

OFFICIAL FILE

32ND ANNUAL REPORT

FISCAL YEAR 1970-1971

ARIZONA DEPARTMENT OF MINERAL RESOURCES

Fairgrounds

Phoenix, Arizona



JOHN H. JETT, DIRECTOR.

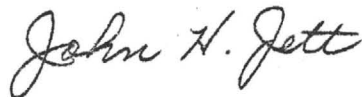
Honorable Jack Williams
Governor of Arizona
Capitol Building
Phoenix, Arizona

Dear Sir:

The Annual Report of the Department of Mineral Resources,
covering the fiscal year July 1, 1970 to June 30, 1971 is
submitted herewith.

The report contains a review of mining activity in the State
and this department's activities which are directed towards
the development and well being of Arizona's mining industry.

Very truly yours,

A handwritten signature in cursive script that reads "John H. Jett". The signature is written in dark ink and is positioned above the printed name and title.

JOHN H. JETT,
Director.

BOARD OF GOVERNORS

William T. Elsing - Chairman - Phoenix
(Term expires January 31, 1976)

Robert E. Heineman - Tucson
(term expires Jan. 31, 1975)

Robert C. Bogart - Bagdad
(term expires Jan. 31, 1974)

Kenrick L. Lamb - Tucson
(term expires Jan. 31, 1973)

Matt Danenhauer - Phoenix
(term expires Jan. 31, 1972)

PERSONNEL

John H. Jett
Mrs. Glenn W. Pare
Fremont T. Johnson
Glen Walker
Gerald W. Irvin
Mrs. Pauline Halloren
Mrs. Ray E. Sparkes
Belinda S. Bible
Lester R. Brown
Frank P. Knight

Director
Administrative Aide
Field Engineer
Field Engineer
Field Engineer
Secretary
Secretary (to 2-13-71)
Secretary
Consultant (to 12-5-70)
Consultant (from 12-5-70)

OFFICES

Phoenix Office - Mineral Building, Fairgrounds
Tucson Office - Room 106, State Office Building

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.

CONTENTS

	<u>Page</u>
ARIZONA MINING	
Value of Arizona's Mineral Production	1-2
Activity	2
Employment	2
Production by Counties	3-7
Interesting High-lights	7-9
DEPARTMENT OF MINERAL RESOURCES	
Board of Governors	i
Personnel	i
Offices	i
Statutory Powers and Duties	ii
Department Activities	10-11
Statement of Expenditures	11
Tables:	
Value of Arizona's Mineral Production	1
Copper-Gold-Silver Content - Arizona Ores	13
Recycled Copper or copper reclaimed from Scrap	14
Byproduct Sulfuric Acid from U. S. Copper Plants	14

VALUE OF MINERAL PRODUCTION IN ARIZONA 1/

	<u>1969</u>	<u>1970</u>	<u>Increase or Decrease</u>
Copper	\$ 761,840,000	\$ 1,059,277,000	\$ 297,437,000
Molybdenum	20,947,000	26,700,000	5,753,000
Sand and Gravel	18,224,000	19,804,000	1,580,000
Silver	10,997,000	12,981,000	1,984,000
Stone	5,812,000	7,094,000	1,282,000
Petroleum	7,056,000	5,281,000	- 1,775,000
Lime	5,074,000	4,523,000	- 551,000
Gold	4,603,000	3,958,000	- 605,000
Zinc	2,639,000	2,947,000	308,000
Helium	1,126,000	1,186,000	60,000
Pumice	814,000	627,000	- 187,000
Clay	394,000	454,000	60,000
Gypsum	424,000	358,000	- 66,000
Natural Gas	199,000	188,000	- 11,000
Gem Stones	153,000	155,000	2,000
Lead	65,000	89,000	24,000
Asbestos, Cement, Feldspar, Mica (Scrap) Perlite, Pyrites, Diatomite, Iron Ore, Mercury, Tungsten Concentrate, Coal (1970)	19,095,000	21,105,000	2,010,000
Total	\$ 859,462,000	\$ 1,166,767,000	\$ 307,305,000

1/ Source: U. S. Bureau of Mines

ARIZONA'S MINERAL PRODUCTION

The value of Arizona's total mineral production in 1970 increased to \$1,166,767,000. This is an all-time record and exceeds a record 1969 by more than 36 percent, or \$307,305,000. Copper accounted for \$1,059,277,000 which is a 39% dollar value increase over 1969. Copper recovered from ores amounted to 917,918 short tons, This was 53.4 percent of total United States production.

