

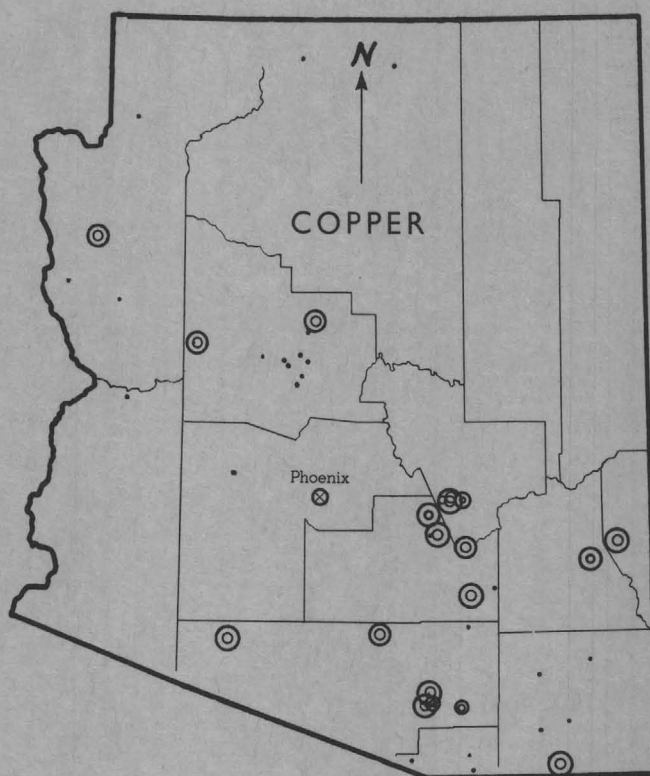
DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA

PHOENIX, ARIZONA

FRANK P. KNIGHT, DIRECTOR

OFFICIAL FILE



27TH ANNUAL REPORT

FOR

YEAR ENDING JUNE 30, 1966

Honorable Samuel P. Goddard
Governor of Arizona
Capitol Building
Phoenix, Arizona

Dear Sir:

The Annual Report of the Department of Mineral Resources, covering the fiscal year July 1, 1955 to June 30, 1956, is submitted herewith.

The report contains, as formerly, a review of mining activity in the State and of this department's activities, which are directed towards the development of Arizona mining and the maintenance of the health of the present industry.

Very truly yours,

Frank P. Knight

FRANK P. KNIGHT,
Director.

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ARIZONA MINERAL PRODUCTION

The value of Arizona's mineral production in 1965 was \$580,170,000, again an all-time record. It was 19 percent above the record in 1956, a year of abnormally high copper prices, and 8.6 percent above the record year of 1964. Copper accounted for \$497,991,000 or 85.8 percent of the 1965 total. The tonnage of copper produced in Arizona in 1965 was 703,377 short tons or 1.8 percent above that for 1964. Record tonnages of copper have been produced by Arizona in each year since 1959.

The total value of Arizona's mineral production to the end of 1965 is approximately \$10.5 billion, of which approximately 83.8 percent has come from copper. Arizona mined 52.0 percent of the Nation's copper production in 1965, and so ranked first among the United States, as it has done since 1910. It ranked 2nd in silver, 4th in gold, 7th in lead, and 12th in zinc production. Although Arizona ranked 10th in total value of all minerals produced in 1964, it was first in value of metal production. Arizona has at San Manuel the largest underground copper mine; at Morenci, the second largest open pit copper mine and at the Iron King mine one of the largest lead-zinc producers in the Nation.

Details of mineral production are to be found in the following tables of the appendix to this report:

- I. Arizona Production and Value of the Five Principal Metals in 1965.
- II. Mineral Production of Large and Small Producers in Arizona in 1965.
- III. Arizona Mine Production of the Five Principal Metals, 1956 to 1965.
- IV. Relative 1965 Production in the United States for the Five Principal Metals.
- V. Value of Mineral Production in Arizona, by Counties.
- VI. Copper, Gold, Silver and Molybdenum Recovered from Metal Mines in Arizona in 1963, 1964, and 1965.

ACTIVE MINES

No major copper mine came into production during the fiscal year, but expansion projects at several existing mines increased the total productive capacity. The number of active mines of all kinds increased, as is shown in Table VII on page VIII of the Appendix. In April, 1966, a department survey showed 37 active copper mines, 5 of them with ores containing considerable lead or zinc; 12 lead and/or zinc mines; 9 gold or silver, 11 uranium, and 42 other producers of metallic or non-metallic minerals, making a total of 111, compared to 95 in April, 1965. Sand, gravel, stone, clay, and the solid and liquid fuel producers are omitted from these lists.

EMPLOYMENT

The Arizona Employment Security Commission reported for 1965 that there were employed in Arizona mining, quarrying and smelting an average of 18,485 covered employees with total covered wages of \$144,165,631, or an average of \$7,799 per year per employee. Fringe benefits are estimated to be an amount equal to over 25 percent of the regular payroll. Some of these fringe benefits, such as vacation pay and paid holidays, were included in the payroll for the year. Other benefits such as unemployment, social security, hospital, and recreation, estimated to total about \$12,000,000 were not so included.

