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**TENTH  
ANNUAL REPORT**

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**DEPARTMENT OF  
MINERAL RESOURCES**

**STATE OF ARIZONA  
JULY 1, 1948 TO JUNE 30, 1949**

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**CHAS. H. DUNNING**  
Director

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**OFFICIAL FILE**

*“The nation best fitted to survive in this machine age is the one best supplied with minerals. Minerals bulwark our economy in peace time and are our national insurance in war. History is strewn with the wrecks of empires that neglected their mineral resources.”*

*Busch*

*The Urge of the Prospector*

*“ ’Tis the everlasting whisper  
Day and night repeating—So!  
Something hidden go and find it,  
Search the desert, hills, and ranges,  
Go and look behind the ranges,  
Something waiting for you—Go!”*

*Adapted from Kipling*



**DEPARTMENT OF MINERAL RESOURCES  
STATE OF ARIZONA**

**Board of Governors:**

- Dr. N. H. Morrison, Phoenix, Arizona, Chairman,  
(Term expires January 31, 1951)
- Edwin W. Mills, Salome, Arizona, Vice Chairman  
(Term expires January 31, 1953)
- T. E. Steele, Ajo, Arizona  
(Term expires January 31, 1950)
- W. C. Humphrey, Tombstone, Arizona  
(Term expires January 31, 1952)
- H. F. Mills, Humboldt, Arizona  
(Term expires January 31, 1954)

**Personnel:**

- Chas. H. Dunning, Phoenix, Arizona, Director
- W. C. Broadgate, Prescott, Arizona, Special Assistant
- A. C. Nebeker, Prescott, Arizona, Field Engineer, Northern District  
(Deceased)
- R. I. C. Manning, Phoenix, Arizona, Field Engineer, Southern District
- J. E. Busch, Tempe, Arizona, Part-time Land Specialist and Statistician
- H. N. Wolcott, Phoenix, Arizona, Part-time Geologist and Engineer
- George A. Ballam, Phoenix, Arizona, Part-time Field Engineer
- Mrs. George D. Hunt, Phoenix, Arizona, Office Secretary, Phoenix Office

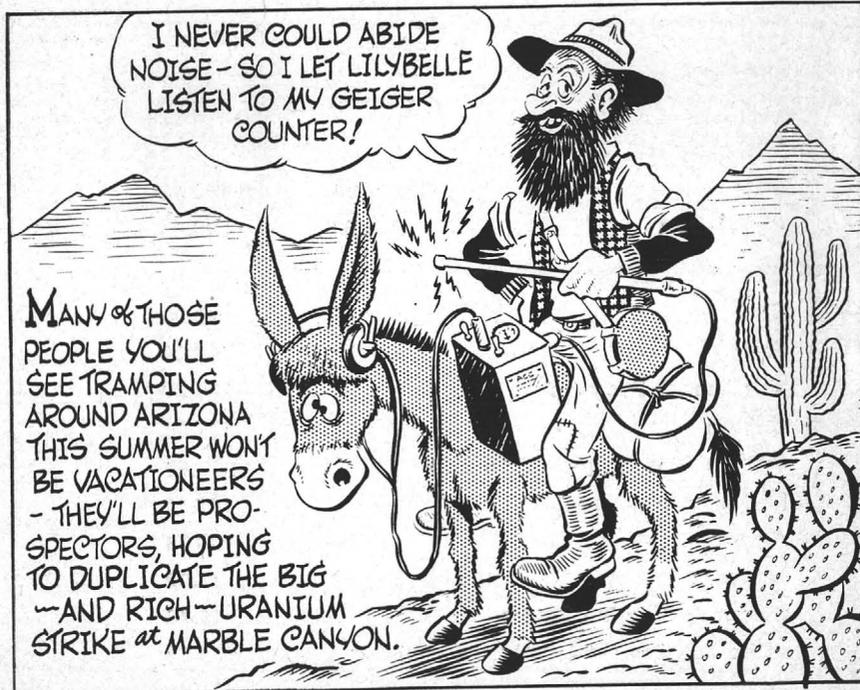
**Offices:**

Headquarters Office:

Mineral Building, Fairgrounds, Phoenix, Arizona - Telephone 4-7034

Field Office:

Court House - Prescott, Arizona



**A COMBINATION OF THE OLD AND NEW**

(Reprinted from the Arizona Republic of May 8, 1949, Kerney Edgerton, cartoonist.)

