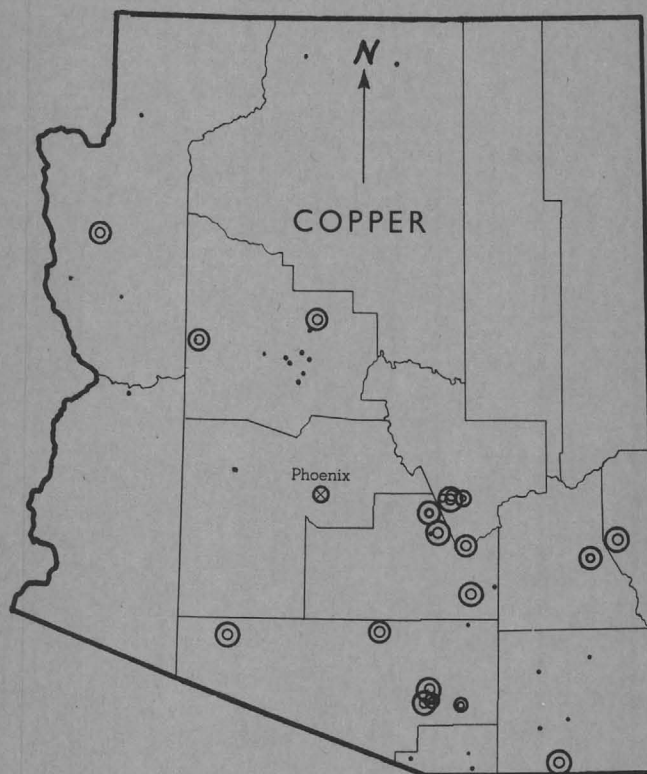


**DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
PHOENIX, ARIZONA**

OFFICIAL FILE

FRANK P. KNIGHT, DIRECTOR



**25TH ANNUAL REPORT
FOR
YEAR ENDING JUNE 30, 1964**

Honorable Paul Fannin
Governor of Arizona
Capitol Building
Phoenix, Arizona

Dear Sir:

The Annual Report of the Department of Mineral Resources, covering the fiscal year July 1, 1963 to June 30, 1964 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 MINING PRODUCTION

The total value of Arizona's mineral production in 1963 was \$481,392,000. This exceeded all prior years except 1956 when abnormal metal prices boosted the total to \$484,959,000. However, the tonnage of copper produced in 1963 was 660,977 tons, 2.6 percent above that for 1962, 31 percent above the 1956 tonnage, and an all-time record.

The total value of Arizona's mineral production to the end of 1963 exceeds \$9 billion.

Arizona ranked first in copper production in the United States in 1963, and has done so since 1910. It ranked second in silver, third in gold, fifth in lead, and ninth in zinc production. It has the largest underground and the second largest open pit copper mine and one of the top ten lead-zinc mines 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 1963.
- II. Mineral Production of Large and Small Producers in Arizona in 1963.
- III. Arizona Metal Production, with ten year records of the Five Principal Metals from 1953 to 1963.
- IV. Relative 1963 Production in the United States for the Five Principal Metals.
- V. Copper, Gold, Silver and Molybdenum Recovered from Mines in Arizona in 1961, 1962 and 1963.

ACTIVE MINES

No major mines came into production during the fiscal year, but there were expansion projects at several major copper mines. Table VI of the appendix gives the kind and number of active mines in 1963-64. In April 1964, according to a department survey, there were 39 active copper mines, 5 of them with ores containing considerable lead or zinc; ten lead and/or zinc mines; 5 gold or silver mines; 12 uranium and 48 other producers of metallic or non-metallic minerals; making a total of 113, which is the same total as that of an April 1963 survey.

EMPLOYMENT

The Arizona Employment Security Commission reported for 1963 that there were employed in Arizona mining, quarrying and smelting a total of 17,711 covered employees with total wages of \$125,734,967, and an average wage of \$7,099. Fringe benefits are not included in these figures, but are estimated to amount to over 25 percent of the regular payroll. In the second quarter of 1964, employment in the copper industry was the highest since the summer of 1962.

