wives attending the 35th Annual Fall Meeting of the Society of Petroleum Engineers of AIME Oct. 2-5 are invited to attend the dinner being held at 8 p.m. Monday, Oct. 3, at the Denver Press Club, 1330 Glenarm Pl. The dinner is being sponsored by the Denver Section of the CSM Alumni Assn. For reservations telephone the Alumni Office, CR 9-3381, Ext. 251.

Lt. Schutz, '59, Completes Rotary-Wing Aviator Course

Army 2nd Lt. Ronald C. Schutz, a 1959 metallurgical engineering graduate of the Colorado School of Mines, recently completed the 16-week officer rotary-wing aviator course at The Primary Helicopter School, Camp Wolters, Texas.

The course is designed to train Army aviators in helicopter flying techniques and in the employment of rotary-wing aircraft for observation missions.

Editor Argall, '35, Urges Scholarship Program For Filipino Students

The following editorial entitled "Meet These Challenges" by Editor George O. Argall, Jr., '35, in the August 1960 issue of *Mining World*, draws attention to a problem and suggests a solution:

"The friendly Filipinos of the mineral-rich Philippines are the staunchest friends and supporters of the United States.

"Americans—particularly American mining and metallurgical engineers—over the last 60 years have done much to discover, develop, and produce a wide variety of minerals and metals. They have had an important part in creating this friendship.

"The mining industry in the Philippines is led by a small, but highly skilled, group of American engineers. They are a vital segment of the mining industry today which is being financed by Filipinos on an ever-growing scale.

"The Philippine government, the United States government, the mining companies of both countries, and the mining colleges of the United States all have a most important part in maintaining the close friendship of the two nations, the production of minerals, the opportunities for engineers of both countries and the sale of United States equipment.

"Here is a challenge to government—to foster a more favorable investment climate in the Islands.

"That's not enough. There must be a greater exchange of technical skills and education of young Filipino engineers.

"Here is a challenge for mining companies of both nations. Arrange engineer-

ing exchange visits. A flotation specialist from Arizona would work in one of the copper mills in the Philippines. His counterpart would work in Arizona. Their respective employers would continue to pay their salaries. The same could apply to mining engineers and geologists.

"All engineers would learn new methods, new ways of prospecting and operation. These added skills would be of great value to their employers.

"When I was a student at the Colorado School of Mines, there were 17 Filipino students. Today these engineers fill important operational and managerial positions in mining and other industries in the Philippines. They are the core of trained engineers in the Islands. There are no Filipino student engineers now at the Colorado School of Mines. With independence, the Philippines lost their preferred scholarship position.

"Here is a challenge to the Colorado School of Mines—and other mining colleges, too. Award scholarships to qualified Filipinos. They did and they will pay all their transportation and living expenses. The financial boost the scholarship would afford would be just the amount needed to permit carefully selected and well qualified students to again study mining engineering in the United States.

"The Philippine mining industry, so long a branch of the United States mining industry, is expanding. The challenge is to expand it in the established pattern—not to let it wither, not to let it become an Oriental satellite.

"Here is the challenge for all. Maintain the Philippines as the brightest star in the Orient."

The following comments were made by a prominent Philippine mining executive:

"The governments of both the United States and the Philippines should facilitate a greater exchange of technical skills

and education of young Filipino engineers by easing innumerable restrictive controls on travel and exchange.

"The Philippine government has followed a policy of discouraging student training in foreign countries in order to save dollars. This short-sighted policy causes the eventual loss of many times the dollars saved by delaying the economic development of the natural resources of the Philippines."

(Editor's Note. The Colorado School of Mines encourages the attendance of students from foreign lands and would welcome with enthusiasm the return of the Filipino students whose predecessors have done so much to develop the natural resources of the Philippines.)

CLASS NOTES

(Continued from page 41)

TED L. MYERS is open hearth trainee for Inland Steel Co. His address is 696 Allen St., Gary, Ind.

KENNETH M. O'CONNELL, 2228 N. Union Blvd., Colorado Springs, Colo., is employed by Colorado Interstate Gas Co.

JEAN Z. PASQUALI, employed by Asiatic Petroleum Corp., gives his address as Bogue 18, A-6 Sarria, Caracas, Venezuela, S.A.

DHANNALAL N. PATNI lives at 25 Bombay Bazar, Indore City, India.

DOUGLAS L. PATTON, 417 E. Douglas, O'Neil, Nebr., is employed by Cities Service Oil Co., Bartlesville, Okla.

FORREST D. PETERS is seismic computer for Superior Oil Co., 2200 First National Bank Bldg., Denver 2, Colo.