To the Honorable Dan E. Garvey,  
 Governor of Arizona,  
 Capitol Building,  
 Phoenix, Arizona.

Dear Governor Garvey:

In compliance with Chapter 27, Laws of 1939, creating the Department of Mineral Resources, the following report of the activities of the department from July 1, 1948 to June 30, 1949 is hereby respectfully submitted.

We have so many requests for an explanation of the purposes and functions of the department that we are this year devoting more space to an outline of the duties and objectives of the department, and a resume of its recent accomplishments.

Yours sincerely,

CHAS. H. DUNNING  
 Director

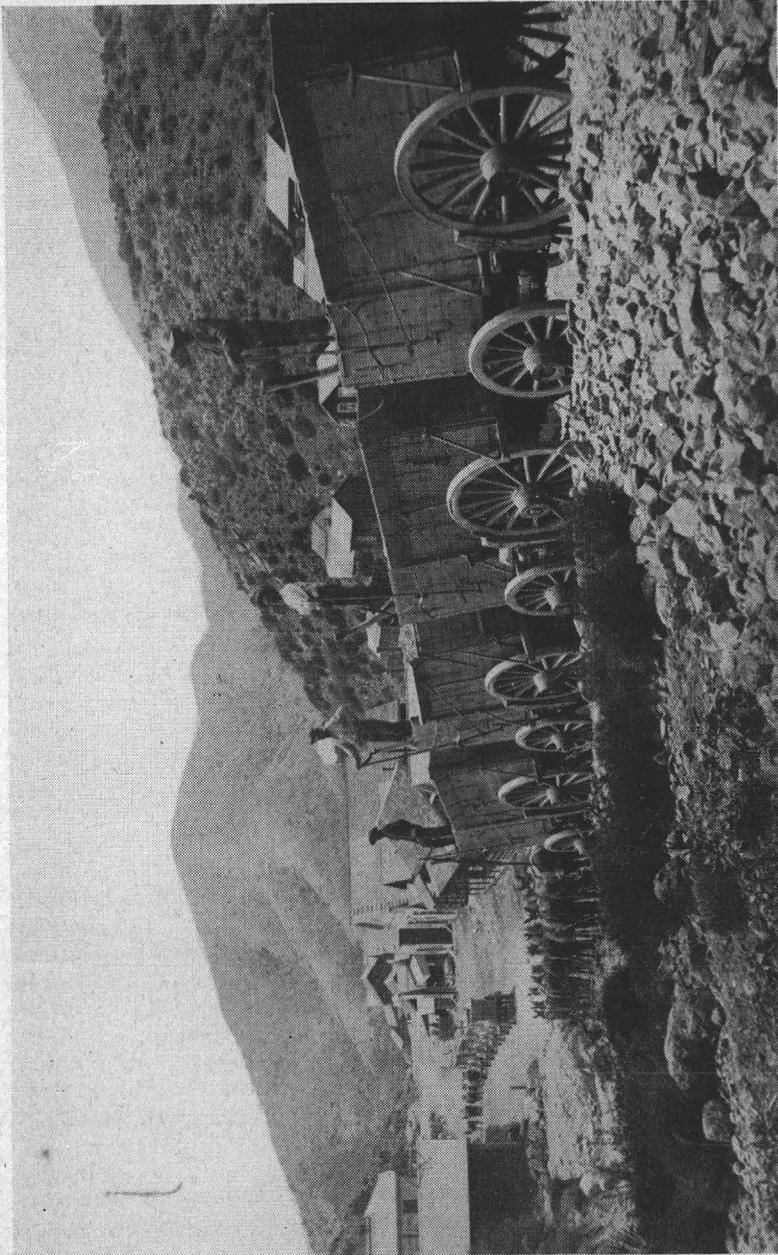
Phoenix, Arizona  
 June 30, 1949

**FINANCIAL STATEMENT  
 DEPARTMENT OF MINERAL RESOURCES**

**STATEMENT OF EXPENSES  
 July 1, 1948 to June 30, 1949**

	Appropriation for fiscal Year	Expenditures for fiscal year	Balance Returned to State
<b>PERSONAL SERVICES:</b>	\$25,200.00	25,186.50	13.50
<b>CURRENT EXPENDITURES-TRAVEL:</b>			
State	4,500.00	4,500.00	.....
Out-of-state	300.00	298.44	1.56
<b>CURRENT EXPENDITURES-OTHER:</b>			
Rent		600.00	
Postage		545.00	
Telephone & Telegraph		228.79	
Utilities		309.46	
Printing (Reports, pamphlets, etc.)		571.67	
Equipment Maintenance		127.77	
Assaying		96.73	
Insurance		32.02	
Newspaper Clipping Service		35.78	
Office Supplies (Inc. stationery, etc.)		373.53	
Janitor Supplies		31.60	
Miscellaneous (Books, films, etc.)		43.00	
	3,000.00	2,995.35	4.65
<b>SUBSCRIPTIONS &amp; DUES:</b>	25.00	13.00	12.00
<b>CAPITAL OUTLAY:</b>	100.00	93.96	6.04
<b>TOTALS:</b>	\$33,125.00	32,087.25	37.75

NOTE: Certain items (such as utilities, telephone, travel and part-time payroll for the month of June 1949 are estimated amounts.



Ore transportation about 1900

## THE DEPARTMENT

### Law and History:

The Department of Mineral Resources was created by the fourteenth legislature in House Bill No. 103, Chapter 27, which became a law on March 1, 1939, and functioning started immediately thereafter.