COPPER

The mines of Arizona continued, in 1963-64, to produce more than one-half of the Nation's copper output. Arizona's percent of the 1963 total was 54.5 and the production figures were, Arizona 660,977 tons; the United States 1,213,166. Over one-half of the State's output came from mines in Pima and Pinal counties. These two counties ran neck and neck in 1961, with Pinal in the lead. In 1962, the new Mission mine south of Tucson put Pima county in the lead and it probably continues to be. Greenlee, Gila, Cochise and Yavapai are the other important copper producing counties.

Consumer demand for copper began to increase in the last quarter of 1963, and in the first quarter of 1964, curtailment of production by free world producers stopped. In mid-March 1964, the price of copper moved up to 32 cents per pound after holding for nearly three years at 31 cents. The market was strong in the second quarter of 1964 but the major producers held the price at 32 cents in spite of a London Metal Exchange figure of approximately 36 cents and in the face of labor negotiations and expiration on June 30th of union contracts with a number of the major producers. United States production and consumption were at peak levels in June.

Phelps Dodge Corporation reported 1963 production at its Morenci Branch to be slightly below that of 1962. The two newly installed grinding mills started operating in July and made possible the treatment of a record tonnage in the concentrator. Work was begun in November 1963 on a \$15.5 million project to increase recovery 7 to 8 percent by installation of facilities for a leach-precipitation-float (LPF) process. The project was scheduled for completion about the first of 1965.

Phelps Dodge completed its Blue Ridge Dam on Clear Creek and drove approximately one mile of a tunnel to divert impounded water to the East Verde River. It was originally planned to try the tunnel first and to change if it seemed advisable. At the end of the fiscal year, tunneling was stopped and an alternate plan to pipe the water out of the tunnel and over the Mogollon Rim was substituted. Water so diverted will be exchanged with the Salt River Project for water from Black River to be diverted for use at Morenci.

At the New Cornelia Branch of Phelps Dodge, eight new 2250 horsepower diesel-electric locomotives, added in 1963, speeded the pit hauling. Four 3000 KW engine-generators were being installed in the second quarter of 1964, to replace obsolete steam driven equipment.

Twenty-two 65-ton dump trucks were added to the equipment at the Lavender Pit of the Copper Queen Branch of Phelps Dodge in 1963. A new reverberatory furnace went into operation at its Douglas smelter in September 1963, and the capacity of the sponge-iron plant at the smelter site was increased.

Magma Copper Co. announced, in February, plans for increasing the capacity of its San Manuel Division from 35,000 to 39,000 ore tons per day. New primary crushing plant and added mill equipment were to be installed. Completion was scheduled for mid-1965. At the Superior Division, the change to a cut and hydraulic sand fill method was more troublesome than expected, but there was continued improvement in its use after late 1963.

At the Pearl Handle Pit of the Ray Division of Kennecott Copper Corporation stripping east of Mineral Creek and mining under the former business section

of Ray, started in mid-1963, proceeded to erase remaining evidence of the section.

At the end of the fiscal year, Duval Corporation looked forward to starting copper-molybdenum production at its Mineral Park property north of Kingman about the last of September. Its Esperanza property operated at full capacity through the fiscal year. Stripping of the west side of the pit for the West Esperanza Extension, continued. Leach dump areas were added and production of cement copper increased considerably.

Inspiration Consolidated Copper Company, Inspiration Division, increased the removal of waste for pit extensions and is to continue stripping at an increased rate through 1965 to prepare for production of 20,000 tons per day, up from the present 16,600 tons. Plant capacity is being increased to the 20,000 ton level. Its Christmas Division operated at a loss through the first quarter of 1964 but was expected to contribute to earnings soon thereafter. The addition of a new converter at the Inspiration Smelter was planned for 1964.

Miami Copper Company Division of Cities Service Co. purchased twelve 45-ton trucks for use in deepening its Copper Cities Pit. Leaching operations continued at its Miami and Castle Dome mines.

American Smelting and Refining Company in December 1963, authorized the construction of a plant at its Mission mine to recover molybdenum concentrates, and work was well advanced at the end of June. At its Silver Bell mine, stripping for the southeast extension of the El Tiro Pit continued.

Pima Mining Company completed its mill expansion in August 1963, and operating results exceeded the planned increase to 7,000 from 3,800 tons per day capacity. The company continued to mine and treat Banner Mining Co. ore as agreed upon. It also continued stripping to uncover its northeast orebody.

Bagdad Copper Corporation with improved pit conditions and greatly improved leaching efficiency, enjoyed a good year at its Bagdad mine. It completed pilot plant work on refining precipitated "cement" copper to pure powder, and found that economic operation would require larger scale production than the present market could absorb.