COPPER

Arizona's copper production in 1965, 703,377 tons, was an all-time record for the sixth consecutive year. It was 52 percent of the Nation's total mine production of 1,351,734 tons, and Arizona again was first among the United States, as it has been since 1910. Over one-half of the State's total came from Pima and Pinal Counties, with Pima first in rank and Pinal a very close second. Greenlee, Gila, Cochise, Yavapai and Mohave, are the other important copper producing counties. Arizona's production of recoverable copper for the first half of 1966 has been 376,660 tons, 3 percent above that of the first half of 1965, according to reports of the U. S. Bureau of Mines.

Copper was in tight supply throughout the fiscal year. Releases from the National stockpile were authorized as follows: September, 1965. 110,000 tons to the Mint for new coinage; October, 1965. 200,000 tons, leaving reserves below the 775,000 ton level set for non-nuclear war; March, 1966. 200,000 tons - mainly to defense contractors. The last authorization, ordered by the President, left only 409,000 tons of uncommitted copper in the stockpile, a level considered by some to be dangerously low. Export quotas, "set asides" of percentages (13% in mid-1966) for defense orders, suspension to June 30, 1968 of the import duty on copper, restoration of copper to the list of minerals for whose exploration government loans may be available, and announcement of a program to stimulate production by subsidization of marginal copper mines, were other moves made by the government in the fiscal year to ease the tight copper situation and its impact.

During the fiscal year major domestic copper producers held their price at 36 cents except for a brief period in late 1965 when all except Kennecott raised to 38 cents, and dropped back following strong disapproval by the President. Major foreign producers, however, followed Chile's lead and raised to 42 then 62 cents (April 14, 1966). Spot copper on the London Metal Exchange reached an all-time high of 98-3/4 cents (U.S.equivalent) on April 5, and fell off to about 74 cents at the end of June.

Copper production in 1965 at the Morenci mine of Phelps Dodge Corp. was 127,566 tons slightly below its all-time record of 129,406 tons in 1964. Its "LPF" system for recovery of non-sulphide copper was completed but

did not get up to its rated capacity. Plans were announced for increasing copper production by 15,000 tons per year by the addition of facilities for leaching waste dumps, at an estimated cost of \$1,600,000. The company completed its Blue Ridge Dam project on East Clear Creek in November, 1965. The storage and diversion of the water for use in the Salt River Valley gives the company additional exchange water for its dump leaching. At its New Cornelia Branch at Ajo the company produced 70,905 tons of copper from a record 10,665,000 tons of ore milled. The Copper Queen Branch at Bisbee produced 66,635 tons of copper, 30,949 from the Copper Queen mine and 35,686 from the Lavender pit. A \$3 million project to extend the latter and prolong its life by about two years, was announced early in 1966. The total copper production of Phelps Dodge's Arizona properties in 1965 was 265,106 tons, or 38 percent of the State's total.

The San Manuel Division of Magma Copper Company produced 93,767 tons of copper in 1965. Its expansion program was completed in July, 1965. Magma's Superior Division produced 19,452 tons of copper in 1965. Diamond drilling at the Magma mine in the fiscal year disclosed a new replacement orebody in a limestone stratum well above areas now being mined.

The American Smelting and Refining Co. produced in Arizona 75,722 tons of copper - 54,735 from its Mission mine south of Tucson and 20,987 from its Silver Bell mine at Silver Bell. Major expansion of crushing and concentrating facilities at the Mission Unit to permit 50 percent increase in production was started in the spring of this year. Completion of the \$9 million project was scheduled for the spring of 1967. At the Silver Bell unit, mill and other equipment were added to permit increase of ore production from about 8,500 to 10,000 tons per day and to increase leaching of mine dumps.

The Ray Mines Division of Kennecott Copper Corporation produced 72,153 tons of copper in 1965, up 24% from 1964. Plans for a plant for recovery of molybdenite at Hayden were finalized in mid-1966 and completion is expected in early 1967.

Inspiration Consolidated Copper Company produced in 1965 a total of 62,077 tons of copper - 53,436 from its open pit operations at Inspiration and 8,641 from its Christmas property. At Inspiration, it completed its two-year program for increase to 20,000 tpd of oxide-sulphide ore. At Christmas, a small open pit operation was started in order to increase production and provide more sand from tailings for underground stope filling.

The first year of production at the new Mineral Park property of Duval Corporation north of Kingman yielded 19,052 tons of copper. The property's designed capacity of 12,000 ore tons per day was reached in February 1965, and at the end of June, 1966 it had been expanded to about 15,000. Duval's Esperanza mine south of Tucson also was expanded to 15,000 ore tons per day. A second pit was opened and a third was planned. Production for the year was 21,691 tons of copper, making Duval's total for the two mines 40,743.

The Miami Copper Company Division of Tennessee Copper Corp. produced 19,605 tons of copper from its Copper Cities mine, 8,953 from the Miami,

and 2,030 from the Castle Dome, a total of 30,588.