THEIN O. PO SAW may be addressed c/o Engineering Science Dept., University of Illinois, Urbana, Ill.

EMILIO A. POSSE is living at Junea 1945, Buenos Aires, Argentina, S.A.

KENT D. POTHAST, 505-E Fair Oaks Ave., South Pasadena, Calif., is civil engineering assistant for Los Angeles Flood Control.

LOUIS W. PRIBILA lives at 6920 W. 47th Pl., Wheat Ridge, Colo.

WILLIAM M. RAMSBURG is engineer trainee for Superior Oil Co. with address P.O. Box G, Cortez, Colo.

WILLIAM S. RANSOM advises that his mailing address has been changed to 15635 S. Dixie Highway, Harvey, Ill., and comments: "I enjoy The MINES Magazine and look forward to it each month."

DONALD R. REICHMUCH is a graduate student at the School of Mines and Metallurgy, University of Minnesota, Minneapolis 14, Minn.

CHARLES M. RICHARD lives at 12 Circle Dr., Brush, Colo.

RALPH N. ROCKWELL is living at 46 Dann Dr., Stamford, Conn.

GORDON L. ROYCE, whose home address is 390 12th St., Durango, Colo., is employed by Northern Illinois Gas Co.

CARL W. SAMUEL, employed by Standard Oil Co. of Texas, gives his home address as 1430 W. Alameda, Denver, Colo.

MICHAEL R. SARGENT'S address is 52 E. Third Ave., Denver, Colo.

JOHN J. SELTERS is employed by the Exploration Department, U.S. Smelting, Refining & Mining Co. His address is 134 H. St., Salt Lake City 3, Utah.

GEORGE D. SHIER may be addressed c/o Graduate School, Chemistry Dept., University of Illinois, Urbana, Ill.

EUGENE H. SKINNER lives in Wilton, N. Dak.

JOHN B. SMITH, JR., gives his address as Box 922, Elkhart, Kans.

ARCHER D. SWANK, 601 N. Chandler Ave., Apt. M, Monterey Park, Calif., is civil engineering assistant for Los Angeles County Flood Control District.

ROBERT R. TALLEY's address is 803 E. 8th St., Spencer, Iowa.

JAMES K. TRIMBLE is employed at Ohio Oil Co.'s Research Laboratory in Littleton, Colo. He lives at 612 2nd St., Golden, Colo.

BERNARD J. C. TURPIN lives at 94 Ave. Victor Hugo, Paris 16, France.

SHIRLEY MAE VALENCIA is a technical writer for Hercules Powder Co. She lives at 3185 S 2nd E, Apt. 4, Salt Lake City, Utah.

RICHARD E. VAN DOEREN's mailing address is Whitewood Lane, Winston-Salem, N.C.

R. GLENN VAWTER is associate petroleum engineer for Ohio Oil Co. with address 2918A San Emidio, Bakersfield, Calif.

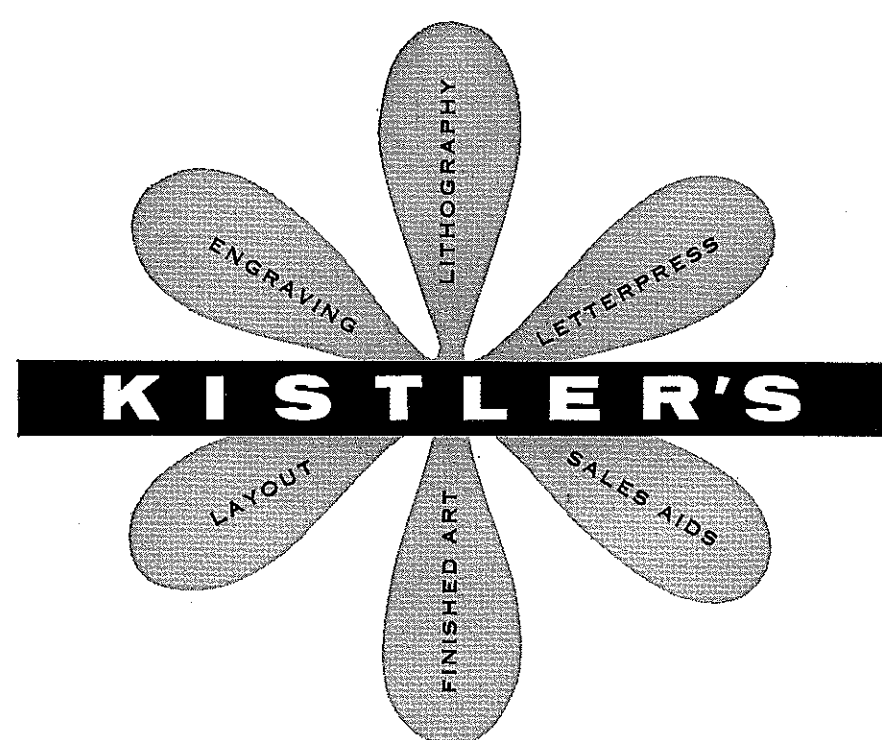
WALLACE C. WADE may be addressed at 5948 10th Rd., N. Arlington 5, Va.