Anaconda Copper Company in April exercised its option to lease Banner Mining Company properties in Pima, Helvetia and Twin Buttes districts, and continued exploration work therein.

United Nuclear Corporation reported in April 1964, the discovery of a large deposit of low grade copper ore northeast of Safford in the Lone Star district.

Ranchers Exploration and Development Corporation of Albuquerque, New Mexico, exercised its option to purchase the Blue Bird property near Miami, in March. Leaching operations were stopped in April while engineering and metallurgical studies were made. Preparations for pit expansion and heap leaching on a larger scale, were then started.

Zontelli Western Mining Company continued leaching operations at its White Mesa property in Coconino County.

Charles Stevens, in May 1964, obtained from Phelps Dodge a new lease of the Stevens mine in the Metcalf district north of Clifton and started preparations for further development work and production.

Bob Burney, in March 1964, resumed mining and milling of a small tonnage of ore from the Childs-Aldwinkle mine at Copper Creek. The mill is at Mammoth and the mine and mill had been idle since the end of 1962.

Bruce Mining Co. shipped a few cars of copper-silver ore from the Pittsburgh mine near Ruby, Santa Cruz County, then closed down in the second quarter of 1964.

At the Mineral Hill mine in the Planet district northeast of Parker, preparations for open pit mining and heap leaching continued, with some interruptions, into 1964. In May 1964, Mineral Hill Mining Co. was reported to be the operator of the property and to have filed petition for relief under the United States Bankruptcy Laws.

Pat Paterson of Chloride started preparations for heap leaching at the Emerald Isle mine 17 miles northwest of Kingman early in 1964. At the end of the fiscal year about 18,000 tons of ore were piled on the leach area awaiting completion of the precipitation plant.

Interstate Accounting and Office Service of Phoenix acquired a lease of the Mame mine, Turquoise district, Cochise County early in the fiscal year and proceeded with leach-precipitation operations.

Copper exploration was active in the fiscal year in many areas, some of which were: - Pima County - Mineral Hill, Twin Buttes, Helvetia, Empire, Silver Bell, Cimarron, Gunsight, Sierrita, Helmet Peak and Baboquivari districts and Papago Indian Reservation; Pinal County - Pioneer, Superior, Summit, Black Hills, Mineral Hill, Blackwater, Bunkerhill and Vekol districts and Sacaton and North Picacho Mountains; Yavapai County - Eureka, Agua Fria, Humbug, Walnut Grove, New River and Black Hills districts; Cochise County - Dos Cabezas, Johnson, Gleeson districts and Willcox area; Yuma County - Ellsworth, Oro Fino, Eagle Tail and Cienega districts; Santa Cruz County - Patagonia, Harshaw and Palmetto districts; Gila County - Miami and Summit districts; Maricopa County - Vulture district; Graham County - Lone Star district; Greenlee County - Metcalf district.

Silica fluxing ores for copper smelters were produced at the Allison, Anderson and Cimarron Mt. mines, Pima County; Orizaba, Tiger, Del Oro and Gold Hill mines, Pinal County; Nancy Group # 2 mine, Cochise County; Arizona Commercial mine, Gila County; and a little from Ask Peak mine, Greenlee County. Shipments from the Burro mine, Cochise County and the White Peak mine, Maricopa County, stopped in April and October, respectively.

Coronado Copper and Zinc Company continued leaching experiments at Johnson Camp, Cochise County, after September, 1963.

LEAD - ZINC

The price of pig lead, f.o.b. New York rose from 10-3/4 to 11-3/4 cents per pound September 16 and by early 1964 it reached 13 cents, where it held for the balance of the fiscal year. Prime Western zinc, St. Louis basis, rose from 11½ to 12 cents per pound in late July, to 13 cents in early December and to 13½ cents early in the last quarter of the year 1963-64.

Lead and zinc stocks continued to drop in the first half of 1964 and prices of both metals were to go higher.

Lead production in Arizona in 1963 was 17 percent below 1962 and the lowest since 1934, but the value was only 2 percent lower. Yavapai County produced 93 percent of the State's total. Santa Cruz County accounted for 6 percent and Cochise, Maricopa, Pima and Pinal Counties together produced the balance of 1 percent.