Bagdad Copper Corporation produced 20,276 tons of copper in 1965 of which 7,912 tons derived from heap leaching of oxide ores. The new plant to convert the cement copper product of the leaching to powdered copper of high purity, owned jointly by Bagdad and the Chemetals Corporation, was started intermittently in June, 1966.

Pima Mining Company produced 17,977 tons of copper in 1965 from its Pima mine south of Tucson. Having completed its expansion from 6,000 ore tons per day capacity in April, 1965 to 18,000 tons in May, 1966, its 1966 copper output is expected to double the 1965 figure, and "By making lower grade ores commercial, the life of the mine will be extended well into the 1980's", said its president.

Ranchers Exploration and Development Corporation reported production "in excess of 3,000 tons of copper" for the first full year's operation in 1965 at its open pit Bluebird mine near Miami. At the end of June, 1966 it was producing at a rate of 20,000 pounds per day by heap leaching.

The Anaconda Company in September, 1965 began the stripping of some 200 million tons of waste from the Twin Buttes orebody south of Tucson, having finished its underground work of checking findings of exploratory drilling. By May of 1966 new scrapers and nearly a mile of 60-inch belt conveyor were beginning to speed the stripping to meet a 1969 rather than an early 1970 date for completion of the project which then called for a capacity of more than 30,000 tons per day.

McAlester Fuel Co. began open pit mining - heap leaching - copper precipitation operations at the Zonia mine near Kirkland in mid-June.

Banner Mining Co. erected a 5-ton per day pilot plant at its San Xavier property to test its patented process for leaching copper from ores of high limestone content.

Standard Copper Corp. rehabilitated the mine and mill at the Copper World property and started production of copper and zinc concentrates in the first half of 1966.

William Stoffers leased the Moore Shaft at Johnson Camp from Coronado Copper and Zinc Co. early in the fiscal year and shipped about 3 cars per week of copper-zinc ore to the Deming, New Mexico mill of American Zinc Co. during the balance of the year.

White Mesa Co., Inc. started work at the Mardun mine in the White Mesa district, Coconino County, in the spring of 1966. Zontelli Brothers had been heap leaching there and the White Mesa Co. proceeded to convert to vat leaching. New equipment including an electric shovel for the mine was to be installed and high line power brought in.

C. G. Patterson stopped leaching operations at the Emerald Isle mine between Kingman and Chloride in January, 1966, after lease and optioning the property to El Paso Natural Gas Co.

Arizona Ranch & Metals Co. stripped a considerable tonnage of waste from above ore in the Mineral Hill pit east of Parker and started preparations for vat leaching and precipitation of copper. Plans call for eventual electrolytic deposition.

Exploration for copper continued to be very active throughout the fiscal year. Among the many areas in which exploration was done in 1965-66 were:

- Cochise County - Dagoon, Johnson;
- Coconino - White Mesa;
- Gila - Miami, Globe;
- Graham - Safford;
- Greenlee - Metcalf, King Mt., Copper Mtn;
- Maricopa - Vulture, Webb, Magazine;
- Mohave - Signal, Rawhide Mts., Cedar Valley, Maynard, Mineral Park, Cerbat;
- Pima - Mineral Hill, Twin Buttes, Growler, Arivaca, Amole;
- Pinal - Old Hat, Owl Head, Vekol, Superior, Canada Del Oro, Casa Grande, Slate Mts.;
- Santa Cruz - Patagonia, Palmetto, Red Rock, Wrightson;
- Yavapai - Jerome, Copper Basin, Walnut Grove, Turkey Creek, Humbug, Peck, Agua Fria;
- Yuma - La Cholla, Ellsworth.

Siliceous fluxing ores for copper smelters were produced at the Nancy # 2 and Burro mines, Cochise County; Copper Hill mine, Gila County; Ash Peak, Graham County; Harmony claims, Greenlee County; Sheridan, Anderson, Ballesteros, and Kit Peak mines, Pima County; Orizaba, Pico 1-3, Tiger, Del Oro, Silver Bell-Martinez, Sacaton Mts., Copper Belle, and Copper Butte mines, Pinal County; Commercial mine, Yavapai County; and others.

LEAD - ZINC

The price of pig lead, f.o.b. New York, held at 16 cents per pound until May 5 when it fell to 15 cents, after dropping to 12 cents on the London Metal Exchange.

Prime Western Zinc, St. Louis basis, held at 14-1/2 cents per pound through the fiscal year in spite of pressure of foreign metal at 12 cents. Lead-zinc quotas were abandoned in October, 1965. Lead and zinc stockpiles were declared surplus to national defense and releases were authorized.

Lead production in Arizona in 1965 was 5,913 tons, 4 percent below 1964. Zinc production was 21,757 tons, 12 percent below 1964.

Iron King mine of Shattuck-Denn Mining Corporation, in Yavapai County, produced the bulk of the lead and zinc output of the state in the fiscal year. It is one of the Nation's leading producers of lead-zinc, and also of gold and silver.

Continental Exploration, Inc. completed a 1,000 foot shaft at the CWT zinc-copper mine south of Tucson, cut stations at the 800 and 900 levels, started headings, completed a power plant building and progressed with the design of a 500 ton mill.

