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Department of Mineral Resources

DEPARTMENT OF MINERAL RESOURCES STATE OF ARIZONA

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OFFICES:

Mineral Building, State Fairgrounds, Phoenix (Main Office)

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To the Honorable Paul Fannin Governor of Arizona Capitol Building Phoenix, Arizona

Dear Governor Fannin:

I herewith submit the Annual Report of the Department of Mineral Resources, covering the fiscal year July 1, 1959 to June 30, 1960.

Respectfully yours,

Frank P. Knight

FRANK P. KNIGHT,

Director.

EXCERPTS FROM THE LAW CREATING THE ARIZONA

DEPARTMENT OF MINERAL RESOURCES

"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 with a view to 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 such other investigations as 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 such information and data as may be 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 turn over to said Bureau such problems as the field work of the division may show to be within the scope of the activities of said Bureau.

Cooperate with federal and other agencies having for their purposes the development of mines and minerals.

Work against all congressional acts favoring reciprocal or duty free imports of foreign materials.

Do such other things as may assist the more extensive exploration and development of the Mineral Resources of the State."

ARIZONA MINING

PRODUCTION

Based on U. S. Bureau of Mines reports for 1959 output, Arizona ranked first in copper production in the United States (including Alaska), as it has done since 1910. It ranked 2nd in silver, 4th in zinc, 5th in gold, and 6th in lead.

Arizona production and value of the five principal metals in 1959, as reported by the U. S. B. M., were as follows:

9,999 37,325 124,627	tons copper tons lead tons zinc ozs.gold ozs.silver	@ @ @ @	30.7 ¢/lb 11.5 ¢/lb 11.5 ¢/lb \$ 35.00 /oz 90,5+ ¢/oz	\$ 264,202,000 2,300,000 8,585,000 4,362,000 3,528,000
				\$ 282,977,000

This compares with the following final figures for 1958:

485,839 tons 11,890 tons 28,532 tons 142,979 ozs. 4,682,580 ozs.	lead @ zinc @ gold @	\$ 26.3 ¢/lb 11.7 ¢/lb 10.2 ¢/lb 35.00 /oz 90.5+ ¢/oz	\$ 255,551,314 2,782,260 5,820,528 5,004,265 4,239,781
			\$ 273,398,148

Following are tables showing:

- 1. Mineral Production of Large and Small Producers in Arizona in 1959.
- 2. Arizona Metal Production, with ten year figures for the five principal metals.
- 3. Relative 1959 Production in the United States for the five principal metals.
- 4. Copper, Gold, Silver and Molybdenum Recovered from Mines in Arizona in 1957, 1958 and 1959.

MINERAL PRODUCTION OF LARGE AND SMALL PRODUCERS IN ARIZONA IN 1959 *

LARGE COPPER PRODUCERS 1/	PRODUCTION	VALUE
Copper (1bs.)	841,153,000 100,000 2,850,000 3,181,000	\$ 258,234,000 3,500,000 2,579,000 4,019,000 \$ 268,332,000
SMALL MINERAL PRODUCERS:		
Clays2/ (short tons) Coal (short tons) Copper(recoverable content of ores,etc.)(lbs.) Gem stones Gold(recoverable content of ores,etc.)(troy ozs) Lead(recoverable content of ores,etc.)(lbs.) Lime (short tons) Manganese ore and concentrate (35% or more Mn) (gross wt.)(short tons) Manganiferous ore & concentrate(5-35%Mn)(gross s.t.) Mercury (76-lb. flasks) Mica (scrap)(short tons) Pumice (short tons) Sand and Gravel (short tons) Silver(recoverable content of ores,etc.) (troy ozs.) Stone (short tons) Uranium Ore (short tons)	10,693 (3) 3,069 487,000 13,458,000	179,000 63,000 5,968,000 88,000 2,300,000 1,666,000 5,727,000 234,000 (3) 55,000 1,153,000 11,966,000 949,000 3,998,000 6,309,000
Zinc (recoverable content of ores, etc.)(lbs.) Value of items that cannot be disclosed: Asbestos, cement, clays (bentonite), feldspar gypsum, perlite, pyrites, petroleum, vanadium, and values indicated by footnote 3	74,650,000	9,837,000
Total Value of Small Mine Production 5/ GRAND TOTAL VALUE OF MINERAL PRODUCTION		\$ 58,556,000 \$ 326,888,000
PERCENTAGE DUE TO SMALL MINES		17.91%

FOOTNOTES:

4/ Weight not recorded.