Zinc production in Arizona in 1963 was 23 percent lower in both tons and value than in 1962. The Iron King, Old Dick, Atlas, Johnson Camp and Flux mines, ranking in that order, produced 99 percent of the total.

The Iron King mine of Shattuck-Denn Mining Corporation produced a large percentage of both the lead and zinc produced in the fiscal year. It also produced substantial amounts of gold and silver. It ranked among the top dozen producers of lead, zinc and gold in the Nation and was 14th in silver in 1962. In July 1963, it brought its new 2200 level into production, using for the first time a sub-level method of ore-stopping. Initial troubles were largely overcome by mid-1964 and the method gave promise of years of extended life for the mine.

The Flux mine in the Harshaw district in Santa Cruz County, operated by Nash and McFarland, and the second largest lead producer in 1963, closed in September of that year. McFarland (E.W.) started work at the Hardshell mine, also in the Harshaw district; in October, and started shipments soon after.

Cyprus Mines Corporation operated its Old Dick property near Bagdad throughout the year, and B. S. and K. Mining Company's Atlas mine near Silver Bell produced at about the same rate as in 1962-63. However, the Johnson Camp operation of McFarland and Hullinger had been closed in the first half of 1963 and the Flux closed in September as above stated - two of the top five zinc producers shut down.

American Zinc, Lead and Smelting Co. abandoned the Hilltop mine just east of Chiricahua National Monument. Portable equipment was removed and the houses torn down.

Alvarez and Majalca shipped complex ore from the Indiana mine in the Patagonia district, Santa Cruz County, to the mill of the American Peru Mining Co. at Deming, New Mexico.

Arivaca Mining Company started work at the Arizona mine at Ruby, Santa Cruz County, about November 1st and shipped ore to their Cerro Colorado mill 20 miles away. The company bought out the interest of U. S. Magnetite, Inc., former lessee and operator of the mill, and installed added equipment.

Western Minerals Corporation of St. Louis purchased the Indiana-Arizona property in October 1963 and a few months later leased it to Waterman Mountain Mining Co. The latter started development work and shipped some lead-silver ore from the Carbonate claim late in the fiscal year.

R. A. and Joe Pursley shipped some sorted lead-silver ore from the King of Lead mine in the California district, Cochise County.

Lead-zinc-silver exploration activity increased in the latter part of the fiscal year. Some of the areas of such activity were, by county and districts: Cochise - Tombstone, California; Gila - Banner; Mohave - Wallapai; Pima - Silver Bell, Cerro Colorado; Pinal - Mineral Hill, Martinez Canyon; Santa Cruz - Harshaw, Patagonia; Yavapai - Humbug.

GOLD - SILVER - MOLYBDENUM

Practically all of the Arizona production of these metals comes as by-product from copper, lead-zinc and complex ores mined.

Gold

Delaying tactics which are claimed to have lowered the balance of payments deficit and the outflow of gold from this country appear to have lessened the interest in Arizona gold prospecting. However, some experts think that an increase in the price of gold is near, an event which would mean considerable new interest in gold mines.

In 1963, Arizona gold production was 2 percent above 1962. In 1962 the Copper Queen mine at Bisbee was the largest Arizona producer and 6th in the United States. New Cornelia, at Ajo was next and 8th in the U. S., followed by Iron King (12th), San Manuel (14th) and Magme (20th in the U. S.).

Americana Investment Company's mill at Oatman was dismantled during the year.

Silver

The price of silver rose to the monetary price of \$1.293 in the first quarter of the fiscal year and was held there by Treasury sales. Otherwise, the large excess of Free World consumption over supply would have raised the price considerably. Some authorities on silver now think that the Treasury silver stocks will not be sufficient to hold the price for more than three or four years.

In 1963, 84 percent of Arizona's silver production was by-product from copper mines, and 14 percent from lead-zinc mines. Some silver was produced in all counties except Apache. The six largest producers were, in order of production, Pima, Yavapai, Pinal, Cochise, Greenlee and Gila. The Mission mine, Pima County, ranked 12th in the United States; Iron King 14th; Morenci, 16th; and New Cornelia, 20th.

The higher silver price, together with higher lead-zinc prices, stimulated exploration for properties containing combinations of these metals.