The Cyprus Mines Corp. started a new 2150 foot, 3 compartment shaft at its Old Dick mine in the Eureka district of Yavapai County, and continued mining operations at a reduced rate. The shaft will also serve its near-by Copper Queen mine.

The Trench mill, long a processor of ores from the Patagonia area, was closed in July, 1965.

Some lead ores from the Globe mine, east of Amado, Pima County, and complex ores from the Indiana mine near Washington Camp, Santa Cruz County and lead-silver ores from the Silver Crown mine in the Walnut Grove district, Yavapai County, were shipped in the fiscal year.

GOLD - SILVER - MOLYBDENUM

Practically all of Arizona's production of these metals comes as by-products from copper, lead-zinc and complex ores.

Gold

Arizona's gold mines were closed by executive order and have remained so. In spite of dwindling gold reserves and continuing adverse "balance of payments", the Treasury continues to oppose all measures which might allow the gold miners to resume needed production, for the stated reason that any of them might upset the monetary situation.

In 1965 both the quantity and value of Arizona's gold production decreased by 2 percent in spite of the greater production of copper. A few ounces were produced at placers in Yuma and Yavapai Counties, and possibly others. Small amounts of gold bearing quartz, and larger amounts of silica flux carrying a little gold, were shipped to the copper smelters, but the copper ores accounted for nearly all of the total. The Copper Queen, New Cornelia, San Manuel, Iron King, Morenci and Magma mines, lead the state in the order listed and ranked among the top 15 in the United States, in gold production in 1964. All except Iron King are copper producers.

Silver

Treasury sales held the price of silver at the monetary figure of \$1.293. Arizona's silver production in 1965 was up 5 percent in both quantity and value above that in 1964.

The Mission, Copper Queen-Lavender Pit, Iron King, New Cornelia, Morenci, Pima and Magma mines ranked among the top 25 silver producers in the nation in 1964 in the order listed. Production came almost entirely from these plus the other major copper mines, in 1965.

Silver exploration appeared to be less than in 1964. A small exploration loan was obtained from the Office of Minerals Exploration by D. C. Gilbert for his property near Washington Camp.

Molybdenum

Recovery of molybdenum from Arizona copper ores in 1965 yielded 49 percent more of the metal than in 1964. The value of the 1965 production was \$15,880,000, up from \$9,532,000 in 1964, and it ranked third behind copper and sand and gravel.

URANIUM - VANADIUM

Uranium

Arizona's production of uranium ore in 1965 was 117,898 tons valued at \$3,918,000, up 16 percent in quantity and 21 percent in value from 1964. The Orphan mine of Westec Corp. was Arizona's largest producer of uranium ore until its closing near the end of the fiscal year. Since the Tuba City processing plant, operated by El Paso Natural Gas Company's Mining Division, was dependent upon Orphan mine ores, it too stopped uranium production.

Vanadium

Uranium processing plants outside of Arizona extracted vanadium valued at \$381,000 from Arizona ores from the Four Corners area. The value was 34 percent less than in 1964.

IRON

The U. S. Bureau of Mines reported 1965 production of 8,000 long tons of usable Arizona iron ore valued at \$51,000. This is double the 1964 tonnage but an increase of only 59 percent in value.

Arizona Gypsum Co. shipped usable iron ore from the Iron Chancellor mine in the Seligman area, but ceased operating in the spring.

Magna-Blast, Ltd. produced some magnetite concentrates in various grain sizes from the Owl Head district northwest of Oracle Junction, Pinal County, for use in sand blasting.

C.F. & I. Steel Corp. constructed a four mile truck haulage road from the Young-Heber road to its iron lease in the northwest corner of the Fort Apache Indian Reservation, and mined and stockpiled part of some 10 to 20,000 tons of iron ore to be shipped to Pueblo, Colorado for test purposes.

MERCURY

The price of mercury fell from \$725 per 76-lb flask at the beginning of the fiscal year to \$330 in mid June. At the end of June it had turned upward to \$345-350. The drop caused the closure of the National and Mercuria mines in the Mazatzal Mountains north of Sunflower. Work on the Cypress claim was stopped after two miners were killed by powder gas in a shallow shaft.

United Nuclear Co.'s subsidiary, Harpoon, Inc., took over the Pine Mt. mine in the same Sunflower district in October, 1965, reconditioned the mine and plant, operated on some dump material and mined ore, and drove some underground headings in search for new ore.

Wells Cargo, Inc. of Las Vegas, Nevada was active throughout the fiscal year at the National mine, Sunflower district. It reconditioned the plant, explored for and mined some mercury ore, but started removing its equipment in June.

Production of mercury in Arizona in 1965 totaled 158 - 76 lb flasks valued at \$90,000.

NON-METALLIC MINERALS

Arizona's production of non-metallic minerals in 1965 was valued at a preliminary figure of \$46.3 million, 2 percent below the 1964 total. Production and values of individual items are given in Table II, page IV of the Appendix.

Sand and gravel production was down 18 percent in quantity and 20 percent in value. Like figures for stone were down 34 percent in each; for gypsum, down 30 in each; for lime, up 15 to 21 percent; pumice, up 45 in tons and down 2 percent in value.