### Purposes and Objectives:

The Department was created for the purpose of furnishing aid in the promotion and development of the mineral resources of the state, with particular view to assisting small mine owners and operators along semi-technical and general economic lines. The Department cooperates with but does not encroach upon the field of the private engineer or the more technical bureaus.

The following excerpts from the original laws are explanatory.

The Department of Mineral Resources shall "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 view to assisting in their solution".

"Assist in discovering sources of supply for persons desiring to buy minerals. List and describe available mining properties". "Cooperate with — State Land Department — Corporation Commission — Arizona Bureau of Mines — federal and other agencies".

"Do such other things as may assist the more extensive exploration and development of the mineral resources of the state".

"The Board of Governors of the Department shall consist of five members, who shall be appointed by the Governor. Members of the Board shall receive no compensation as such but shall be reimbursed for necessary expenses incurred in performance of their duties".

"The Director of the Department shall be appointed by the Board of Governors of the Department. The Director shall be a mining engineer graduated from an accredited school of mines, and qualified by education and experience to secure a certificate of registration as an engineer".

"The Director shall have charge and control of the work of the Department, including field offices, and shall appoint the field and office assistants and fix their compensation".

The following activities of the department during the past year have been pertinent:

### Sale or Lease of Mines:

We consider that this is a very primary objective of the department but one that is especially difficult under present

conditions. However the department has been quite successful in placing many prospects or small mines in the hands of those who are technically and financially able to carry them on, and we could enumerate many properties being operated today that would not have been in operation if it had not been for this phase of the department's efforts.