Molybdenum

Arizona produced over 8 percent of the domestic molybdenum in 1963, and ranked third, behind Colorado and Utah. The quantity produced was 5,553,000 pounds, up 26 percent from 1962, and it came from the following mines: San Manuel, Esperanza, Silver Bell, Inspiration, Morenci and Bagdad, listed in order of production. The value of the 1963 production was \$7,584,000, 29 percent higher than in 1962.

Construction of a by-products plant for recovery of molybdenum and other minerals, was started at the Mission mine early in 1964 by Western Knapp Engineering Co., contractor.

URANIUM - VANADIUM

Uranium

Arizona's production of uranium in 1963 was 150,584 tons valued at \$4,844,000. This is 5 percent in quantity and 59 percent in value above 1962. The return to a full year's production at the Orphan mine of Western Equities, Inc., at Grand Canyon, more than offset closings or stretch-outs elsewhere in the State.

Important ore developments were reported at the Orphan mine. The ore from this mine is the chief source of feed for the Tuba City plant operated by El Paso Natural Gas Company's Mining Division.

Vanadium

Uranium plants outside of Arizona extracted 222 tons of vanadium from ores from Apache and Navajo Counties, in 1963.

IRON

Sponge iron was produced at Hayden by the Ray Division of Kennecott and at Douglas by Phelps Dodge Corporation, each for its own use in precipitating copper from leach solutions.

The Arkota Steel Corporation's sponge iron and steel plant at Coolidge was idle during the year, but the company supplied some magnetite concentrates from the Omega mine to Kennecott's sponge iron plant at Hayden.

Exploration east of Young continued and magnetite placer claims were located in the Big Horn and Estrella Mountains and elsewhere. Exploratory drilling was done in the Big Horns.

MERCURY

Arizona mercury production in 1963 was five times that of 1962, but the total was small, in spite of good prices which reached \$270. per 76-lb flask by June 30th.

Bacon and W. Brunson were the largest producers. After 3 years of development work at the Pine Mountain mine, Sunflower district, Maricopa County, they reconditioned the Gould Furnace and began mining and retorting early in 1964.

Big Sam Mining Co. produced a small amount from the National mine, Sunflower district; and there was a small amount recovered from clean-up at the Rattlesnake mill in Gila County.

MANGANESE - BERYLLIUM

None was produced in Arizona in the year ending June 30th.

NONMETALLIC MINERALS

Potash exploration was done by five or more major companies in the Holbrook-St. Johns area. Most of the work was done under prospecting permits on state or private lands.

Asbestos production in Gila County was up in 1963 over 1962. Jaquays Mining Corp. operated the Regal and Chrysotile mines and its mill at Globe. It was the major producer. Metate Asbestos Corp. operated the Lucky Seven mine and its mill at Globe intermittently. These two accounted for practically all of the production. Roger Kyle, pioneer Gila County asbestos producer, died in May.

Arizona Portland Cement Company and Phoenix Cement Company with plants at Rillito and Clarkdale respectively, operated throughout the year.

Arizona Gypsum Corporation shipped gypsum from quarries near Feldman and Camp Verde to cement plants and supplied 100 mesh gypsum for agricultural use. National Gypsum company, the largest producer, shipped gypsum from its Feldman quarries to its wallboard and plaster plant at Phoenix. Garcia Gypsum shipped some from the Feldman area in 1963 for agricultural use. Harquahala Gypsum Company, a new firm, started production of 100 mesh gypsum, from its property 15 miles southeast of Salome, to be sold for soil conditioning.

Arizona Gypsum Co. ground and shipped diatomite from the White Cliffs and a nearby property east of San Manuel for use as filler and as insecticide.

Arizona again was the leading U. S. producer of pumice and accounted for 31 percent of the Nation's total in 1963. Coconino County supplied 89 percent of the State's total, which was up 6% from 1962.

Perlite production from the Superior area was at a new high in 1963.

Sand and gravel was second in importance among mineral production items with a value for 1963 of \$14,500,000.

Stone production was down 25 percent in 1963. Production was reported by all counties except Santa Cruz.

Terrazzo and roof chips were sized and shipped by a number of companies. Some of them suffered a considerable drop in sales in the latter part of the fiscal year, caused by decline in building, particularly in the Tucson area.