^{1/} Phelps Dodge, Kennecott, Inspiration, Miami, Magma, A.S.&R.Co's Silver Bell, Pima, Bagdad and Duval's Esperanza.

^{2/} Excludes bentonite; value included with "Items that cannot be disclosed."

^{3/} Figure withheld to avoid disclosing individual company confidential data; value included with "Items that cannot be disclosed".

^{5/} Total has been adjusted to eliminate duplication in the value of raw materials used in the manufacture of cement and lime.

^{*} Compiled from U. S. B. M. Area Report D-106, July 1960 - Final Figures 1959.

ARIZONA'S METAL PRODUCTION

Source: United States Bureau of Mines

	GOLD ozs.	SILVER ozs.	COPPER 1bs.	LEAD 1bs.	ZINC lbs.	TOTAL VALUE
1950 1951 1952 1953 1954 1955 1956 1957 1958	118,313 116,093 112,355 112,824 114,809 127,616 146,110 152,449 142,979 124,627	5,325,441 5,120,985 4,701,330 4,351,429 4,298,811 4,634,179 5,179,185 5,279,323 4,684,580 3,898,336	808,602,000 831,740,000 791,438,000 787,050,000 755,854,000 908,210,000 1,011,816,000 1,031,708,000 971,678,000 860,594,000	52,766,000 34,786,000 33,040,000 18,856,000 16,770,000 19,634,000 23,998,000 24,882,000 23,780,000 19,998,000	120,960,000 105,998,000 94,286,000 55,060,000 42,922,000 45,368,000 51,160,000 67,810,000 57,064,000 74,650,000	\$ 201,033,694 235,289,045 220,686,278 242,572,489 237,818,952 355,928,786 450,599,680 332,081,963 273,398,148 282,977,000

RELATIVE 1959 PRODUCTION

	United States	Arizona	Arizona %	Arizona's Place	Leading Sta State	te in the U.S.A. Production
Gold - ozs	1,603,802	124,627	7.77	5th	So. Dakota	577,730
Silver - ozs	31,194,098	3,898,336	12.50	2nd	Idaho	16,636,486
Copper - tons	824,846	430,297	52.17	1st	Arizona	430,297
Lead - tons	255,586	9,999	3.91	6th	Missouri	105,165
Zinc - tons	425,303	37,325	8.78	4th	Tennessee	89,932

COPPER, GOLD, SILVER AND MOLYBDENUM RECOVERED

FROM MINES IN ARIZONA IN 1957, 1958. AND 1959

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

	1957	1958	1959
Tons copper concentrating and leaching ore mined	58,948,055	55,805,752	
% Copper in ore (estimated assay)	0.910	0.933	
Tons direct smelting copper ore	623,779	450,057	
% Copper in ore (estimated assay)	5.380	5.932	
TOTAL TONS COPPER ORE MINED	59,571,834	56,255,809	53,121,545
Ozs. gold recovered from all copper ores mined	123,375	114,262	96,153
Ozs. silver recovered from all copper ores mined	4,088,618	3,543,044	2,724,701
Lbs. molybdenum recovered from all copper ores mined	2,385,000	2,320,000	2,659,000
Lbs. copper recovered from all copper ores mined	947,840,100	913,973,800	803,087,000
Lbs. copper recovered from mine waters	75,180,700	53,129,500	48,610,000
TOTAL LBS. COPPER RECOVERED FROM ALL COPPER MINES	1,023,020,800	967,103,300	851,697,000
TOTAL LBS. COPPER RECOVERED FROM MINES OTHER THAN COPPER	8,687,200	4,574,700	8,897,000
GRAND TOTAL LBS. COPPER RECOVERED FROM ALL ARIZONA MINES	1,031,708,000	971,678,000	860,594,000

ACTIVE MINES

The Department's active mine list in February, 1960, consisted of 43 copper properties, 3 copper combined with lead or zinc, 7 lead and/or zinc, 18 uranium, 15 gold and/or silver, and 4 quicksilver, for a total of 90 metal mines. There were 52 active producers of non-metallics, consisting of 13 sand, rock, building stone and flagstone, 8 silica, 10 asbestos, 2 gypsum, 4 lime, limestone and cement, 3 marble, 4 perlite, 2 bentonite, 2 mica and one each of feldspar, salt, guano, and diatomaceous earth.