The value of molybdenum production increased 27.5 percent for a total value of \$26,700,000. This was the second most dollar productive mineral to be mined.

Major gains were made in sand and gravel, stone and silver. Petroleum, lime, gold and pumice showed decreases in value. Value of the remaining minerals was about the same as in 1969. Details of mineral production values are to be found in the front of this report.

ARIZONA'S MINING ACTIVITY

A summary of Arizona mining activity is a part of the annual report. Since this summation is in great demand by the mining industry, business men and other government agencies, a Directory of Arizona's Mining Activity is published separately for distribution. A copy is attached to this report.

The report lists 46 operating companies, some with several mines and other plant facilities. 58 major exploration companies are listed. 90 prospects with type of activity and potential mineral are shown.

EMPLOYMENT

Information supplied by the Arizona Employment Security Commission indicates an average of 21,479 covered employees on payrolls of the copper companies with total wages paid of \$201,655,064. Average annual wage was \$9,389. This is an approximate 10 percent increase in number of employees but represents a more than 16 percent increase in total wages paid. These figures include all covered employees in actual mining plus milling and smelting. An additional 1802 employees were reported for other mining and quarrying. An annual payroll of \$16,351,472, for an annual average of \$9,074 was reported. None of these total payroll or average annual wage figures include the "fringe benefits" of retirement, health and life insurance, social security, unemployment compensation, etc.

MINERAL PRODUCTION AND ACTIVITY BY COUNTIES
(source of figures: U.S. Bureau of Mines)

APACHE

Total value of mineral production in Apache County decreased from \$9,002,000.00 to \$7,231,000.00, a 19.6 percent drop. Petroleum, helium and clays accounted for most of the production with natural gas, pumice, sand and gravel and some stones accounting for the balance. Two bentonite plants and one hydrafrac sand plant operated most of the year. Exploration activity appeared at a minimum with no indication of increasing at this time.

COCHISE

Mineral production increased 20.2% with copper, lime and silica predominant. Minor amounts of stone, sand and gravel, lead and zinc were produced. Gold and silver were recovered from copper ores. Total value amounted to \$78,297,000. Exploration activity was very intense with several major companies and a number of small companies active. Activities included drilling programs, ground surveys induced polarization and airborne magnetometers.

Mill construction continued in Tombstone for a custom mill. One large flux mine was active all year. Some activity was shown in turquoise with a \$50.00 per pound price quoted. There is substantial small mine activity in this area by individual mine owners. A new lime kiln was started up at the lime plant.

COCONINO

Mineral production decreased 56.8% to a total value of \$2,290,000. Sand and gravel, stone, pumice, copper, silver and gold made up the values. There was little active exploration activity. Some of the copper prospects north of the Colorado River are beginning to get some attention. White Mesa Copper was closed and equipment was sold. Numerous small flagstone quarries made some intermittent shipments to other counties for resale.

GILA

Total mineral production increased over 25 percent to a total of \$124,653,000. Copper, molybdenum, asbestos and stone were the principal producers with some value added by silver, gold, clays and sand and gravel.

Prospecting for clay, remodeling of a tungsten mill, erection of a small fluorspar mill, some old mine evaluation, uranium and copper exploration were included in exploration activities.

Ray Mines Division of Kennecott Copper Corporation announced construction of a diversion tunnel and dam to divert water out of their open pit mine at Ray.

Miami Copper operations of Cities Service Co. began shaft sinking to deepen the old Miami shaft to over 3,500 ft. to permit mining of a new orebody. Miami has also announced possibility of a new mine near Pinto Valley and possibility of opening the Old Dominion Mine.