DEPARTMENT ACTIVITIES

Laws, regulations and administrative procedures pertaining to mineral rights in the public domain again were subjected to abnormal attention by the Departments of the Interior and Agriculture, the Congress and others, including the department. The director testified at a January hearing by the Public Lands Sub-committee of the House Interior Committee on Wilderness legislation. He also attended three meetings of the Western Governors Mining Advisory Council, at which public land matters were a major subject, and a meeting of the Public Lands Committee of the American Mining Congress. He discussed public land and other matters at meetings of the Arizona Small Mine Operators Association and elsewhere, for the purpose of emphasizing the importance of mining, the ever present chance that minerals of great importance may lie beneath lands showing no promise at the surface, and the tremendous progress in mining which our mining laws have been largely responsible for. He attended the convention of the American Mining Congress in September, 1963, and Arizona meetings of sections of the A. I. M. E., at which various mining matters, including public lands, were discussed, and was present at two hearings on state legislation to allow substitution of drilling for claim location work.

He was joint author and co-signer of a brief submitted to the U. S. Tariff Commission and the Office of Special Representative for Trade Negotiations in protest of any agreement to reduce the copper import tax during or following Gatt negotiations at Geneva. He also supplied the Emergency Lead Zinc Committee with information about Arizona lead-zinc industry, for use at U. S. Tariff Commission hearings and in connection with proposed legislation for flexible lead-zinc tariffs.

He prepared requested papers on proposed legislation for Federal inspection and control of health and safety in non-coal mines, and other articles including a summary of laws and regulations relating to prospecting on Indian lands in Arizona. He also gave lectures to conservation classes at Arizona State College and Arizona State University, and talks to various organizations.

He attended at Los Angeles, while there for the American Mining Congress convention, a meeting of the representative of mining agencies of the western states, at which it developed that Arizona allows its agencies less in relation to its mineral output value than nearly all of the others.

Department assistance was given to state agencies concerned with property tax study, welfare, park areas, rights-of-way, industry development, economic research, and employment; to Federal agencies concerned with public lands, mining, statistics and area development; and to the many companies and individuals in and out of the state seeking mining information.

Publications

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

Copper Industry - Statistics for 1962 Compared with Other Years - Arizona, United States and World.

Lead and Zinc Industry - Statistics for 1962 Compared with Other Years - Arizona, United States and Free World

The Gold and Silver Industries in the World, United States and Arizona.

Mine Taxation in Arizona, Statistical Analysis for Year 1963.

Preliminary Estimate of Copper, Lead, Zinc, Gold and Silver Production in Arizona and the United States, in 1963.

Review of Copper Industry in 1963.

Inventory of Arizona Lands, as of June 30, 1963.

Arizona Wage Statistics and Copper Output, Base Period (1947-49) Compared with Period 1961-63.

The department booklet, Mining in Arizona was revised and republished, the previous edition having been exhausted.

The following papers were compiled and mimeographed:

Active Mine List, October, 1963.

Active Mine List, April, 1964.

List of Arizona Fluorspar Properties.

Bibliography of Some Arizona Mineral Districts which have Zinc Production Records or Possibilities.

Revised List of Arizona Registered Mining Engineers.

Revised Directory of State and Federal Agencies in Arizona of Interest to Mining.

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 28,740 miles, attended 130 meetings of the Arizona Small Mine Operators Association, made 277 mine visits, and discussed mining problems with individuals on 1754 occasions - 397 in the field, 692 in the office and 665 by telephone. They also answered 186 mail inquiries. Their miscellaneous services included: Vice-President, program committee chairman, Maricopa Subsection, A.I.M.E.; Chairman and program committee chairman of Phoenix Council, A.S.M.O.A.; lecture at the University of Arizona and talks at various meetings, on the subjects of geology and mining.

There were 1627 visitors and 4535 telephone calls to the department during the fiscal year.

There were approximately 9,800 visitors to the Mineral Museum, exclusive of an estimated 39,500 visitors during the State Fair. Special visits for 1007 school children and special meetings with 1795 total attendance were held in the Mineral Building. The museum curator answered 1108 inquiries and sent out 495 specimen kits to school children.

Receipts and Expenditures - 1963-64.