During the year 1959, the State Mine Inspector reported inspection of 47 copper mines, 17 lead and/or zinc, and/or copper, 37 manganese mines, 29 uranium, 11 asbestos mines. 17 other metallic mines and 26 other non-metallic mines, a total of 184.

The U. S. Bureau of Mines reported production, during the calendar year 1959, from 41 copper mines, 5 copper-zinc, 10 lead, 5 lead-zinc and 1 zinc mine. It also reported production of copper precipitates from 13 mines, and gold and silver from 38 lode mines shipping fluxing ores to the 8 copper smelters in Arizona.

EMPLOYMENT

The Arizona Employment Security Commission reported for 1959 that there were employed in mining and quarrying a total of 13,680 covered employees with total wages of \$83,038,890, and an average wage of \$6,070. Smelting employment brought the grand total payroll to \$91,477,996 with an average of 15,205 covered employees, earning an average of \$6,016 per year. Fringe benefits are not included in these figures, but are estimated to amount to over 25 percent of the regular payroll.

COPPER

The copper industry in Arizona accounted for over half of the United States production in 1959. It began the fiscal year 1959-60 with a threat of strikes hanging over its head. The strikes materialized and a substantial decline in output resulted from the inactivity of a number of the major copperproducing mines during mid-August to early February. The strikes at some of the mines, mills and smelters were called because the operating companies and the International Union of Mine, Mill and Smelting Workers, the United Steelworkers of America, and other local unions were unable to reach agreements on new labor contracts to replace the Mine-Mill 1956 contract which terminated June 30th, the Steelworkers' 1956 contract terminated July 31. 1959, and others. Operations idled by these strikes included the Copper Queen and Morenci Branches of the Phelps Dodge Corporation, Ray Mines Division of the Kennecott Copper Corporation, and the Magma and San Manuel properties of Magma Copper Company. Other copper mining and milling operations, both large and small, were forced to stockpile ore or concentrate at the mines and mills, or else curtail or stop production, for the duration of the respective strikes which shut down the particular smelters to which they usually shipped.

The first six months of the fiscal period (which embraced five months of strike conditions) production of copper in Arizona averaged only about 23,000 tons per month, whereas the last six months averaged over 43,000 tons.

The producers' price of copper held steady at 33 cents per pound from November to beyond the close of the fiscal year.

Several new developments of importance to the State's copper industry occurred during the fiscal year 1959-60.

American Smelting and Refining Company completed its 5-year exploration program at the Mission Project, and on July 28, 1959 the Board of Directors authorized an expenditure of \$43.5 million to bring the property into production in the next 3 years. An annual output of 45,000 tons of copper was planned.

Inspiration Consolidated Copper Company continued its development of the Christmas Mine, and plans a production of 4,000 tons of ore daily or 36 million pounds of copper annually - starting in 1962.

Kennecott Copper Corporation has completed its expansion program at Ray and Hayden, and is now ready to produce an additional 20,000 tons of copper annually. It also is continuing its exploration and development program at Safford.

Phelps Dodge Corporation continued its exploration work in the Safford area. American Metal Climax, Inc. stopped its work on optioned claims in the eastern part of this copper area to the north and northeast of Safford.

Miami Copper Company abandoned underground mining at the Miami mine but continued extracting the remaining recoverable copper by in-place leaching in the mined-out areas. Although fewer pounds of copper would be produced annually from this operation, the per pound cost of this copper should be lower. The Company's water leaching of the old waste dumps at the Castle Dome Division, and the mining and milling at the Copper Cities Division continued at the same level as formerly.