Inspiration Consolidated Copper Co. is doing metallurgical testing on the ore from the Christmas mine with thought of a possible expansion. Their Ox Hide pit is also being evaluated for a possible production increase.

Occidentals Minerals Co. announced what may be a significant deposit of copper ore in the Miami area.

GRAHAM

The value of mineral production for Graham County is not available. Prospects continue excellent for a good mineral production future. Phelps Dodge Corp. started drifting to develop the orebody at their Safford Project. Producers Minerals Corp. was producing copper precipitates most of the year. Inspiration Consolidated Copper Co. continued development work at their Sanchez Project. Considerable exploration activity is evidenced by large companies and small mine operators conducting exploration programs. In addition to copper, lead and diatomaceous earth activity was noted. Periodic small shipments of chabazite were made.

GREENLEE

The value of mineral production in Greenlee County increased approximately 12 percent for a total of \$151,043,000. Copper, silver, lime, stone, gold, sand and gravel were the minerals produced. Copper exploration was very active along with minor exploration activity in fluorite.

A four mile aerial tramway for lime haulage started operation and a fourteen mile relocation of a State hiway to permit development of a new mine was announced by Phelps Dodge Corp. The Metcalf project of Phelps Dodge was delayed for approximately two years. However, some stripping, power plant construction and underground development continued.

MARICOPA

Mineral production in Maricopa County decreased approximately 15 percent in value to a total of \$7,258,000. Sand and gravel, lime, stone, silver, copper, mica and gold were produced.

Exploration drilling for copper with some development work on gold, silver, salt, clay and small copper prospects were undertaken. Southwest Salt Co. started

evaporating brine from their No. 2 well to produce salt. Vermiculite production, although small, was halted this year.

MOHAVE

The value of mineral production in Mohave County increased almost 15 percent to \$40,762,000. Copper, molybdenum, silver, sand and gravel, stone, lead, feldspar and gold were produced. Two gold mines were under development and a mill for silver is being considered. Considerable copper exploration was noted in several parts of the county including the strip country.

Standard Metals Corp., operators of the Antler mine near Yucca, ceased operations and filed for bankruptcy. Considerable interest has been shown in their mine and mill by other operators.

NAVAJO

The total value figure of mineral production of Navajo County is not available. However, there was some production of sand and gravel, coal, iron ore, pumice and stone. Coal production will increase considerably while iron production will probably stop in the coming year.

Contracts were let for the engineering and construction of the 78 mile railroad to carry coal from Black Mesa Mine to the Navajo Electric Generating Station near Page.

PIMA

A more than 67 percent increase in the value of mineral production in Pima County resulted in a total value of \$422,296,000, the largest value of any of the counties. Copper, molybdenum, cement, silver, sand and gravel, stone, gold, clay, zinc and lead were all produced to some extent.

In addition to becoming a center of copper mining, Tucson has become a center of exploration activity with approximately 50 exploration offices active. A number of small mines have been active in the county.

Santa Rita Mining Co. opened offices in Tucson to further develop lime and copper deposits.

Duval Corp. announced construction of a pilot plant for large scale evaluation of a new direct reduction and pollution free process for recovery of electrolytic grade copper.

Anaconda continued planning for long range development of ore bodies in the Helvetia area of Santa Rita Mountains.

Pima Mining Co. started construction on an expansion to 53,000 TPD.

Continental Materials announced discovery of what may be a significant copper deposit with minor silver values, in the Catalina Mountains.

Essex International, Kaiser Exploration and General Mills opened offices in Tucson.

Phelps Dodge Corp. started construction on sulphuric acid plant at Ajo.

PINAL

A value of \$285,166,000 on Pinal County's mineral production is more than 34 percent over 1969. Copper, molybdenum, silver, sand and gravel, gold, stone, perlite, lime, gypsum, diatomite, pyrite and pumice were produced. In addition to new large copper discoveries, additional copper exploration was noted. Perlite and silica-copper flux shipments continued.