APPROPRIATION		\$ 77,658.00
EXPENDITURES:		
Personal Services	\$ 52,751.25	
Professional Services	6,875.00	
Travel - State	5,311.34	
Travel - Out of state	566.03	
Current Expenditures:		
Utilities	1,240.03	
Telephone	1,259.53	
Postage	992.00	
Bldg & Equip Mtnc	822.30	
Printing	593.94	
Supplies: Office, etc	1,678.67	
Fixed Charges	245.50	
Subscription & Organization Dues	148.91	
Capital Outlay	954.73	
TOTAL EXPENDITURES		\$ 73,439.23
Balance - returned to General Fund		4,218.77
		<u>\$ 77,658.00</u>

Museum Account 1963-64

Balance brought forward	\$ 285.16
Expenditures	\$ 255.43
Balance	<u>29.73</u>
	<u>\$ 285.16</u>

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA

BOARD OF GOVERNORS

Charles F. Willis, Phoenix - Chairman
(term expires January 31, 1966)

Stanley M. Secrist, Tucson
(term expires January 31, 1965)

Raymond L. Dye, Kingman
(term expires January 31, 1968)

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

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

PERSONNEL

Frank P. Knight	- Director
W. C. Broadgate	- Special Assistant. (Died April, 1964)
E. H. Peplow, Jr.	- Assistant to Director
Axel L. Johnson	- Field Engineer - Southern District
Lewis A. Smith	- Field Engineer - Central District
Ernest G. Williams	- 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)

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 1963, as reported by the U. S. Bureau of Mines were as follows:

660,977 tons copper	@	30.8 ¢/lb	\$ 407,162,000
5,815 tons lead	@	10.8 ¢/lb	1,256,000
25,419 tons zinc	@	11.5 ¢/lb	5,846,000
140,030 ozs. gold	@	\$35.00 /oz	4,901,000
5,373,058 ozs. silver	@	127.92 ¢/oz.	<u>6,873,000</u>
			<u>\$ 426,038,000</u>

This compares with the following final figures for 1962:

644,242 tons copper	@	30.8 ¢/lb	\$ 396,853,000
6,966 tons lead	@	9.2 ¢/lb	1,282,000
32,888 tons zinc	@	11.5 ¢/lb	7,564,000
137,207 ozs. gold	@	\$35.00 /oz	4,802,000
5,454,000 ozs. silver	@	108.49 ¢/oz	<u>5,917,000</u>
			<u>\$ 416,418,000</u>

TABLE II

MINERAL PRODUCTION OF LARGE AND SMALL PRODUCERS IN ARIZONA IN 1963 ^{1/}

Source: U.S.B.M. Area Report for Arizona, 1963

<u>LARGE COPPER PRODUCERS:*</u>		<u>PRODUCTION</u>	<u>VALUE</u>
Copper (lbs.)		1,314,959,892	\$ 405,004,569
Gold (ozs.)		121,177	4,241,195
Silver (ozs.)		4,494,239	5,748,941
Molybdenum (lbs.)(content of concentrate) . .		5,553,000	7,584,000
TOTAL VALUE - LARGE PRODUCERS			<u>\$ 422,578,705</u>
<u>SMALL MINERAL PRODUCERS:</u>			
Clays ^{3/}	thousand short tons	163	\$ 203,000
Copper ^{2/}	lbs.	6,994,108	2,157,431
Gem Stones		^{4/}	120,000
Gold ^{2/}	troy ounces	18,853	659,805
Lead ^{2/}	short tons	5,815	1,256,000
Lime	thousand short tons	181	3,048,000
Natural Gas	million cubic feet	1,334	161,000
Petroleum (crude) . .	thousand 42-gal.barrels	^{6/} 55	^{5/}
Pumice	thousand short tons	800	1,877,000
Sand and gravel . . .	thousand short tons	15,036	14,466,000
Silver ^{2/}	thousand troy ozs.	879	1,124,059
Stone	thousand short tons	3,257	5,069,000
Uranium ore	short tons	150,584	4,844,000
Vanadium	short tons	222	^{5/}
Zinc ^{2/}	short tons	25,419	5,846,000
Values of items that cannot be disclosed: asbestos, cement, clays (bentonite and fire- clay), diatomite, feldspar, gypsum, helium, iron ore, mercury, mica (scrap) perlite, pyrites, and values indicated by footnote 5			^{7/} 17,982,000
TOTAL VALUE - SMALL PRODUCERS			<u>58,813,295</u>
TOTAL - ALL PRODUCERS			<u>\$ 481,392,000</u>
Percentage due to small mines			12.22

- ^{1/} Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
^{2/} Recoverable content of ores, etc.
^{3/} Excludes bentonite and fire clay; included with "Value of items that cannot be disclosed."
^{4/} Weight not recorded.
^{5/} Figure withheld to avoid disclosing individual company confidential data.
^{6/} Preliminary figure.
^{7/} Value of metals and mineral fuels, \$2,320,000; value of nonmetals \$15,662,000.

