



EIGHTEENTH
ANNUAL REPORT
OF THE
DEPARTMENT
OF
MINERAL RESOURCES
STATE OF ARIZONA
FOR
JULY 1, 1956 - JUNE 30, 1957

FRANK P. KNIGHT
DIRECTOR

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA

BOARD OF GOVERNORS:

Charles F. Willis, Phoenix - Chairman
(term expires January 31, 1961)

H. F. Mills, Humboldt
(term expires January 31, 1959)

T. J. Long, Globe
(term expires January 31, 1962)

Stanley M. Secrist, Tucson
(term expires January 31, 1960)

Raymond L. Dye, Kingman
(term expires January 31, 1958)

PERSONNEL:

Frank F. Knight - Director
W. C. Broadgate - Special Assistant
A. L. Flagg - Museum Curator
Bayard J. Squire - Field Engineer - Northern District
Axel L. Johnson - Field Engineer - Southern District
Lewis A. Smith - Field Engineer - Central District
Frank J. Tuck - Statistical Engineer
Mrs. Glenn W. Pare - Administrative Assistant
Mrs. George L. Dunagan - Stenographer

OFFICES:

Mineral Building, State Fairground, Phoenix
(Main Office)

Chamber of Commerce Building, Tucson
(Branch Office)

The many favors of the Tucson Chamber of Commerce, including the use at no cost to the State of its office space, are gratefully acknowledged.

To the Honorable Ernest N. McFarland
Governor of Arizona
Capitol Building
Phoenix, Arizona

Dear Governor McFarland:

I am pleased to submit herewith the Annual
Report of the Department of Mineral Resources
covering the fiscal year 1956-57.

Respectfully,

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."

Based on preliminary estimates of 1956 output (according to the U. S. Bureau of Mines), Arizona ranked first in copper production in the United States (including Alaska), as it has done for the last forty-seven years. It ranked fourth in silver, fifth in gold, seventh in lead and eleventh in zinc.

Arizona production and value of the five principal metals in 1956, were as follows: (preliminary figures)

502,400 tons copper	@ 41.9¢ lb	\$421,011,200
11,900 tons lead	@ 16.0¢ lb	3,808,000
25,150 tons zinc	@ 13.5¢ lb	6,790,500
145,500 ozs. gold	@ \$35.00 oz	5,092,500
5,112,000 ozs. silver	@ 90.5+¢ oz	<u>4,626,618</u>
		<u>\$441,328,818</u>

This compares with the following actual figures for 1955:

454,105 tons copper	@ 37.3¢ lb	\$338,762,330
9,817 tons lead	@ 14.9¢ lb	2,925,466
22,684 tons zinc	@ 12.3¢ lb	5,580,264
127,616 ozs. gold	@ \$35.00 oz	4,466,560
4,634,179 ozs. silver	@ 90.5+¢ oz	<u>4,194,166</u>
		<u>\$355,928,786</u>

ARIZONA'S METAL PRODUCTION

Source: United States Bureau of Mines

	GOLD oz	SILVER oz	COPPER lbs	LEAD lbs	ZINC lbs	TOTAL VALUE
1947	95,860	4,569,084	732,436,000	57,132,000	109,288,000	\$ 182,752,537
1948	109,487	4,837,740	750,242,000	59,798,000	108,956,000	196,207,948
1949	108,993	4,790,736	718,020,000	67,136,000	141,316,000	177,894,134
1950	118,313	5,325,441	808,602,000	52,766,000	120,960,000	201,033,694
1951	116,093	5,120,985	831,740,000	34,786,000	105,998,000	235,289,045
1952	112,355	4,701,330	791,438,000	33,040,000	94,286,000	220,686,278
1953	112,824	4,351,429	787,050,000	18,856,000	55,060,000	242,572,489
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*	145,500	5,112,000	1,004,800,000	23,800,000	50,300,000	441,328,818

* Preliminary

RELATIVE 1956 PRODUCTION

Preliminary Figures

	United States	Arizona	Arizona %	Arizona's Place	Leading State	Production
Gold - - oz	1, 814,228	145,500	8.02	5	So. Dakota	573,700
Silver - oz	37,127,149	5,112,000	13.79	4	Idaho	13, 016,280
Copper - tons	1,100,307	502,400	45.66	1	Arizona	502,400
Lead - tons	348,329	11,900	3.42	7	Missouri	122,000
Zinc - tons	537,643	25,150	4.68	11	Montana	71,865