Work was resumed at the Franconia tuff mine and mill near Topock, with U. S. Marble Corp. operating.

Harquahala Gypsum Co. ceased production from its gypsum pit southeast of Salome in July 1966 after supplying agricultural gypsum in the area throughout the fiscal year.

Harms Engineering Co. in the spring of 1966 started a mica operation at the Cavaliere property about ten miles east of Yucca.

Apache Drilling Co. broke ground for its new helium plant at Navajo, Apache County, in June. Production is expected to exceed 2 million cubic feet per month of helium gas.

Exploration for coal in the Black Mesa field in the Hopi-Navajo Indian reservations continued to be active, as did potash exploration east and southeast of Holbrook.

DEPARTMENT ACTIVITIES

Laws, regulations and administrative procedures relating to mineral rights in Arizona continued to be subjects of numerous inquiries as well as matters of concern to the department. The director participated in a group study of regulations proposed by the Bureau of Land Management and the National Forest for implementation of the Wilderness Act, from which recommendations were drafted by representatives of the mining industry. Hearings by the Phoenix office of the Bureau of Land Management on classification of lands in Mohave County under Public Law 88-607, were attended by field engineer Johnson; a meeting of the National Association of Counties at which public land matters were discussed, was attended by the administrative assistant; and the director, assistant to director, and field engineer Irvin attended a symposium on American Mineral Law, sponsored by the University of Arizona and originally proposed by a small group including the director. The

assistant to director and field engineer Irvin attended meetings of the Mining Claims Review Committee, Tucson Council, ASMOA, which were concerned with rights of locators of mining claims upon which cabins had been built.

As Publications Chairman, Open Pit Unit, Mining and Exploration Division, Society of Mining Engineers, AIME, the director wrote a review, Open Pit Mining in 1965, which was published in the February issue of Mining Engineering. He continued as chairman of the budget and advisory committees for the joint meeting of the Society of Mining Engineers and the Rocky Mountain Mineral Conference sponsored by the Maricopa Subsection, A.I.M.E., held at Phoenix on October 6-9, 1965. The assistant to director was active and prominent in the publicity work for this meeting and conceived and monitored a press conference with the meeting's leading speakers on energy sources and leaders of Arizona's water and power industries.

The director attended the annual meeting of the western division of the American Mining Congress and preceding meeting of its resolutions committee, at Las Vegas, Nevada in October, 1965. He and field engineers Irvin and Johnson also attended the annual meeting of the Arizona Section, A.I.M.E. at Tucson in December, 1965. On February 3-5 he attended the annual meeting of the Colorado Mining Association. In October, at Las Vegas, February, at Reno, and April at Las Vegas, he was present at meetings of the Western Governors' Mining Advisory Council, as a delegate and a member of committees on gold, public lands and import controls (chairman). The meeting at Las Vegas, in April was just before the Western Governors' Conference at which the Council's recommendations were presented. He spoke on Arizona mining before conservation classes at Arizona State and Northern Arizona Universities, at meetings of the Tucson Council, ASMOA, and Tucson Subsection, AIME, wrote several mining articles which appeared in "Pay Dirt", and was interviewed for two short news items on station KOOL's "Big News" TV program.

The assistant to director, in addition to activities mentioned above, devoted considerable time to assisting with preparations and publicity for Tucson Copper Days, sponsored by the Tucson Trade Bureau. From March 7th through 12th, Tucson was well covered with exhibits of huge mining equipment, copper products, mine models, free movies, etc., etc., in an unprecedented display. In addition to numerous news releases, he wrote mining articles and reports appearing in magazines of the Phoenix Chamber of Commerce, Arizona Society of Professional Engineers, and "Pay Dirt", official organ of the A.S.M.O.A., and elsewhere. He spoke on mining before a number of club, ASMOA, AIME and other meetings, to schools, including "Summer Camp" classes at Phoenix and Central High Schools, and on a KAET Channel 8 program. Publicity for the dedication of the model of Jerome presented to the Jerome Museum, was handled by him. The Maricopa Subsection, AIME elected him vice-chairman and program chairman at the end of his active year as secretary of the group.

Department assistance was given to state agencies on mining questions relating to property tax studies, park areas, rights-of-way, industry development, economic research, history, employment and state lands; to Federal agencies concerned with public lands, mining statistics, mine loans, exploration loans,

old and new mines, mining costs, stimulation of copper production, use of water, study of strip and surface mining; and to the many companies, private agencies, and individuals in and out of state, seeking information relative to Arizona mining. Among them were most of the more than 50 exploration teams of substantial companies which were at work in Arizona searching for new ore deposits during the year.

Publications

The following statistical reports were sent to a mailing list of legislators, companies, agencies, banks, newspapers, libraries and individuals; and upon request:

Copper Industry - Statistics for 1964 Compared with Other Years.
Arizona, United States and World.

Lead and Zinc Industry - Statistics for 1964 Compared with Other Years.
Arizona, United States and World.

The Gold and Silver Industries in the World, United States and Arizona -
Salient Statistics for 1964.