Hecla Mining Co. reached the lower oxide zone and are developing as they continue shaft sinking.

Newmont completed an exploration project and results are being analyzed for a potential open pit mine.

Magma Copper Co. and the U. S. Bureau of Mines started tests to produce sulphur from stack gases. Magma also announced addition of an electrolytic refinery and a copper rod mill at their San Manuel complex.

Red Hill mines held a dedication of their new open pit and precipitate copper plant.

Continental Oil Co. announced a copper mineralization discovery near Florence.

SANTA CRUZ

No production value figures are available from Santa Cruz County. Sand and gravel, stone, tungsten, copper, lead, silver, zinc and gold were produced in small quantities. Exploration activity was very extensive, with large companies, small companies and individuals all participating. Mill rehabilitation, shaft sinking, drifting, sampling and small shipments were all noted.

Kerr McGee Corp. announced a significant copper ore discovery near Patagonia. It is deep, ranging from 3,410 feet to 5,194 feet. This activity is very significant due to depths drilled.

YAVAPAI

Yavapai County's mineral production increased more than 17 percent to a total value of \$41,698,000. Copper, cement, zinc, stone, sand and gravel, molybdenum, lime, silver, gypsum, clays, gold, lead and pumice were produced. Extensive drilling programs by the large companies sampling and old mine evaluation by small miners were exploration activities noted during the year.

Bagdad Copper Co. dedicated its electrowinning plant. Governor Williams was the principal speaker. This is the third "smokeless" copper plant in the state.

YUMA

No figures are available for the value of Yuma County mineral production for 1970. However, some production was noted for sand and gravel, copper, stone, lead, silver, zinc and gold. The area is being prospected by both large and small companies and the small miner. Pit leaching, screening tungsten, cross-cutting and raising in old mines and bulk sampling were activities noted. This area should remain quite active.

INTERESTING HIGH-LIGHTS

JULY -

Arizona Small Mine Operators Association at their annual meeting went on record to retain 1872 Mining Law but accept changes to eliminate abuses.

Phelps Dodge Corp. established a Division of Environmental Engineering & Research.

Suspension of most copper import duties extended to June 30, 1972.

Bill introduced to stockpile gold for future space and defense needs.

Legislation was proposed to create a committee to investigate the copper industry.

AUGUST-

Copper concentrates are being exported to reduce smelter production and resultant emissions.

Arizona signed a law to retain autonomy in establishing and administering mine Health and Safety programs under new Federal metals and non-metallics mine safety act.

Legislation proposed to question copper industry on its pricing method.

Copper prices on LME or copper made from foreign ores and scrap fell below the price of copper made from domestic ores for the first time in seven years. It dropped from a high of 85 cents to 57-1/2¢.

SEPTEMBER-

Commerce Department lifted copper export controls it had imposed for last 5 years. Unrestricted export licensing to be resumed immediately. This was due to world price of copper falling below U. S. price.

Lead was reduced to 14-1/2 ¢ per pound.

Bureau of Land Management held public hearings on proposed multiple use classification for 165,000 acres of public lands in Hieroglyphics and Wickenburg Mtns.

OCTOBER-

Arizona Mining Association gave a \$545,179.00 grant to the Atmosphere Analysis Laboratory at University of Arizona. The grant was for an in-depth study of air pollution.

Department of Mineral Resources employed a new Director for the Department.

Copper dropped 4 cents to 56¢/lb.

NOVEMBER-

President of Anaconda was quoted as predicting a surplus of 250,000 metric tons of copper in the world supply and increasing to 850,000 metric tons in 1975. (320,000 MT in 1972 and 500,000 MT in 1973). However surplus would balance out in late 1970's or early 1980's.

GSA announced long range plans for selling some of its 71 million pounds of surplus tungsten concentrates. 20-25 million pounds will be for domestic sales and 10-15 million for foreign sales.

Arizona's Mine Inspector named on Advisory Committee to Secretary of Interior on Safety Standards.

Federal Government ended all silver sales.