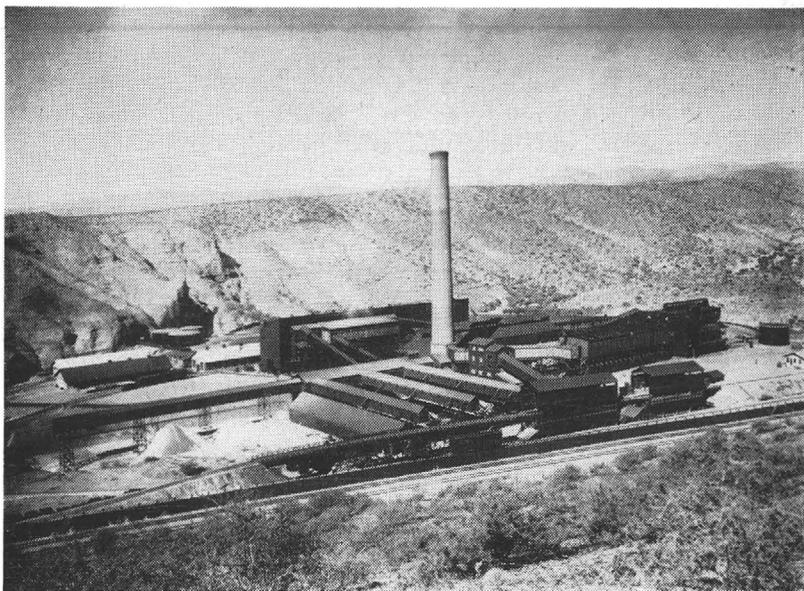
#### **Sale of Products:**

Gold, silver, copper, lead and zinc are automatically sold through their only outlets. We try to keep in touch with the markets for other minerals and advise any tentative producer as to what he might do with anything he can economically produce.

#### **Primary Engineering and Economics:**

We feel that it is a function of the department to furnish primary engineering and economic advice to small miners, provided it does not encroach on the field of the private engineer.

In this regard, if a mine owner will furnish us with a description of his property and ask us for advice we will send a field engineer to his property and such engineer may make a Brunton survey, and take key samples, all of the results of which will be turned over to the owner, together with such advice as might accrue therefrom. We cannot make detailed surveys or topographical maps, or do detailed or assay map sampling. Such work would be in the category of the private engineer. But we



**A typical Arizona Copper Smelter**

filled and a slackening in demand started, adding impetus to the decline. It is hoped that enough pressure can be brought on Congress to reinstate a reasonable tariff and avoid a return of the situation that developed in the 30's when all our mines were forced to close and the relief load and loss of taxes was much greater than the extra price necessary to keep them going.

A contract settlement bill for the relief of those miners who produced or prepared to produce under war stimulus, only to be left on a limb when the government withdrew its purchase plans, has also been before Congress again this year, and for a while looked quite favorable. But it appears at this writing that none of these bills, or any of the various bills to permit a free market for gold, will receive final favorable action.

Various changes in our mining laws have also been proposed by some departments in Washington. Most of these proposed changes indicate a tendency on the part of some government bureaus to do away with the basic miner's rights and install some sort of governmental controlled leasing system. Any such thought is vigorously opposed by the industry and would merely form one more restrictive influence to inhibit the finding and development of new mines.

#### **Appropriation and Plans:**

Due to a serious and unbalancing cut in the department's travel allowance made by the last legislature it will be necessary to practically eliminate our field service after July 1st. This in face of the fact that an expanded service is needed and justified at this time. Many miners thrown out of employment by the large mines are turning to prospecting and small individual mines and come to us for advice and for a field examination of their properties. This is a service for which this department was especially created.

The new and very promising uranium situation in northern Arizona justifies a special field engineer properly equipped with instruments stationed in that part of the state. Uranium prospecting and development is new, and such a trained and equipped engineer could be of great help in examining prospects, advising miners and furnishing them with necessary information that they have difficulty in obtaining elsewhere. Such service could augment our uranium resources and production in measure of importance to the economy of the state. But in spite of the great importance of uranium and the absolute necessity of a Geiger counter the state has never furnished us with enough funds to buy one. We have two - one was donated to us by private parties and the other loaned by the manufacturer, but without this private assistance we would have been utterly unable to aid in the investigation or development of any of the new uranium discoveries.

## MISCELLANEOUS ACTIVITIES & COMMENTS

### Public Relations:

Efforts were continued throughout the year to assist in maintaining good public relations for the mining industry and to inform the public of the needs of the industry and its value to the state and nation.

These included talks by the department's director before the American Mining Congress in San Francisco in September on metal tariffs; before the Southwest Mining Association in Los Angeles in December and the Prospectors' Institute in Los Angeles in March on uranium; the Prescott Kiwanis Club in March; the Arizona Historical Society in Phoenix on the history of mining in Arizona; the Phoenix Lions Club in June on uranium, and the "Know Your Arizona" program at the Arizona State College at Tempe on mining economics and uranium.

Several freight rate hearings—both interstate and intrastate—were attended as a witness protesting further increases in rates on ore and concentrates, and several articles were furnished the press on various phases of mining. The August issue of the Highway Magazine will carry an article on uranium.

The department has built up a fine collection of uranium ores which will form a permanent part of the mineral display at the Fairgrounds and no doubt create special public interest at Fair time.