Phelps Dodge Corporation has been engaged in enlarging its Lavendar Pit at Bisbee to the southeast, and will eventually deepen the pit beyond the limits planned when initial operations began in 1954. According to the Company, the enlargement will result in a total remaining operating life & of about 15 years.

Bagdad Copper Corporation announced plans for a \$2 million leaching plant to produce copper from its oxide ore stockpile. The company expects to recover 40,000 pounds of cement copper per day by this operation. It will make its own sulfuric acid for leaching copper by burning sulfur.

In November, Pima Mining Company consummated an agreement with the neighboring Banner Mining Company under which Pima will enlarge its pit to include an adjoining portion of the Banner property and will mine and mill this adjoining ore for Banner at approximate cost.

Banner Mining Company sank its 5 compartment, vertical Palo Verde shaft 1020 feet. It expects to have this shaft in full operation in 1962.

Other copper prospecting in the "hot" area south of Tucson was actively carried on. Some of it entered Tucson Mountain Park and mining lost out

in its attempt to induce the Secretary of the Interior to stand on his published order to open the mineralized section of this park to further mineral entry and thus to multiple use including mining. Near the close of the fiscal year, location of claims and prospecting work at the south end of the Tucson Mountains on stock-raising homesteads subdivided for residences, aroused realtors and owners to vociferant protest. These homesteads carry surface rights only, the minerals being reserved to the Federal Government along with the right to prospect for, mine and remove them. The miner must pay for damages to permanent improvements, crops or grazing.

Copper exploration including some diamond drilling was carried on in other areas, including the southern part of the Dragoon Mountains, Ithaca Peak north of Kingman, Courtland district, near Salome, and Naco Hills, west of Bisbee.

Hunting Geophysical Services, Inc. of New York, proceeded under a prospecting permit covering the San Carlos Indian Reservation.

Leaching operations were started by Paramount Mining Company at the Mame mine in the Courtland district; and by Chilson Mining Company at the De Soto Mine in the Peck District. Dump leaching at Jerome and leaching at the Carlotta mine west of Miami were discontinued.

The Commercial mine in the Copper Basin district, operated by Fred Schemmer, discontinued shipping in the spring of 1960.

McFarland and Hullinger operated the Republic and Moore mines (copper-zinc) at Johnson Camp. They also mined high silica copper ore at the Elgin mine at Helvetia and started exploration for copper at the Three R mine near Patagonia.

Strong and Harris, Inc. shipped high silica copper ore from the Burro claims at Johnson Camp.

C. D. Wilson and Company shipped high lime ore from the Narragansett mine near Helvetia.

Cyprus Mines Corporation continued operations at the Old Dick mine near Bagdad, and has added a substantial quantity of copper to the State's output. It also started sinking a shaft on its adjacent Copper Queen property.

Transarizona Resources, Inc. started trial runs at its open-pit copper mine and plant 28 miles south of Casa Grande, using a new segregation process for treating oxidized and mixed oxide-sulfide copper ores.

At the close of the fiscal year free world copper production was at record level and in excess supply. Uncertainties of the African unrest and Chilean strike prospects were believed to be holding the price up.

LEAD-ZINC

Lead and zinc mining activities in the United States have a well known habit of varying with the respective price levels.

The lead price of 12 cents per pound at the start of the fiscal year increased to 13 cents then fell back to 12 cents at the end of 1959. It has stayed there since. Lead mine production showed little change and consumer buying continued to be slack. However producers' stocks of refined lead fell off about 5% and consumers' stocks declined about 20% during the fiscal year.

The zinc price rose from 11 cents per pound on July 1, 1959 to 12½ at the end of 1959. Early in January it went up to 13 cents and has stayed there since. Zinc production was fairly steady and domestic deliveries fell off a little during the year. Smelter stocks of slab zinc rose from 169,400 tons July 1, 1959 to 187,700 tons June 30, 1960.

Lead-zinc quotas for nearly two years had failed to revive the domestic industries and the Emergency Lead-Zinc Committee continued active in seeking Government relief. An emergency lead-zinc products hearing was held early in the year by the Tariff Commission and no action followed. The Commission also held senate requested lead-zinc hearings in early 1960 and reported with no recommendations in April. A two-man minority of the Commission recognized industry distress and recommended increase of present tariffs.