Preliminary Estimate of Copper, Lead, Zinc, Gold and Silver Production
In Arizona and the United States in 1965.

Review of Copper Industry in 1965.

Arizona Wage Statistics and Copper Output - Base Period 1947-1949
Compared with 1963-1965.

Other statistics pertaining to mining were given upon request to people in the above categories.

The department brochure, "Rocks", was reprinted, this time with illustrations. It was written by A. L. Flagg for children and many copies have been distributed.

Reprints of a special article, "Southwest Copper", by John V. Beall, Editorial Director, Mining Engineering magazine, with colored photographs of Arizona mines, were purchased for distribution as educational matter.

The following papers were compiled and mimeographed for distribution:

Active Mine List, October, 1965
Active Mine List, April, 1966
List of Arizona Barite Deposits
Bibliography of Arizona Quicksilver (revised)
Bibliography of the Geology and Mineral Resources of Santa Cruz
County, Arizona.

Information and Other Services

The department's files, maps, and library on mining properties and mining, are in constant use, and information is perhaps the department's most important service. At least one field engineer is scheduled to be present each working day at the

Phoenix office for consultation, and much of the time one is at the Tucson office. The engineers also are at announced places at announced dates during the year. The administrative assistant is available for consultation on public land matters.

During the fiscal year, the field engineers traveled 31,739 miles, attended 134 meetings of the Arizona Small Mine Operators Association, made 479 mine visits and discussed mining problems with individuals on 2188 other occasions - 662 in the field, 673 in the office and 853 by telephone. They also answered 107 mail inquiries. Their miscellaneous services included: Chairman and program committee chairman of Phoenix Council, A.S.M.O.A.; and member of Mining Law Review Committee, Tucson Council, A.S.M.O.A.

There were 2132 visitors and 5578 telephone calls to the department during the fiscal year. Respective figures for 1963-64 were 2084 and 5578.

Mineral Museum

There were approximately 7982 visitors to the Mineral Museum exclusive of 67,337 visitors during the State Fair. Special visits for 2344 school children and special meetings with 1829 total attendance were held in the Mineral Building. The Museum curator answered 621 inquiries and sent out 369 specimen kits to school children.

Receipts and Expenditures - 1965-66.

APPROPRIATION

\$ 86,729.00

EXPENDITURES:

Personal Services	\$ 59,911.20
Professional Services	7,500.00
Travel - State	6,032.38
Travel - Out of State	549.75
Current Expenditures:	
Utilities	1,435.45
Telephone	1,395.19
Postage	800.00
Bldg & Equip. Mtnc.	917.91
Printing	797.77
Supplies - Office, etc	1,849.04
Fixed Charges	234.00
Subscriptions & Dues	180.75
Capital Outlay - Equipment	801.27
Bldg & Imp.	<u>996.00</u>

TOTAL EXPENDITURES

Balance - returned to General Fund

\$ 83,400.71-
\$ 3,328.29
<u>\$ 86,729.00</u>

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA

BOARD OF GOVERNORS

Charles F. Willis, Phoenix - Chairman
(term expires January 31, 1971)

Jack W. Still, Prescott
(term expires January 31, 1969)

Matt Danenhauer, Clifton 1967
(term expires January 31, 1970)

Willie J. Roper, Kingman
(term expires January 31, 1968)

Stephen H. Congdon, Tucson
(term expires January 31, 1970)

PERSONNEL

Frank P. Knight	Director
Mrs. Elizabeth R. Saulsberry	Assistant to Director
Lewis A. Smith	Field Engineer - Central District
Gerald W. Irvin	Field Engineer- Southern District
Fremont T. Johnson	Field Engineer - Northern District
Mrs. Glenn W. Pare	Administrative Assistant
Mrs. Pauline Halloren	Secretary
Mrs. Ray E. Sparkes	Secretary
Frank J. Tuck	Consultant

OFFICES

Mineral Building, State Fairgrounds, Phoenix - Main Office
Room 164, State Office Building, Tucson

MINERAL MUSEUM, Mineral Building

Lee Hammons, Curator.

STATUTORY POWERS AND DUTIES

- "Aid in the promotion and development of the Mineral Resources of the State.
- Conduct studies of the economic problems of prospectors and operators of small mines for the purpose of assisting in their solution.
- Assist in discovering sources of supply for persons desiring to buy minerals.
- List and describe available mining properties.
- Make mineral resource surveys and conduct other investigations which may interest capital in the development of the state's mineral resources.
- Serve as a bureau of mining information in conjunction with the Arizona Bureau of Mines.
- Publish and disseminate information and data necessary or advisable to attain its objectives.
- Cooperate with the state land department to encourage mining activity on state lands.
- Cooperate with the corporation commission in its investigations and administration of laws relating to the sale of mining securities.
- Cooperate with the Arizona Bureau of Mines, and deliver to the Bureau problems which the field work of the division shows to be within the scope of the activities of the bureau.
- Cooperate with federal and other agencies designed to develop mines and minerals.
- Oppose congressional acts favoring reciprocal or duty free imports of foreign minerals.
- Use its authority in other ways to assist in more extensive exploration and development of the mineral resources of the state."