MINERAL PRODUCTION OF LARGE AND SMALL MINING COMPANIES IN ARIZONA IN 1956*

<u>Large Mining Companies:</u>	<u>Production</u>	<u>Value</u>
Copper (lbs.)	981,800,000	\$ 411,374,200
Gold (ozs.)	115,200	4,032,000
Silver (ozs.)	3,541,000	3,204,600
Molybdenum(lbs.)	2,420,000	2,444,200
 Total Value of Large Mine Production		<u>\$ 421,055,000</u>

<u>Small Mining Companies:</u>		
Copper (lbs.)	23,000,000	\$ 9,637,000
Gold (ozs.)	30,300	1,060,500
Silver (ozs.)	1,571,000	1,422,018
Lead (lbs.)	23,800,000	3,808,000
Zinc (lbs.)	50,300,000	6,790,500
Manganese concentrates(35% or more Mn) long tons	38,900	3,644,800
Tungsten concentrates(60% WO ₃ basis) short tons	123	450,000
Mercury 76 pound flasks	100	26,000
Lime (open market) short tons	114,000	1,472,000
Clays " "	270,000	920,000
Mica (Crude) " "	250	1,300
Perlite (Crude) " "	15,500	107,000
Pumice and Pumicite " "	104,000	442,000
Sand and Gravel " "	8,000,000	7,000,000
Stone " "	1,750,000	3,000,000
Coal " "	10,000	1/
Gem Stones	2/	120,000
Undistributed: Asbestos, barite, beryllium concentrate, cement, gypsum (crude), natural gas, vanadium.		11,397,980
 Total Value of Small Mine Production3/		<u>\$ 50,049,000</u>
 GRAND TOTAL VALUE OF MINERAL PRODUCTION3/	<u>\$ 471,104,000</u>
 Percentage due to Small Mines		<u>10.6%</u>

1/ Value included with undistributed.

2/ Weight not recorded.

3/ Total has been adjusted to eliminate duplication in the value of stone.

* Compiled from U.S.B.M. preliminary report of January 18, 1957

Director Manning passed away on December 8th, after eleven years with the Department. His ability and wide knowledge of Arizona mining were a great loss to the State.

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As of July 1, 1957, according to the Department's field engineers, there were 159 active mines in the State, of which 123 were classed as metal mines and 36 non-metallic. Of the 36 non-metallic mines, 7 were asbestos. Of the 123 metallic mines, 42 were copper producers, 18 were manganese, 1 tungsten, 24 lead or zinc producers and 32 uranium. Many of these metal mines produced more than one of these metals.

During the year 1956, the State Mine Inspector reported inspection of 47 copper mines, 15 copper combined with lead or zinc, 12 lead and/or zinc mines, 34 uranium or uranium-vanadium mines, 14 manganese mines, 7 asbestos mines, 4 tungsten mines, 4 gold-silver mines, 4 silica, 3 lime, 2 bentonite, 2 perlite, and one each of mercury, flagstone, feldspar and tuffa; a total of 152 mines or quarries.

The Arizona Employment Security Commission reported for 1956 that there were employed in mining and quarrying a total of 16,439 covered employees with a total payroll of \$94,693,048, and an average annual wage of \$5,760. Smelting employment brought the grand total payroll to \$104,781,308, with an average of 18,189 covered employees, earning an average of \$5,761 per year. Fringe benefits accounted for an estimated 18% of the regular copper mining and smelting payroll bringing the grand total of mining, quarrying and smelting wages to an estimated 122 millions of dollars.

Copper alone accounted for 89.37% of the total value of mineral output in Arizona in 1956. The outstanding gain in copper production and value resulted from increased output by established producers and the first full year of operation of the San Manuel Mine. The average Engineering and Mining Journal price of copper in 1956 was 41.818 cents per pound, as compared with 37.491 cents per pound in 1955.

The price of copper quoted by principal producers at the beginning of 1956 was 43 cents per pound. In the latter part of February this quotation was advanced to 46 cents, the highest level in over ninety years. This price was maintained until July 10, 1956, when buying resistance and foreign competition forced a reduction to 40 cents. A slight slacking of general industrial activity in the last half of 1956, together with a high rate of mine production indicated the development of an over supply. As a consequence the price per pound of copper was reduced further to 36 cents on October 25th, where it remained for the balance of the year.

In June of 1956, agreements were negotiated between principal producers and International Union of Mine, Mill and Smelter Workers. The new pacts were for 3 years and non-reopenable, with pay increases over 3 years and providing new and improved pension plans and better health and welfare benefits. The hourly wages alone for copper miners in Arizona reached \$2.43 in the latter half of 1956. They were due to be raised about 6 or 7 cents per hour in July of this year, and about the same in July of 1958.