### Washington Activities:

The department has maintained its efforts in Washington to bring about a reasonable premium price plan law that would permit some of our marginal mines to continue operation, and also act as an incentive to the development of new mines. There are many marginal mines that if once closed could never again reopen, thus causing a tremendous waste of natural resources, and new mines are not being developed as rapidly as the old ones are being depleted because of lack of confidence and incentive.

Better administration of metal stockpiles is also needed and we have always recommended a type of stockpile purchases that would straighten out the extreme fluctuations in metal prices. While there was considerable publicity given to the needs of the stockpile when metal prices were high, now that metal prices have dropped to the point where mines are closing down and unemployment is becoming serious, one hears little of any stockpile purchases or of any effort through stockpiling to support fair prices. A premium price for marginal or new mines plus stockpiling of the extra cost metal would make an ideal combination.

The excise tax (tariff) on copper imports was suspended by Congress for fifteen months just as the supply pipe lines became

are always willing to help in the initial stages—especially when the owner-operator cannot afford individual engineering services.

We have a great many records in our files where our engineers have drawn rough survey sketches, both above ground and underground, together with taking a few key samples, and such assistance has been of basic value to the small mine owner.

We have a long list waiting for this kind of service and it is often impossible for us to act promptly. This service is somewhat similar to that rendered agriculturists by state and county agents.

### Rocks and Minerals:

While the identification of rocks and minerals is primarily a function of the Arizona Bureau of Mines in Tucson, it is a fact that an average of three or four people per day come to our office in Phoenix asking about this sample or that. The number of callers has been about doubled since uranium has come to such prominence and we were known to have a Geiger counter.

We feel that we should do a preliminary or screening job on such presentations. They are brought to us rather than the Arizona Bureau of Mines because we are more convenient for them. Our engineers do not claim to be experts along such lines and we have practically no laboratory facilities, but any experienced mining engineer can usually classify and determine 80 per cent of such samples submitted, and we feel that it is an important service for us to do so.

### Land Matters and Mining Regulations:

The department has been fortunate in having a man with a life-time experience in the above caption on its part-time staff. The number of callers and letters that come to us daily in the above category is prima facie evidence of the value of this service.

While most of the old-timers have an understanding of our basic mining regulation, there appears to be a new class of inexperienced miners continually coming to Arizona who have no knowledge of the old rules. They have a yen for mining. Sometimes, but not always, they are financially able. We try to get their feet firmly established.

In this category we do not attempt to enter the field of the regular attorney. We especially avoid any controversial legal matters or those which require the services of an attorney. We merely try to inform the prospector or small miner as to his rights, what his procedure should be, and protect him in case we think he is being treated unfairly.

### Statistics:

We feel that it is a function of the department to keep a full line of mining statistics. While such may not be of great value to the small miners, they are of general value — to small

miners, large miners, business men and supply houses, and the general public, particularly to the general mining industry. And as the health of the general mining industry is a pertinent factor to the well being of the small miner, there is an accrued value to him. Someone, or some department, should be responsible for having such information available. We have taken it unto ourselves, but we have not been able to do as thorough a job as we think should be done.

#### **Records and Old Files:**

It has been the policy of the department to obtain and place in our files every bit of information possible regarding any prospect or mine in the state. The value of such information is often not of the present, but as time goes on the value of such a file becomes more and more important.

At present we have about 3,000 folders on mines in our files. Many contain only vague and indefinite information. Many others contain reports by our own or independent engineers.

The value of any mine or mining prospect is in a continual state of flux. Today's disregarded mineral may become most sought after tomorrow. If our old-timers had submitted to some central clearing and filing agency all the information they acquired in their day, and such information could have been automatically and unbiasedly checked and placed in permanent files, it would be of inestimable value to the mining industry today — especially in times of national emergency or basic changes in values.

#### **Washington Activities:**

It is a well-known but not generally advertised fact that the department maintains a representative in Washington to further the interests of the industry and particularly the small miner in every way possible. This service resolves itself into two divisions, one of which is case or individual service such as following through or expediting such matters as mineral patents, cases before the Munitions Board, RFC, or other governmental departments. The other covers more general matters such as those involving proposed or sought for legislation affecting the whole mining industry. Again may we say that the health of the entire industry reflects directly on the path of the small miner. (For further data see page 20).