Bureau of Land Management asks for written comments on proposed multiple use classification of 24,000 acres of public lands in Mohave, Pinal and Graham Counties.

DECEMBER-

House Interstate and Foreign Commerce Committee postponed consideration of legislation to give FTC regulatory powers over manner in which copper producers allocate and price copper.

Copper dropped to 53 cents per pound.

JANUARY-

Public Law 91-631 becomes effective. This law encourages orderly and economic development of domestic mineral resources and reserves, reclamation of metals, recycling and methods of waste disposal.

FEBRUARY -

GSA sold stockpiled tungsten concentrates. Department of Treasury's Explosive Regulations become effective.

Eight major copper companies establish a new research association with objective to develop improved methods of removing sulphur dioxide and particulates from their smelter stacks.

MARCH -

The Silver Institute was organized to disseminate information about and promote use of silver.

APRIL-

Hearings held in Washington on proposed legislation to authorize the sale of lead and zinc from the Nation's strategic stockpile reserve.

Governor Jack Williams named an eight member state council to advise him on development proposals that could have an effect on the state's environment.

Public meeting held by National Park Service to discuss updating plans for Saguaro National Monument, including Wilderness designation for portions of the Monument.

MAY-

Contract talks start between unions and four major operating companies.

Kennecott announces expenditure of \$100,000,000 for pollution control at its U. S. plants.

Phelps Dodge Corp. completes merger with Western Nuclear.

JUNE-

Copper Development Association displays second generation electric car. It is faster, longer range, accelerates quicker and recharges more quickly than previous model. Uses 3 times the amount of copper as an ordinary car. Approximately 125 lbs to 135 lbs.

Valuations of Arizona mines up 22.1% to \$739.6 million (283 million increase).

Anaconda has project pending for oxide ore treatment plant with electrowinning facilities for production of cathodes.

Hopes are high there will be no copper strike.

DEPARTMENT ACTIVITIES

The statutory duties of the department are transcribed on page ii of this report. They are summarized in the first paragraph which reads: "Aid in the promotion and development of the mineral resources of the state".

A new director was appointed by the Board of Governors and took office October 16. Personally, as the new director of the Department of Mineral Resources, and on behalf of the Board of Governors, I wish to thank the former director, Mr. Frank P. Knight for consenting to remain with the department as a consultant. His general wisdom, vast knowledge of and dedication to Arizona's mineral industry and sympathetic understanding of the problems confronting the new director are most helpful and sincerely appreciated. We are very grateful.

Between the time of appointment in October and the end of the fiscal year in June, the new director spent much time in familiarizing himself with procedures of the office and the field activities of the engineers. This was followed by trying to get acquainted with the complete mineral industry of the state and the related problems.

The director attended meetings of the Governor's Four Corner Regional Commission, AIME, WGMAC, exploration groups, ASMOA, other state agencies, and Congressman Udall.

The director called on some schools, chambers of commerce, libraries and visited many mines and exploration groups.

The activities of the Department are summarized as follows:

Arizona Small Mine Operators Association	114
meetings	
Mine visits and field interviews	704
Miscellaneous meetings & conferences	50
Office visitors	2,119
Telephone calls	4,144

Publications

<u>No. of Pages</u>	<u>Title</u>	<u>No. of Copies</u>
11	Inventory of Arizona Lands	500
2	Copper Produced by Large Copper Mines	50
1	Arizona Leach Copper Production	50
22	Gold - Silver Statistical Report	500
1	List of Publications Available	200
4	Directory of State and Federal Agencies	200

<u>No. of Pages</u>	<u>Title</u>	<u>No. of Copies</u>
3	Directory of Active Exploration Companies	150
4	Directory of Active Exploration Companies	200
5	Directory of Active Exploration Companies	225
2	Revised Bibliography of Coal Deposits	75
31	Lead-Zinc Statistical Report	400
8	Molybdenum Statistical Report	400
18	31st Annual Report of the Department	300
10	Active Mine List	300
10	Inventory of Arizona Lands	500
52	Mining in Arizona, Its Past, Its Present, Its Future	25,000
36	Copper Statistical Report	500
93	Laws and Regulations Governing Mineral Rights in Arizona (7th Edition)	4,000