Effective February 1st the big producers cut the price of copper to 34 cents, but with stocks continuing to pile up, the price was reduced to 32 cents on February 18th. Finally, on June 19th, the producers slashed their price to $29\frac{1}{4}$ cents, with copper smelters selling their copper for $28\frac{1}{2}$ cents. The Engineering and Mining Journal average price for June was 30.334 cents per pound.

In April, 1957, this Department compiled figures to show that the copper tariff should be re-enacted to provide an excise tax of four cents per pound on copper imports, whenever the price of copper falls below 32 cents. If this had been done, the industry would not now be shutting down its mines and radically curtailing its production in most of the others.

The additional tariff is sought for the chief purpose of keeping United States copper mines producing at their full capacity, for continuous operation is a prime essential for security in war and economy in peace. An operating mine is the best kind of stockpile.

The lead-zinc industry is in even worse condition than the copper industry. It has never recovered from the disastrous slump of 1952-1953, when over 100 Arizona lead-zinc mines were closed down because of low metal prices due to an unprecedented flood of imports from foreign countries. Government stockpiled purchases in 1955 and 1956 helped stabilize the price of lead at 16 cents and the price of zinc at $13\frac{1}{2}$ cents, but this price encouraged only a minor fraction of mines to re-open. At the same time, imports of lead and zinc continued to mount until finally on May 6, 1957, the price of zinc fell to 12 cents, and on May 9th, lead fell to $15\frac{1}{2}$ cents. The price of zinc is now 10 cents per pound, and lead 14 cents. An adequate tariff on both lead and zinc should be adopted before both industries are ruined, a fact which is recognized in the Administration's Long Range Mineral Program recommendation for these tariffs.

Asbestos mines in the Globe area were active until April. Appropriated funds for General Services Administration purchase under Public Law 733 gave out the last of April and some of the mines closed. Eight mines hung on pending final action on further appropriations. In middle July, \$2,500,000 was appropriated for continued buying until July 1, 1958. The industry also was encouraged by the Administration's consideration of a loan to the Apache Indians to assist in establishing a mill to utilize all grades of fiber in producing asbestos for the west coast market. Such a mill could utilize present waste from all asbestos mines and dumps.

38,900 long tons of ore or concentrates containing 35% or more of manganese with a value of \$3,644,800 were shipped under the General Services Administration carlot program, according to the United States Bureau of Mines. That program has a termination date of January 1, 1961, but at present rates, it provides for continuance only to about the end of 1959.

Five Manganese mills were operating at the end of June and one was being constructed. Manganese has become an important Arizona industry through the stimulation of the General Services Administration Wendon Depot buying of low grade manganese ores from 1953 to 1955.

Failure of the House of Representatives to recognize the obligation to provide further funds for tungsten purchases pursuant to Public Law 733 was a serious blow to tungsten producers. Funds ran out in November, 1956, and Arizona's tungsten mines were closed. 123 short tons of tungsten concentrates valued at \$450,000 were shipped in 1956.

Another section of Arizona mining was wiped out by the closing of the Atomic Energy Commission uranium purchasing depot at Cutter the end of June. Large sums had been invested in Gila County uranium properties, largely because of that depot and its closing was strenuously though ineffectively objected to. The 1956 fall-off in prospecting for radioactive minerals continued into 1957.

There has been increased interest in ferrous and non-metallic minerals, particularly iron, lithium, mica, beryl, barite and bentonite.

In general there was considerable drop-off in small operator activity. However, extensive exploration and research, particularly, with respect to copper, was continued by several larger companies.

The field engineers traveled 49,649 miles, attended 108 meetings, visited 384 mines and held 76 conferences. There were 2,177 visitors to the field and Phoenix offices, exclusive of the Museum.

Out of state meetings attended by the Director - The American Mining Congress at Los Angeles, California, and the Western Governors Mining Advisory Council in Reno, Nevada.

At Washington the Arizona members of Congress were furnished information regarding mining in Arizona and elsewhere, particularly with regard to minerals included in Public Law 733. This Department cooperated with various mining organizations and parties in endeavors to advance the economy of the mining industry, especially in Arizona.

The Department published two books in June, "Stories of Arizona Copper Mines" by Frank Tuck and "Laws and Regulations Governing Mining Location in Arizona". The Stories are of general interest and valuable as record as well as promotionally. The Laws and Regulations book is a complete revision by Victor H. Verity of the Department's original edition by J. E. Busch.