TABLE I

Arizona production and value of the five principal metals in 1965, as reported by the United States Bureau of Mines were as follows:

703,377 tons copper	@	35.4 ¢/lb	\$ 497,991,000
5,913 tons lead	@	15.6 ¢/lb	1,845,000
21,757 tons zinc	@	14.6 ¢/lb	6,353,000
150,566 ozs. gold	@	\$35.00 /oz	5,269,000
6,095,000 ozs. silver	@	\$1.293 /oz	<u>7,881,000</u>
			<u>\$ 519,339,000</u>

This compares with the following final figures for 1964:

690,988 tons copper	@	32.6 ¢/lb	\$ 450,524,000
6,147 tons lead	@	13.1 ¢/lb	1,611,000
24,690 tons zinc	@	13.6 ¢/lb	6,716,000
153,676 ozs. gold	@	\$35.00 /oz	5,379,000
5,811,000 ozs. silver	@	\$1.293 /oz	<u>7,513,000</u>
			<u>\$ 471,743,000</u>

TABLE II

MINERAL PRODUCTION OF LARGE AND SMALL PRODUCERS IN ARIZONA IN 1965 ^{1/}

Source: U.S.B.M. Area Report for Arizona, 1965

LARGE COPPER PRODUCERS: *

	PRODUCTION	VALUE
Copper tons	697,859	\$ 494,084,000
Gold ozs	133,830	4,684,000
Silver ozs	5,352,850	6,921,000
Molybdenum (Content of Concentrates). lbs	9,399,000	15,880,000
		<u>\$ 521,569,000</u>

SMALL MINERAL PRODUCERS:

Asbestos short tons	3,469	441,000
Clays short tons	2/ 129,000	164,000
Copper tons	5,518	3,907,000
Diatomite short tons	295	8,000
Gem Stones	3/	120,000
Gold troy ozs	16,601	581,000
Gypsum short tons	103,000	540,000
Iron Ore (Usable) long tons	8,000	51,000
Lead short tons	5,913	1,845,000
Lime short tons	204,000	3,543,000
Mercury 76-lb flask	158	90,000
Natural Gas (marketed) cubic feet	p/ 2,705,000,000	p/ 325,000
Petroleum (crude). 42-gallon barrels	97,000	W
Pumice short tons	1,273,000	1,605,000
Sand and Gravel short tons	14,918,000	16,621,000
Silver troy ozs.	742,150	960,000
Stone short tons	2,474,000	4,171,000
Tungsten concentrate (60% WO ₃) . short tons	3	5,000
Uranium ore short tons	117,898	3,918,000
Vanadium short tons	W	381,000
Zinc short tons	21,757	6,353,000

Value of items that cannot be disclosed: Cement,
feldspar, helium, mica (scrap), perlite, pyrites,
and values indicated by footnote 2 and W.

4/ 12,972,000

Small Mine sub-total

\$ 58,601,000

TOTAL

\$ 580,170,000

Percentage due to Small Mines

10.1%

* Phelps Dodge (Morenci, New Cornelia, Bisbee), Kennecott, Inspiration and Christmas, Miami, Copper Cities, Castle Dome, Magma and San Manuel, Asarco's Silver Bell and Mission, Pima, Bagdad, Duval's Esperanza and Mineral Park.

p/ Preliminary

W - withheld to avoid disclosing confidential data.

1/ Production as measured by mine shipments, sales, or marketable production.

2/ Excludes bentonite; included with "Value of items that cannot be disclosed."

3/ Weight not recorded.

4/ Value of mineral fuels, \$2,346,000; value of nonmetals \$10,626,000.

TABLE III
ARIZONA'S MINE PRODUCTION OF

	GOLD øzs.	SILVER øzs.	COPPER lbs.	LEAD lbs.	ZINC lbs.	TOTAL VALUE
1956	146,110	5,179,185	1,011,816,000	23,998,000	51,160,000	\$ 450,599,680
1957	152,449	5,279,323	1,031,708,000	24,882,000	67,810,000	332,081,963
1958	142,979	4,684,580	971,678,000	23,780,000	57,064,000	273,398,148
1959	124,627	3,898,336	860,594,000	19,998,000	74,650,000	282,977,000
1960	143,064	4,774,992	1,077,210,000	16,990,000	71,622,000	366,340,000
1961	145,959	5,120,007	1,174,106,000	11,874,000	59,170,000	370,101,000
1962	137,207	5,453,585	1,288,484,000	13,932,000	65,776,000	416,418,000
1963	140,030	5,373,058	1,321,954,000	11,630,000	50,838,000	426,038,000
1964	153,676	5,810,510	1,381,976,000	12,294,000	49,380,000	471,743,000
1965	150,566	6,095,285	1,406,754,000	11,826,000	43,514,000	519,339,000