JAMES W. WALTON lives at 11154½ Daines Dr., Temple City, Calif.

GARY E. WARNER's address is Route 2, Gering, Nebr.

ROBERT A. WELDON may be addressed c/o Halliburton Oil Well Cementing Co., Tioga, N. Dak.

EUCLID P. WORDEN is junior engineer with Hughes Tool Co. His address is 3822 N. Braeswood, Apt. 49, Houston 25, Texas.



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4600 E. 17th Ave. FR. 7-2550

Boris S. Voukovitch, '51
and
Robert P. Lucas
Consulting Geologists
Exploratory investigations and analysis of geology, laws, and economics of petroleum exploration in Libya and other Mediterranean areas.
431 S. Marshall St. WA 2-2144
Denver 26, Colorado

Hugh A. Wallis, '28
Petroleum Engineer
Production & Management
16 So. Ogden St. Denver 9, Colo.

Elmer R. Wilfley, '14
Wilfley Centrifugal Pumps
Denver, Colo.

BOOK REVIEWS

Paleozoic Solenoporaceae

"Paleozoic Solenoporaceae and Related Red Algae" by J. Harlan Johnson, professor emeritus, Colorado School of Mines, is the title of the Quarterly of the Colorado School of Mines, Vol. 53, No. 3, July 1960, 77 pages, price \$1.25.

The author has summarized available data and has presented them in as non-technical form as possible for the benefit of the graduate student and the practicing petroleum geologist. Basic structures have been discussed and illustrated, and general ideas on classification have been presented briefly. No attempt has been made to describe the individual species. Basic data concerning them have been tabulated, and references are given for each where in a good description and illustration can be obtained. A very complete bibliography is appended for the benefit of those who may wish to look up the details of specific descriptions. A glossary is appended at the end giving definitions of those technical terms which were used.

Mineral Resources of Colorado—First Sequel

The manuscript for the book "Mineral Resources of Colorado—First Sequel" is now in the hands of the printers, Publishers Press, Inc., of Denver. The book should be ready for distribution in the fall.

"Mineral Resources of Colorado—First Sequel" is the second volume of an updating, decennial series which originated with a first volume prepared under the supervision and co-authorship of Dr. John W. Vanderwilt, president of the Colorado School of Mines, published in 1947. The forthcoming First Sequel was prepared under the general supervision and co-authorship of S. M. del Rio, Mines '28, consulting mining geologist, Golden. This decennial series on the mineral industries of Colorado is sponsored by the State of Colorado Mineral Resources Board, Robert S. Palmer, executive secretary.

A total of 18 individuals contributed to the forthcoming volume which is divided into four parts and 19 chapters. In these are discussed the history of the State's mineral industries; present status of the industry in Colorado; mineral production, potential, and geology of each county. The petroleum section of the book, coordinated and co-authored by Dr. F. M. Van Tuyl, professor emeritus of geology, Colorado School of Mines, probably contains the most complete over-all coverage of the State's petroleum industry; eight individuals contributed to this section.

The book also contains special chapters on molybdenum, oil shale, coal, beryllium, thorium, rare earths, and ore dressing, and will be distributed by the State of Colorado Mineral Resources Board.

Illustration Guide

Illustration Guide for Bureau of Mines Publications, by staff, Office of Mineral Reports, March 1, 1960. This manual covers general principles of illustration, detailed specifications for illustrations, and standard symbols and abbreviations.

That section of the manual dealing with symbols covers those used for mining, petroleum, maps, general materials, and geologic and materials investigations.

Transcurrent Faulting and Volcanism in Owens Valley, California

"Transcurrent Faulting and Volcanism in Owens Valley, Calif." by L. C. Pakiser, Mines '42, is the title of an article appearing in the Bulletin of The Geological Society of America, Vol. 71, pp. 153-160, Feb. 1960.