It is the first outside of legal publications to cover the recent important changes in laws and regulations governing mining locations.

The statistical department issued the following reports which were sent out to a mailing list of almost two hundred companies, legislators, governmental agencies, chambers of commerce, banks, newspapers and individuals, and to the Capitol Library, as well as other city libraries:

Gross Copper Content of All Arizona Copper Ores, 1946-1955.

Copper Recovered from All Arizona Copper Ores, 1946-1955.

Comparative Copper Recoveries By Periods from 1910-1955.

Metal Production of Principal Lead-Zinc Mining Districts 1952-1955.

Salient U. S. Copper Statistics, Years 1954 and 1955 and First Six Months of 1956.

1956 Assessment of Mining Property in Arizona.

Assessed Valuations of Each Class of Property in Arizona.

Final Valuations of All Producing Mining Companies in 1956.

Net Valuation of Total Arizona Property and All Mining Property in Arizona Years 1952-1956 Inclusive.

A Study of the Copper Industry in 1955 and First Eight Months in 1956- U. S. Production, Consumption, Imports, Exports, Stocks and Prices.

Preliminary Estimate of Copper, Lead, Zinc, Gold and Silver Production in Arizona and the United States in 1956.

Arizona Mine Production of Copper, Lead, Zinc, Gold and Silver - 1858-1953, Inclusive, 1954 and 1955 and Preliminary in 1956 - in Terms of Recoverable Metals.

Mineral Production in Arizona, 1955 and 1956 (Preliminary).

Mine Production of Gold, Silver, Copper, Lead, and Zinc in Arizona in the year 1955, By Class of Ore.

The Mineral Industry of Arizona in 1956 - Preliminary Annual Figures - Table Showing Comparative Mineral Production of Large and Small Mines in Arizona in 1956.

Mine Taxation in Arizona.

A Study of the Copper Industry - Years 1955 and 1956, and First Two Months of 1957 - U. S. Production, Consumption, Imports, Exports, Stocks and Prices.

Inventory of Arizona Lands as of June 30, 1956.

Copper Tariff Should Be Restored When The Price of Copper Drops to 32 cents.

The Importance of Copper Mining To The State of Arizona.

State Production of Copper, Gold, Silver, Lead and Zinc - Five Leading States and Total U. S., Including Alaska.

Comparative Production and Value of Copper, Lead, Zinc, Gold and Silver in Five Western States of Arizona, Utah, Montana, Nevada and New Mexico.

Wage Statistics and Copper Output in Arizona Copper Mines.

Why Repeal Silver Purchase Act of 1934?

During the last fiscal year there have been 12,589 visitors in the Museum exclusive of the estimated 16,000 during the State Fair. Of this number approximately 2,150 were in attendance at regular and special organization meetings. Some 740 school children in groups visited the Museum this year.

Eighty-one new specimens were added to the permanent collection. The Museum also was the fortunate recipient of the Guy E. Hazen fossil collection, which will be displayed when fully classified.

Several hundred requests for various types of information on the mineral resources of Arizona have been answered. Most of these originated in the public schools. Over four hundred mineral kits have been supplied to school children throughout the country.

Museum Curator, A. L. Flagg, is a mineralogist and scientist of national renown and has made the Mineral Museum one of the finest in the United States.

FINANCIAL STATEMENT

DEPARTMENT APPROPRIATION

\$ 69,257.00

EXPENDITURES:

Personal Services	\$ 49,490.75	
Travel - State	6,747.91	
Travel - Out of State	409.50	
Current Expenditures:		
Utilities	693.26	
Tel & Tel	698.17	
Postage	409.20	
Equipment Mtnc, etc	1,752.74	
Printing	1,872.24	
Supplies: Office, Eng'r, etc	925.36	
Fixed Charges	102.01	
Subscriptions & Organization Dues	46.00	
Capital Outlay	998.78	
TOTAL EXPENDITURES	\$ 64,145.92	\$ 64,145.92
Returned to General Fund		\$ 5,111.08

DEPOSITS:

Sale of Regulations Booklets	14.10	
Insurance recovery (brunton compass loss)	45.00	59.10

MUSEUM ACCOUNT

DEPOSITS AND BALANCE BROUGHT FORWARD		\$ 6,673.00
Personal Services		
Miscellaneous	55.56	\$ 4,150.59
Brought Forward		\$ 2,522.41