TABLE IV
RELATIVE 1965 PRODUCTION

	U. S.	ARIZONA			LEADING STATE	
			% of U.S.	Rank in U.S.		
Gold	1,705,190	150,566	8.8	4th	South Dakota	628,259
Silver - øzs	39,806,000	6,095,285	15.3	2nd	Idaho	18,456,809
Copper-tons	1,351,734	703,377	52.0	1st	Arizona	703,377
Lead -tons	301,147	5,913	2.0	7th	Missouri	133,521
Zinc -tons	611,153	21,757	3.6	12th	Tennessee	122,387

Source: U. S. Bureau of Mines

TABLE V

VALUE OF MINERAL PRODUCTION IN ARIZONA, BY COUNTIES

County	1964	1965 ^{1/}	Minerals Produced in 1965 in order of value
Apache	\$ 5,483,255	\$ 4,296,106	Helium, uranium ore, sand and gravel, vanadium, natural gas, petroleum, pumice, clays, stone
Cochise	53,727,756	W	Copper, gold, silver, stone, lime, sand and gravel, zinc, lead.
Coconino	7,367,976	W	Uranium ore, pumice, sand and gravel, copper, stone, silver.
Gila	64,278,510	70,389,453	Copper, lime, molybdenum, asbestos, silver, stone, sand and gravel, gold, mercury, iron ore, clays.
Graham	W	W	Stone, pumice.
Greenlee	87,325,743	93,809,251	Copper, lime, molybdenum, silver, stone, gold, sand and gravel.
Maricopa	9,088,660	6,004,733	Sand and gravel, mercury, mica (scrap), clays, stone, silver, copper, gold.
Mohave	2,092,263	19,586,739	Copper, molybdenum, sand and gravel, silver, stone, feldspar, zinc, gold, lead.
Navajo	1,004,117	1,468,466	Sand and gravel, uranium ore, stone, vanadium
Pima	148,899,356	149,153,395	Copper, cement, molybdenum, silver, sand and gravel, gold, stone, zinc, clays, tungsten concentrate, lead.
Pinal	119,452,151	141,730,125	Copper, molybdenum, sand and gravel, gold, silver, gypsum, lime, pyrites, perlite, stone, diatomite
Santa Cruz	356,623	377,323	Zinc, lead, copper, silver, gold, stone.
Yavapai	32,570,543	33,054,812	Copper, zinc, cement, lead, silver, molybdenum, sand and gravel, gold, stone, lime, gypsum, clays, iron ore, pumice.
Yuma	2,428,721	1,290,738	Sand and Gravel, stone, lead, gypsum, silver, zinc, gold, copper.
Undistributed ^{2/}	288,271	59,008,629	
TOTAL	\$ 534,364,000	\$ 580,170,000	

W - Withheld to avoid disclosing individual company confidential data.

^{1/} Natural gas value is preliminary

^{2/} Includes gem stones that cannot be assigned to specific counties and values indicated by symbol W

TABLE VI

COPPER, GOLD, SILVER AND MOLYBDENUM RECOVERED
FROM METAL MINES IN ARIZONA IN 1963, 1964, and 1965.
Source: U. S. Bureau of Mines Area Reports.

	1963	1964	1965
Ozs. gold recovered from all copper ores mined	121,177	133,983	133,830
Ozs. silver recovered from all copper ores mined	4,494,239	4,915,362	5,352,850
Lbs. molybdenum recovered from all copper concentrates	5,553,000	6,296,000	9,400,000
Lbs. Copper recovered from all copper ores mined including all clean-up	1,226,472,100	1,280,272,100	1,308,986,000
Lbs. copper recovered from mine waters	91,149,000	90,800,800	89,282,500
TOTAL LBS. COPPER RECOVERED FROM ALL COPPER MINES	1,317,621,100	1,371,072,900	1,398,269,100
TOTAL LBS. COPPER RECOVERED FROM ALL OTHER MINES	4,332,900	10,903,100	8,484,900
GRAND TOTAL LBS. COPPER RECOVERED FROM ALL MINES	1,321,954,000	1,381,976,000	1,406,754,000
TOTAL TONS COPPER ORES MINED	80,615,000	86,132,000	92,860,000
TOTAL TONS ALL ORES MINED	81,282,000	86,808,000	93,285,430

TABLE VII
ACTIVE MINES IN ARIZONA

<u>MINES</u>	<u>During 1965 *</u>	<u>April 1965**</u>	<u>April 1966**</u>
Copper	40	29	32
Copper, with lead or zinc	4	6	5
Lead and/or zinc	<u>12</u>	<u>6</u>	<u>12</u>
Sub-total	56	41	49
Dry gold lode	3	-	5
Dry gold-silver lode	6		
Dry silver lode (Ag-Pb)	<u>17</u>	<u>4</u>	<u>3</u>
Sub-total	26	4	8
Gold placer	2	2	1
Uranium		11	11
Mercury		2	6
Silica (with or without metal content) . .		12	12
Asbestos		4	5
Gypsum		4	4
Lime, limestone, cement		5	5
Marble		4	3
Perlite		2	2
Bentonite		1	1
Mica		2	2
Feldspar		1	1
Iron ore or concentrate		-	1
Totals		<u>95</u>	<u>111</u>

* Source: U. S. Bureau of Mines

** Source: Ariz. Department of Mineral Resources lists.