The department prepared a statement for this hearing showing that in the period 1948 to 1952 there were in Arizona 128 lead-zinc mines with average annual production value of \$24,781,254. and in the period 1953 to 1958 there were only 36 mines with average annual production value of \$9,174,052.

At the end of the fiscal year there were only 12 active lead and or zinc mines of which only 4 employed more than 10 men. The total employed was 376, one more than at the beginning of the year. The Iron King mine of the Shattuck-Denn Mining Corporation continued to be by far the largest Arizona producer of both lead and zinc.

The San Xavier mine, long a major Arizona lead-zinc producer, was closed by McFarland and Hullinger, who had started work at the Republic and Moore shafts at Johnson Camp. Later in the year the San Xavier mill at Sahuarita, which had been treating Johnson Camp ores, was closed and the ore was then treated at the Johnson Camp mill.

Other lead-zinc producers which shut down during the fiscal year were the Glove mine near Amado, McCracken mine and mill near Signal, and the Illinois and Venados mines near Washington Camp.

Bills for lead-zinc relief by subsidies, lowering import quotas, and raising tariffs were introduced but none reached the floor during the fiscal year, excepting the Edmundson subsidy bill which passed the House in June, 1960 and was later vetoed by the president.

URANIUM

The value of Arizona's 1959 uranium production was \$6,309,000, 10 percent lower than that for 1958, and uranium ranked fourth among minerals in importance to the State, behind copper, sand and gravel and zinc.

Although production from the Cameron district declined sharply during the fiscal year 1959-60, the Orphan Mine of Western Gold and Uranium, Inc.

completed its shaft development and stepped its production up from about 5,000 to around 7,500 tons per month. This took up the slack and allowed the Rare Metals Mill at Tuba City to operate at a normal rate during the entire year.

The Vanadium Corporation of America, Climax Uranium and Industrial Uranium companies continued to account for most of the uranium ore output in the northeastern section of the State. The Anderson mine in southwest Yavapai County and the Little Joe in the Workman Creek area of Gila County shipped some ore to Tuba City and some 10,000 tons stockpiled by the Atomic Energy Commission at the Cutter buying station were shipped there also. However, Apache, Coconino and Navajo counties produced well over 90 percent of the total for the State. The number employed in the Arizona industry at the end of the year was about the same as at the beginning, approximately 400.

MANGANESE

Termination of the government purchasing program in August, 1959, brought an end to the State's \$6 million per year manganese industry. Mohave Mining and Milling Company subsequently operated its mill and sintering plant for the time needed to clean up inventory stocks and to fill its contract obligations. It announced in December, 1959 that it would liquidate. The other producers shut down. Some kept their properties intact, pending the outcome of endeavors at Washington to secure extended government support. These endeavors persisted through the fiscal year but were unproductive.

During the spring of 1960, Century Mining Company began construction of a 200 ton manganese mill at Bouse.

GOLD - SILVER - MOLYBDENUM

Practically all of Arizona's output of these metals was recovered as byproduct of copper, lead and zinc mining.

Although no significant amount of gold was produced from straight gold mining, the continued outflow of United States gold stimulated a fair amount of both lode and placer exploration and development. Glendel Mining Company started a long adit for the purpose of reopening the old Congress Mine, one of the largest of Arizona's gold mines. The Bald Eagle mine in the Oatman region continued development work until it was forced to shut down. Toward the end of the fiscal year, the King Midas Gold Mining Company began rehabilitation and development work at the Gold Key. McDonald Construction Company built a dry concentration plant at its Golden Sands property and spent most of the year on pilot test work. The Loma Grande Company recovered a small amount of gold by gravity treatment at its Little Butte and adjoining claims near Bouse and shut down towards the end of the year. Testing of dry concentration of the Applington placer deposit in Yuma County was carried on for a time. Small placer operations were reported in the Hassayampa and Plomosa areas. Construction of a mill was started at the White Peak mine in the Hieroglyphic Mountains.