#### **Public Relations:**

The mining industry, as it affects the small miner as well as the large, has become a matter of national rather than local scope. The general public must be educated and given an understanding of the need for and value of the industry to our national economy, and the important part that the small miner must play in the permanent maintenance of a sufficiently healthy industry.

It has been the policy of the department to stress this fact

tons per day. Unfortunately the leasing procedure on the reservation has not been conducive to prospecting and mining but attempts are now being made to bring about more reasonable arrangements. There are many square miles of favorable formation on the reservation and sufficient production could be brought about to help solve the Navajo problem, and to become an important part of their economy.

Uranium ores from Arizona are purchased by the Atomic Energy Commission. Processing plants are located at Monticello, Utah, Durango, Naturita and Uravan, Colorado. Ore purchasing schedules can be obtained from the Atomic Energy Commission's office at Grand Junction, Colorado.

The U. S. Bureau of Mines at Tucson has been working on the metallurgy of the copper-uranium ore discovered at Hacks Canyon and described in our report of last year. None of the plants mentioned above can treat this type of ore, but it has recently been announced that the Vanadium Corporation of America will build a plant for copper-uranium ores at Hite, Utah in the near future.

The outlook for increased uranium production in Arizona is bright but so far the only deposits of commercial importance have been found in the sedimentary rocks of the Grand Canyon series in northern Arizona. This department should have a special field engineer with Geiger counter equipment stationed in that area.



**A heavy uranium producer in northeastern Arizona.**

currence and is especially appealing because if it is sufficiently high grade no mining equipment and very little capital is required. Several such deposits besides the one discovered by the Bakers in the Vermillion Cliffs have been found and no doubt there will be others.

Outside of the small scattered occurrences of uranium in petrified wood, Arizona's present production is confined to five mines on the Navajo Indian Reservation under lease to the Vanadium Corporation of America and producing about 200



The Bakers, including young daughter find uranium bearing petrified wood in Vermillion Cliffs. (This picture was sent out over Associated Press, etc.)



Tremendous log segments of uranium bearing petrified wood in northern Ariz.

through public writings and utterances emanating from the department. This policy should be continued and amplified and all efforts so spent will accrue to the eventual benefit of the small miner and to the state. (Further details in this regard are explained on pages 20 & 21).

#### Keeping Mining Clean:

While the above has been a policy of the department, we have not been able to accomplish as much as desired because of lack of funds to do the detailed work often required.

During the year our state Corporation Commission, in conjunction with the Attorney General's office, called together a committee of nine business men to advise and formulate plans for the better protection of the public in the purchase of securities. The department's director was named on this committee and in subsequent meetings the point was stressed that nothing should be done to inhibit man's inborn right to make speculative investments, that no committee or Director of Securities should be constituted by law to adjudge the value of an enterprise. But that full disclosure of all pertinent facts be demanded with the thought of prosecution under fraud laws if they turn out to be misrepresentations.

The committee advised the setting up of a Director of Securities within the Corporation Commission and if a proper man is selected the result should be to open Arizona a bit wider for legitimate primary financing of its resources.



Open pit mining operations in Arizona

### Mining Meetings:

It has always been the policy of this department to have one of its engineers visit the local meetings of the Arizona Small Mine Operators Association at frequent intervals. Such meetings accomplish the double purpose of disseminating news or information that comes to us from Washington or from the markets, and at the same time enables our engineers to pick up information from the field that might be of value to our files or the general health of the industry.

Next to the actual examination of his prospect this service is probably appreciated by the miner in greater measure than any other. As explained in a later chapter this type of service must be greatly curtailed in the future.

### ARIZONA'S METALLIC PRODUCTION AND VALUE

For many years Arizona has lead all the states in the total production value of the non-ferrous metals, and this position was maintained in 1948. As usual, Arizona was first in the production of copper. Among the twelve western states, Arizona stood third in lead and third in zinc production. The combined value of the five non-ferrous metals produced in 1948 was more than \$195,000,000. No data are obtainable as to the value of non-metallic and miscellaneous metallic mineral production, but it was probably not less than \$25,000,000, all of which adds up to the impressive total of \$220,000,000.