A Statement of Expenditures follows:

EXPENDITURES

APPROPRIATIONS Fiscal 1970-1971 \$ 110,446

EXPENDITURES

Personal Services		\$ 76,596
Employee Related		8,332
Professional Services		6,000
Travel - State	\$ 6,461	
Out of State	871	7,332
Operating Expenditures		
Utilities	1,655	
telephone	1,718	
mtnce & repairs	1,709	
office supplies	702	
printing	1,687	
notary fee	14	
postage	1,079	
subs & dues	239	
books & publ.	183	
insurance	70	
janitor supplies	<u>174</u>	

9,230

Capital Outlay - Equipment

625

TOTAL EXPENDITURES

108,115

Returned to General Fund

2,331

\$ 110,446

The returned portion of the appropriation consisted of \$837 personal services; \$686 employee related; \$669 travel; \$114 supplies and \$25 capital outlay.

Charts, tables and statistics are printed in our technical publications and are distributed. There is no intent of duplicating to any extent. However, we have added a few tables that are pertinent to questions asked by many.

The tables are as follows:

Copper-Gold-Silver Content of Arizona Copper Ores

Miscellaneous Copper Statistics showing:

Recycled Copper or Copper Reclaimed from Scrap
and

Byproduct Sulfuric Acid from U. S. Copper Plants.

COPPER - GOLD - SILVER CONTENT - ARIZONA ORES 1/

	<u>TONS ORE TREATED OR SOLD</u>	<u>POUNDS COPPER</u>	<u>PERCENT COPPER</u>	<u>OUNCES GOLD</u>	<u>OUNCES SILVER</u>	<u>VALUE Au-Ag PER TON</u>
1960	66,032,439	993,370,700	0.75	115,603	3,689,622	\$ 0.11
1961	71,918,991	1,092,360,900	0.76	129,184	4,380,458	0.12
1962	72,868,147	1,200,045,700	0.76	117,362	4,571,370	0.11
1963	60,615,132	1,217,337,700	0.76	121,177	4,494,239	0.12
1964	86,132,039	1,279,898,700	0.74	133,983	4,915,362	0.13
1965	92,859,535	1,308,809,700	0.70	133,830	5,352,850	0.12
1966	101,558,298	1,359,481,200	0.67	127,431	5,595,644	0.12
1967	74,289,208	901,853,500	0.61	66,933	3,996,587	0.11
1968	101,294,000	1,146,314,000	0.57	89,419	4,697,394	0.13
1969	113,701,000	1,389,172,000	0.61	108,718	5,899,843	0.13
1970	134,968,000	1,582,065,000	0.59	107,292	7,130,261	0.12

1/ U. S. Bureau of Mines

MISCELLANEOUS COPPER STATISTICS

1/

	SECONDARY COPPER PRODUCTION			ARIZONA COPPER PRODUCTION (tons) FROM ORES	BYPRODUCT <u>2/</u> SULFURIC ACID (tons) FROM COPPER PLANTS 100 PERCENT BASIS
	<u>REPROCESSED</u>	Tons <u>RECYCLED</u>	<u>TOTAL</u>		
1961	437,829	411,110	848,939	587,053	362,630
1962	506,154	415,674	921,828	644,242	403,683
1963	552,583	421,843	974,426	660,977	358,503
1964	619,500	473,521	1,093,021	690,988	330,273
1965	739,814	513,436	1,253,250	703,377	369,321
1966	799,389	534,860	1,334,249	739,569	469,728
1967	677,248	482,659	1,159,907	501,741	348,497
1968	697,568	520,772	1,218,340	627,961	483,108
1969	800,603	574,890	1,375,493	801,363	685,775
1970	743,531	504,071	1,247,602	917,918	747,784

1/ U. S. Bureau of Mines

2/ Includes acid produced at a lead smelter 1966-68. Excludes acid made from pyrite concentrates in Arizona, Montana, Tennessee and Utah.