* Phelps Dodge (Morenci, New Cornelia, Bisbee), Kennecott, Inspiration (Inspiration, Christmas), Miami, Magma (Magma San Manuel), Asarco (Silver Bell, Mission), Pima, Bagdad, Duval and Banner.

TABLE III

ARIZONA'S METAL PRODUCTION
Source: U.S. Bureau of Mines

	GOLD Ozs.	SILVER Ozs.	COPPER Lbs.	LEAD Lbs.	ZINC Lbs.	TOTAL VALUE
1954	114,809	4,298,811	755,854,000	16,770,000	42,922,000	\$ 237,818,952
1955	127,616	4,634,179	908,210,000	19,634,000	45,368,000	355,928,786
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

TABLE IV

RELATIVE 1963 PRODUCTION

	U. S.	ARIZONA			LEADING STATE	
			% of U.S.	Rank in U.S.		
Gold -ozs.	1,454,010	140,030	9.63	3rd	S. Dakota	576,726
Silver-ozs.	35,242,000	5,373,058	15.25	2nd	Idaho	16,710,725
Copper-tons	1,213,166	660,977	54.48	1st	Arizona	660,977
Lead -tons	253,369	5,815	2.30	5th	Missouri	79,844
Zinc -tons	529,254	25,419	4.80	9th	Tennessee	95,847

TABLE V

COPPER, GOLD, SILVER AND MOLYBDENUM RECOVERED

FROM MINES IN ARIZONA IN 1961, 1962, and 1963.

Source: U.S.B.M. Area Reports

	<u>1961</u>	<u>1962</u>	<u>1963</u>
Tons copper concentrating and leaching ore mined	71,332,364	78,436,804	80,615,132
% Copper in ore (estimated)	0.86	0.89	0.90
Tons direct smelting copper ore	586,627	431,263	468,210
% Copper in ore (estimated)	3.92	4.20	3.79
TOTAL TONS COPPER ORE MINED	71,918,991	78,868,147	81,083,342
Ozs. gold recovered from all copper ores mined	129,184	117,362	121,177
Ozs. silver recovered from all copper ores mined	4,380,455	4,571,370	4,494,239
Lbs. molybdenum recovered from all copper ores mined	4,878,000	4,412,000	5,553,000
Lbs. copper recovered from all copper ores mined including all clean-up	1,092,858,200	1,201,172,000	1,226,472,100
Lbs. copper recovered from mine waters	<u>68,698,300</u>	<u>73,215,900</u>	<u>91,149,000</u>
TOTAL LBS. COPPER RECOVERED FROM ALL COPPER MINES	1,161,556,500	1,274,387,900	1,317,621,100
TOTAL LBS. COPPER RECOVERED FROM OTHER MINES	<u>12,549,500</u>	<u>14,096,100</u>	<u>4,332,900</u>
GRAND TOTAL LBS. COPPER RECOVERED FROM ALL MINES	1,174,106,000	1,288,484,000	1,321,954,000

TABLE VI
ACTIVE MINES IN ARIZONA

<u>Mines</u>	<u>During 1963*</u>	<u>April 1963**</u>	<u>April 1964**</u>
Copper	34	30	34
Copper, with lead or zinc	4	5	5
Lead and/or zinc	<u>13</u>	<u>10</u>	<u>10</u>
Sub-total	<u>51</u>	<u>45</u>	<u>49</u>
Dry gold lode	4	4	1
Dry gold-silver lode	8		
Dry silver lode	<u>22</u>	<u>3</u>	<u>3</u>
Sub-total	<u>34</u>	<u>7</u>	<u>4</u>
Gold placer	4	2	1
Uranium		3	2
Silica		6	6
Asbestos		2	3
Gypsum		3	3
Lime, limestone, cement		5	6
Marble		6	7
Perlite		2	2
Bentonite		1	1
Mica		1	1
Diatomaceous earth		1	1
Feldspar		1	1
Iron ore or concentrate		2	1
Sand, rock and stone	<u> </u>	<u>Listing incomplete</u>	
TOTALS	89	87	88

* Source: U. S. Bureau of Mines

** Source: Department of Mineral Resources lists