In the Owens Valley region of California, volcanic activity of Cenozoic age was confined mainly to three areas near the ends of important faults. The volcanic eruptions seemingly took place in regions of relative tension, if the horizontal movement along these faults was left lateral. The deep depression of Owens Valley may have resulted from compression associated with left-lateral horizontal fault movement. The transfer of molten rock from beneath this deep depression laterally into the regions of tension and thence to the surface seems to account for the relief of abnormal stresses and the volume of volcanic rocks.

Petroleum Sourcebook

The 1959 edition of the annual Petroleum Sourcebook has just been published by National Petroleum Bibliography, Box 3586, Amarillo, Texas.

A worldwide directory of information sources classified by country, region, and state or province, the 234-page book lists the 1958 references to petroleum literature from the trade press, as well as publications of professional societies, state and federal agencies, and mapping, statistical and financial institutions. More than 5,000 references are compiled from approximately 1,500 publications.

Designed to serve as a desk-top information service, the book has been widely accepted as a basic reference, copies sold in 54 countries last year. It is priced at \$7.50 per copy and may be ordered direct from the publisher, on approval if desired.

Pumice and Pumicite

Pumice and pumicite is the topic of the Colorado School of Mines Mineral Industries Bulletin, Vol. 3, No. 3, May 1960, which may be obtained free of charge from the CSM Department of Publications, Golden, Colo. Authors of the Bulletin are D. R. Williamson and Lorraine Burgin.

It is explained that much of the molten rock which is carried to the surface of the earth by volcanic processes is distributed outward from the vent by explosive forces. The magma solidifies rapidly, forming a glass, because of the sudden loss of heat and of fluxing gases. Although the glass can take any of a number of different forms, all these types of debris are so similar that they can be grouped under one family name—pyroclasts.

One group of the pyroclasts is distinctive because of its extreme cellular structure. Small-sized, incoherent fragments of such glasses are called pumicite. The larger pieces, and the associated coherent fragments and incoherent ash, are called pumice. The names refer to rocks which have a particular structure, not to any of special origin or composition.

Topics discussed by the Bulletin include terminology and definitions, formation of pumice and pumicite, classifications, alteration, uses, prices and production, compositions, properties of igneous rocks, Colorado deposits, and references.

Review of Metal Literature

Review of Metal Literature, Western Reserve University, Cleveland, Ohio, May 1960, Vol. 17, No. 5, is an annotated survey of engineering, scientific and industrial journals and books here and abroad received during the past month. The May issue carries abstracts of articles on general metallurgy; ore and raw material preparations; extraction and refining; iron and steelmaking; foundry; primary mechanical working; secondary mechanical working; powder metallurgy; heat treatment; assembling and joining; cleaning, coating and finishing; metallography, constitution and primary structures; transformations and resulting structures; physical properties; mechanical properties and tests; corrosion; inspection and control; metal products and parts; plant equipment, and instrumentation—laboratory and control equipment.

IMM Bulletin

Bulletin of the Institution of Mining and Metallurgy, May 1960, No. 642, contains Institution notes and news, annual report of the Council, and the following papers: "Exploitation of Minerals for Mankind" by I. W. Wark, "Investigations Concerning Rock-Bolting at Billingham Mine, County Durham" by G. E. Pearse, "Copper Matte Smelting; the Influence of Charge Composition Upon Heat Requirement" by G. L. Evans, and "Factors Affecting Copper Reverberatory Furnace Performances and Their Influence on the Choice of Various Smelting Methods" by L. R. Verney.

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Direct Iron Processes

Direct Iron Processes and Their Prospects in Eastern Canada, by R. B. Elver; March 1960, 63 pages, 15 tables, 1 graph, 1 map, 5 flowsheets, price, 50 cents; Mines Branch Publication Distribution Office, Department of Mines and Technical Surveys, Ottawa, Canada.

The purpose of this report is to provide tentative answers to the questions: What is the magnitude of the potential direct-iron market? Where is it located? What price might be expected for direct iron? How much might it cost to produce direct iron and where should direct iron plants be located? The Bulletin is a progress report on the present status of direct iron processes.

Mechanical Properties of Metals

NBS Research on the Mechanical Properties of Metals, Summary Technical Report STR-2446, Feb. 1960, U. S. Department of Commerce, NBS Office of Technical Information, Washington, D. C.

To improve the performance of metals and to develop new alloys as they are required by science and technology, a better understanding is needed of the relation of metallurgical structure to the behavior of metals and of the effects of heat treatment and temperature extremes on this relation. To provide such information, the National Bureau of Standards has accelerated its research program on the mechanical properties of metals. The reactions of both conventional metals and super-alloys are observed over a wide range of environmental conditions. Microscopic, X-ray diffraction, and induction furnace techniques are used to discover how relatively small changes in lattice structure affect the tensile and yield strengths, ductility, hardness, and other properties of metals that make them unique construction materials. The results of this effort are expected to increase knowledge of the fundamental laws governing the performance of metals and thus promote their more effective use.