Part of the increased value of Arizona's 1948 production was due to the high metal prices which prevailed throughout the year — part to an increase in the quantity of ore mined. Zinc tonnage showed a slight decline, the first in thirteen years, but copper and lead both made substantial gains.

This year, 1949, started off auspiciously with indications of even higher records, but the weakening of metal prices in the late spring has resulted in the curtailment of operations at various mines and, even with a reversal of the market trend, last year's maks probably will not be approached.

It is also noteworthy that the appraised valuation of Arizona's industries for tax purposes is as follows:

Mining .....	\$182,259,044
City Lots & Improvements.....	168,274,686
Land & Improvements .....	72,770,147
Railroads .....	96,281,975
Public Utilities (Inc. Tel. & Tel.) .....	40,585,743
All other Property.....	106,504,260

While the dollar value of the production from mining and from agriculture is practically the same it will be noticed that the state receives far more tax income from mining than from any other industry.

The tabulation on the opposite page shows Arizona's non-ferrous metallic production for the past ten years.

of blowing, and it is not affected by moisture or humid climatic conditions. Having a high specific volume, it does not compress easily under its own weight, but remains fluffy and springy.

The company is starting the construction of a reverberatory furnace which will utilize natural gas for fuel instead of the coke now being used in the cupola furnace. The new installation is expected to effect a substantial saving on fuel cost and will also increase the plant capacity.

Markets for the product are already established, both in and outside the state, and the demand is absorbing all that the plant can produce on the basis of one shift per day.

### Onyx:

Some onyx has been produced during the year from the quarry near Mayer, and it is reported that California interests have recently acquired an option on the T. C. McReynolds deposit near Seven Springs, north of Phoenix. No other activity has been noted in this field.

### Bentonite Clay:

Production of bentonite clay from a deposit near Sanders on the Santa Fe railroad in Apache County continued at the rate of approximately twenty cars per week throughout the year. The clay is shipped to oil refineries where it is used for filtering purposes.

The Department is carrying on a rather extensive survey throughout the state for other commercial clay deposits. This work is not yet completed but some interesting deposits are being disclosed.

### Silica Sand:

The Meteor Crater Silica Company has moved its plant from Meteor Crater and rebuilt it alongside the railroad west of Winslow. The crude silica is quarried at the Crater and hauled to the plant where it is crushed, pulverized and screened into sizes. Most of the product goes to glass manufacturers. The plant has a capacity of about three cars per shift.

## URANIUM

The year has witnessed much to do about uranium and Arizona has become second only to Colorado in uranium production.

Following press notoriety given to a "find" of uranium bearing petrified wood in the Vermillion Cliffs of northern Arizona, our office has been swamped by persons bringing samples or wanting information. On some days we have had over 100 callers. Uranium in petrified wood is not an unusual oc-

finished product can be either by rail or truck, as the plant is located on U. S. Highway 84 and is connected by a short spur to the main line of the Southern Pacific Railroad. The plant will have a capacity of 4,000 barrels per day.

**Flagstone:**

High quality flagstone is being produced in increasing quantities from various quarries in a large area about 20 miles south of Ashfork. The largest operators in the district are Mills, Inc., who produce from large quarries near Drake, and the MC Quarry near Ashfork. Several other smaller producers are active in the area, and the aggregate production from all of these is substantial.

Part of the flagstone is trucked directly to Phoenix and other points in the state, but the larger proportion is loaded on the Santa Fe railroad at Drake for shipment to marketing outlets on the Pacific coast. The quality of the stone is such that it can compete successfully with products from other areas which are nearer to the markets.