The steady decline in the U.S. free silver stock stimulated search for silver also. F.J. Frankovich carried on exploration work at the Vizina shaft at Tombstone. Exploration work by the Swastika Silver Copper Mining Company at the Swastika mine west of Cleator was suspended in June but will be

resumed. The silver situation also influenced some of the lead mine developments such as the McCracken.

MERCURY

Arizona mercury mining activity in the year 1959-60 was almost entirely in the Mazatzal Mountains. The Rattlesnake mill operated periodically with ores from the Bernice, Rattlesnake and Pine Mountain mines. Other mines worked were the Mercuria, Oneida, Red Bird and Ward; and the Bolich and Carlson Mills produced some quicksilver.

IRON

There was no reported Arizona iron production in the fiscal year but exploration activity increased and Webb & Knapp, Inc. announced that a 500-ton-per-day steel plant would be built at Clarkdale to make steel from the 10 million tons of iron in the copper slag from the old Clarkdale smelter. A 120,000 acre section in the northwest corner of the Fort Apache Indian Reservation was opened for prospecting permit bids because of interest shown in this area. Deposits in this section had been investigated, with some diamond drilling, by the U. S. Bureau of Mines during World War II. The Gillespie hematite deposit west of Young was explored by some drilling. P. Feeney of Pierre, South Dakota, and associates leased the Omega Iron Placer deposit early in 1960 but had not started operations at the end of the fiscal year. Research into the recovery of iron from placer magnetite deposits in the Hope and other areas, was carried on during the year, with encouraging progress reported.

Japan resumed purchasing of U.S. iron ores of western states during the year and interest in Arizona iron was stimulated thereby.

OTHER METALS

A beryllium detector using an atomic energy source and positive in its identification stimulated interest in prospecting for beryllium ores. The government still is interested in stockpiling reserves of this important light metal.

Arizona's tungsten mines remained closed. Treatment of Mexican ores at the Phoenix mill of Tungsten Refining Company stopped during the year.

NON-METALS

Cement production was started at the new Clarkdale plant of the Phoenix Cement Company, built to supply the Glen Canyon dam project.

Pozzolan material (pumice) began to be ground and shipped by the Standard Gilsonite Company at its new plant north of Flagstaff. A large amount of of this material will be used in the Glen Canyon Dam concrete.

Asbestos mining was severely curtailed when government buying stopped at the close of the previous fiscal year. Left with a limited, competitive market for the high grade fibres they were equipped to produce, the

producers were faced with expansion to process and market other grades of fibre they were mining along with the higher grades and wasting. Metate Asbestos Corporation built the first Canadian-type mill at Globe for this purpose. Jaquays Mining Corporation followed with a new mill near Metate's and the LeTourneau Asbestos Corporation built another across the highway from the others. Phillips Asbestos Company planned to install similar equipment. In the last half of the year, the Government called for bids on 500 tons of domestic No. 2 crude, soft,low-iron chrysotile, available only from the Globe area, for the National stockpile. Three producers had bids accepted with an average price of \$918.30 per ton.

Stone production value in 1959 increased to \$3,998,000 from \$2,731,000 in 1958. Production of oranmental stone increased, as did its interest and prospecting.

The Superior Perlite mine and mill were acquired by Harborlite Corporation of California and some filter size perlite was produced.

Silica flux deposits were the objects of increased prospecting during the fiscal year, and new quarries were opened at Johnson Camp, Orizaba mine south of Casa Grande and elsewhere.

The capacity of the Houck plant of the Arizona Silica Sand Company was increased about 400 percent.

American Diatomes, Inc. made several test runs in their improved plant for processing diatomaceous earth from the Whitecliffs mine east of San Manuel.

James Stewart Construction Company of Phoenix stopped production of <u>sericite</u> at its Charleston mine and mill for an indefinite period.

Tucson Mica Company built a small mill and produced a small amount of flake mica from its leased property about 50 miles north of Tucson.

Alba Mining Company resumed strip mining of bleaching clay at the Cheto property east of Sanders, having shipped its considerable stockpile at Sanders siding.

Fluorspar interest during the fiscal year was slight. Resumption of government support was sought at Washington but none was obtained.