Skin Diving for Gold in California

Skin Diving for Gold in California by William B. Clark; Mineral Information Service, State of California, Division of Mines, Vol. 13, No. 6, June 1960.

Skin diving for gold in California's streams has become increasingly popular during the past few years. This is closely associated with the general increase in interest in small-scale placer mining by week-end prospectors, vacationists, and tourists. Many of the major streams in the state have been prospected by skin divers, and several "strikes" have been made where small but high-grade concentrates in holes and crevices in the stream beds have yielded as much as several hundred dollars worth of gold. The value of production from skin diving in the state is unknown, but it is estimated to amount to only a few thousand dollars annually.

Small-scale placer mining offers very little encouragement to the prospector or skin diver in the hope of making a living. This is attributed to the expense of equipment and supplies coupled with the fact that most of the streams have already been mined several times. Today, in addition, royalties or rental payments often must be made to claim holders or property owners, as the land open for mineral exploration is getting smaller each year.

CATALOGS AND TRADE PUBLICATIONS

(Continued from page 29)

SUCCESSFUL MINING. Efficient, profitable mine techniques and operations are described in a new eight-page, two-color booklet, "Successful Mining." Readers of the brochure will see uranium mining in Wyoming, iron and copper mining in Canada, copper waste disposal in Utah, chrome mining in Southern Rhodesia, and bauxite haul roads in Arkansas. Use of crawler-mounted rippers to loosen deposits and overburden and the techniques of seismic analysis to determine rippability of materials are given special attention.

Copies of the publication may be obtained at Caterpillar dealers or by writing the Advertising Division, Caterpillar Tractor Co., Peoria, Ill., and requesting form No. DE009.

TWINDUCER GEAR DRIVE. A new compact space saver drive arrangement for grinding mills has been developed by Allis-Chalmers engineers. The Twinducer drive efficiently harnesses the power of two synchronous motors located on the mill side of the drive. The electrical load is distributed through an angular rotor shift of one of the motors. Once the load is balanced and the rotor locked in place, no further adjustment is needed nor are floating gear or pinions required.

The new Twinducer gear drive is described in leaflet 07B9607 copies of which are available on request from Allis-Chalmers, Milwaukee 1, Wis.

VARIABLE SPEED DRIVES. "Type RS P.I.V. Variable Speed Drives," a new 6-page Folder 2874, describes Link-Belt Co.'s new constant horsepower variable speed drives, designed to meet capacity demands up to 50 horsepower and ratios up to 5.5:1.

The folder describes the new features of a twin-strand single roll chain that operates between a pair of smooth facing wheels to change the ratio and output shaft speed as the effective diameter of the wheel faces is altered. In this manner stepless speed adjustments between maximum and minimum settings are achieved.

Folder 2874 also illustrates types of assemblies and sizes available, speed variation ratios and selection data. A copy can be had free by writing to Link-Belt Co., Dept. PR, Prudential Plaza, Chicago 1, Ill.

VIBRATORY EQUIPMENT. A new condensed catalog of vibratory materials handling equipment, vibrating parts handling equipment, power rectification equipment, mechanical shaft seals, paper joggers, and portable power tools is announced by Syntron Co.

The Syntron product lines listed include vibrators, car shakers, car rappers, packers and jolters, hopper level switches, flow control valves, feeders, conveyors, spiral elevators, dry feeders and weighing equipment, a complete line of vibrating screens, test sieve shakers, parts feeders, lapping machines, rectifiers and rectifier power units, battery chargers, shaft seals, paper joggers, paving breakers and rock drills, electric hammers and hammer drills, and concrete vibrators and floats.

Free copy of Catalog 605 immediately available—without obligation—upon request from SYNTRON COMPANY, 705 Lexington Ave., Homer City, Penn.

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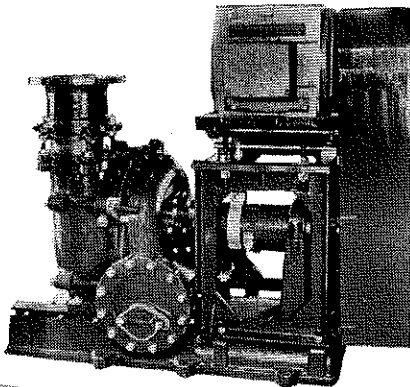
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