Other non-metallics produced in Arizona in the fiscal year were lime, which fell off partly due to the copper strikes; gem stones; feldspar, crushed marble; guano; gypsum; pumice (scoria); clays; coal; and sand and gravel, which increased 20% in value over 1958-59 and was second in value to copper in 1959-1960.

The U. S. Bureau of Mines reported 27 oil and gas wells completed in 1959, of which 4 were successful, 1 oil, 2 gas, and 1 oil and gas. These four were all in the extreme northeast corner of the State. Approval for a 10,000-barrel-a-day oil refinery in Yavapai County was given the Bishop Oil and Exploration Company by the County.

Several wells were drilled for helium in the Pinta Dome area.

DEPARTMENT ACTIVITIES

The purposes and objectives of the department are described in the excerpts from the Arizona statutes set forth on page 3 of this report. All of them are incident to the prime objective, increased exploration and development of the mineral resources of the State. Because the small prospector and the small mine operator are important, having had a part in the discovery and development of practically all of our mines, both large and small, much of the department activity is directed towards them.

This department has over 3,000 individual files of Arizona mining properties, a library of books and maps relating to the State's mineral properties and mining activity, and a file of approximately 17,000 cards with mining information or references thereto. These files and the library are in constant use by or for the benefit of those interested in Arizona mining.

The department has three field engineers all of whom are registered professional mining engineers. These men are available for consultation either at the department's Phoenix or Tucson office or at local Section meetings of the Arizona Small Mine Operators Association which they regularly attend for the purpose of both giving and obtaining mining information. The field engineers at times also are available for brief preliminary mine examination. During the fiscal year they travelled 35,526 miles, attended 164 A.S.M.O.A. meetings, made 281 visits to mining properties, held 541 individual mining conferences while in the field, 732 while in the office, and 798 over the phone. They also answered 240 mail inquiries. In addition they compiled map and file information and lists of active mines (2) and of non-metallic mineral properties; investigated alleged destruction by mineral exploration activity of surface resources in the Kingman and Safford areas; conferred with interested agancies and parties regarding restoration of the San Carlos strip, use of lead base paints in highway striping, leasing activities on Indian reservations, proposed changes in State mineral leasing laws, problems created by Public Law 167, providing for multiple use of public lands, effect of other newly passed laws relating to mining, proposed new Federal legislation affecting mining, abandonment of part of Southern Pacific Railway lines in Cochise County, and abuses of mining rights; attended a two-day hearing on reopening to mineral entry a mineralized area of Tucson Mountain Park; gave special talks on gold and geology at Phoenix A.S.M.O.A. meetings; acted as secretary, and program chairman of that organization and as secretarytreasurer and member of the program committee of the Maricopa Subsection of the A.I.M.E.; attended division meetings of the A.I.M.E., safety and watershed meetings; and hearings on proposed new State mineral leasing laws February 5th and 16th and on placer mining locations in Tucson suburbs on March 16th and 17th.

The department kept in close touch with mining legislation and developments at Washington through its special assistant, who worked particularly on extension of government purchase programs for manganese, fluorspar, beryl, columbium-tantalum and asbestos; on proposed gold and silver legislation; on lead-zinc subsidy, quota and tariff proposals; administration policies regarding mining claims and mineral entries in the public domain including withdrawals thereof; on mineral locations with prediscovery rights; against National Stockpile sales and reduction of depletion allowances, on National Mineral Policy; and on individual mining cases.

The director continued as secretary of the Western Governors' Mining Advisory Council and attended the meeting of that body at Sun Valley, Idaho in July, 1959. He also is a member of the Committee for a National Mineral Policy and chairman of the Maricopa subsection of the A.I.M.E. After attending the American Mining Congress meeting at Denver in September, 1959, the department funds were insufficient to permit his appearance at mining hearings by Congressional Committees and the Tariff Commission, or at the Seattle meeting of the Western Governors' Mining Advisory Council.

The director testified at the Tucson Mountain Park hearing by the Secretary of the Interior on October 29-30, the hearing at Globe on February 10, 11 on the return of the San Carlos Strip to the San Carlos Apache Tribe, and State Land Department mineral leasing law hearings on February 5 and 16.

The administrative assistant, a former employee of the U. S. Bureau of Land Management, continued to be of considerable help to many with mineral land problems, and attended Phoenix land hearings by U. S. Senator Moss and by the Bureau of Land Management.

The statistical department issued the following reports, its mailing list consisting of over two hundred companies, legislators, agencies, banks, newspapers, individuals and libraries:

July 1, 1959 to December 31, 1959 Inclusive:

Digest of "Severance Taxes" as discussed by A. B. Parsons, Consulting Engineer, in "Taxation of Mining Enterprise" (1950).

By Counties - Final Valuation of all Properties Assessed to Producing Mining Companies for the year 1959 as reported by Arizona State Tax Commission, June 1959.

Arizona Mine Production of Copper, Lead, Zinc, Gold and Silver (1858-1958 Incl. - In Terms of Recoverable Metals.)

Mine Production of Gold, Silver, Copper, Lead and Zinc in Arizona, in the year 1958, by class of ore in terms of Recoverable Metals.

Mineral Production of Large and Small Producers in Arizona in 1958.

Copper, Gold, Silver and Molybdenum Recovered from Mines in Arizona in 1957 and 1958.

U. S. Copper Statistics for first six months of 1959, compared with annual figures for other years.

Lead Industry in 1958 and first six months of 1959.

Zinc Industry in 1958 and first six months of 1959.

Mine Taxation in Arizona.

Gross Copper Content of all Arizona Copper Ores, 1949-58. Copper Recovered from all Arizona Copper Ores, 1949-58. Comparative Copper Recoveries by periods from 1910-58. Metal Production of Principal lead-zinc Mining Districts, 1956-58.

January 1, 1960 to June 30, 1960, Inclusive:

Preliminary Estimate of Copper, Lead, Zinc, Gold and Silver Production in Arizona and the United States, in 1959.

Copper Mining in Arizona.

Wage Statistics and Copper Output - Arizona and United States Copper Mines. Base Period (1947-1949) Compared with 1957-1959 Period. News Release.

The statistical engineer was recognized as an authority on copper and requested to write an annual review of the world copper industry for the magazine Mining World.

Following announcements in the daily papers, American Metal Markets and the Wall Street Journal, copies of several of these papers were widely requested. Copies of a paper entitled "Gold Today", by Travis P. Lane, Field Engineer, were distributed, many upon request.

There were 1,691 visitors and 4,469 telephone calls to the department during the fiscal year.

Exclusive of an estimated 25,000 visitors during the State Fair, there were 10,970 visitors to the Mineral Museum during the fiscal year. 776 school children attended museum classes and, as in the past, transportation prevented attendance by more. 1,918 attended special meetings in the assembly room of the Mineral Building. 130 new mineral specimen were added during the year. Curator Arthur Flagg sent out 411 mineral kits to school children throughout the country. He also answered 701 inquiries regarding minerals.

The large return to the General Fund shown on the following financial statement for the fisca! year was due mostly to the inability to use increased salary appropriation for salary increases, and a reduction in intrastate travel caused by increased office work, reduced mining activity and more than usual sickness.

FINANCIAL STATEMENT

Fiscal Year 1959-60

DEPARTMENT APPROPRIATION		\$ 76,550.00
EXPENDITURES:		
Travel - State Travel - Out of State Current Expenditures: Utilities Tel & Tel Postage Bldg & Equipment Mtnce Supplies: Office, etc Fixed charges Subscriptions & Organization Dues Capital Outlay	54,387.72 5,525.64 183.00 889.32 1,222.89 797.20 1,187.38 1,593.93 157.04 73.00 670.30	
TOTAL EXPENDITURES:		\$ 66,687.42
Returned to General Fund		\$ 9,862.58
Deposits: Sale of Regulations and Copper Stories booklets (out of State)		\$ 34.20
MUSEUM ACCOUNT		
BALANCE BROUGHT FORWARD DEPOSITS		\$ 1,219.44 2,700.00 3,919.44
EXPENDITURES:		
Personal Services Employer's share OASI & State Retirement Display cases, display chart & frames for charts & pictures	3,090.00 192.92 413.00	
TOTAL EXPENDITURES:		\$ 3,695.92
Carried forward		\$ 223.52