**Rock Wool:**

During the past year the Sun Valley Manufacturing Corporation has completed and put into operation a modern plant in Phoenix for the manufacture of rock wool. Basalt and smelter slag are the raw materials used, and the resultant product is a high-quality rock wool possessing some distinctive characteristics. Unlike some similar competitive materials, the wool from this plant is said to be splinter-free and non-irritating to the skin when handled on insulating jobs. It forms naturally into small pellets which lend themselves admirably to the process



Quarrying flagstone in northern Arizona

	GOLD oz.	SILVER oz.	COPPER lbs.	LEAD lbs.	ZINC lbs.
1939 .....	316,453	7,824,004	524,224,000	21,542,000	13,422,000
1940 .....	294,807	7,075,215	562,338,000	26,532,000	30,912,000
1941 .....	315,392	7,498,260	652,634,000	31,276,000	32,986,000
1942 .....	253,651	7,064,467	786,774,000	29,544,000	37,044,000
1943 .....	171,810	5,713,889	806,362,000	27,454,000	39,354,000
1944 .....	112,162	4,394,039	716,606,000	33,414,000	58,154,000
1945 .....	77,223	3,558,216	574,406,000	45,734,000	80,452,000
1946 .....	79,024	3,268,765	578,446,000	47,860,000	87,330,000
1947 .....	95,860	4,569,084	732,436,000	57,132,000	109,288,000
1948* .....	107,000	4,720,000	744,000,000	58,000,000	107,500,000

\*Figures for 1948 are preliminary

### Gold and Silver:

There appears to be no prospect of any increase in the price of gold so far as the United States government is concerned, but there is an ever growing demand that American gold producers be allowed to sell their metal freely for whatever price they can get in the world market. Some restrictions have already been removed by the Treasury Department, and there is no valid reason why the lid should not be lifted entirely.

Two or three mines in Arizona are producing gold and silver or silver alone, but they can operate only by reason of the fact that their orebodies are large enough to permit the use of cheap mining methods and that their ore is in demand as a smelter flux. They often receive a very favorable smelting rate, but the average gold and silver miner is still shackled by high mining costs and pegged metal prices.

The increase in the quantity and value of gold and silver produced in Arizona during 1948 was due almost entirely to the larger tonnages of copper and lead ores which were mined, and of which the precious metals were a by-product.

### Copper, Lead and Zinc:

Copper production in Arizona during 1948 amounted to 744,000,000 pounds, an increase of 1.6 percent over the previous year, and the greatest since 1943. With the price of 23½ cents which prevailed throughout the year, the money value amounted to approximately \$163,000,000. Many small mines have been able to operate during the period of good market prices, but with copper selling at 18 cents, many of the small mines and a few of the large ones are curtailing or closing down completely.



An "antiqua," pre-history mine opening discovered near the Superstition Mt.

steady rate of production. The reserves of raw material in the area near Superior are enormous, and the chief problems of the industry continue to lie in marketing and processing. Expanded perlite has been proven to be an excellent material for use in light-weight building blocks and concrete aggregate, insulating and acoustic plaster and, in the loose form, for the insulation of residential and commercial buildings.

### Barite:

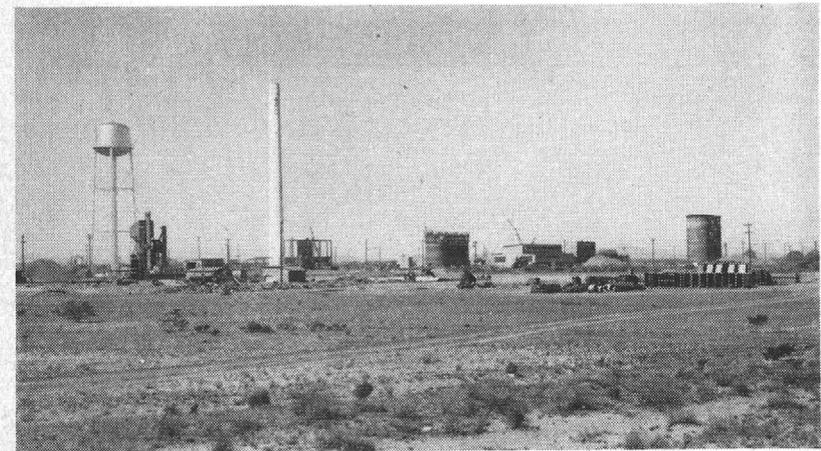
The production of Barite in Arizona has continued steadily during the past year, and, had it not been for successive increases in freight rates, the tonnage produced would have been even greater. The Arizona Barite Company is shipping steadily from its mine near Granite Reef Dam, and processing the ore in its modern flotation plant south of Mesa. Production has been at the rate of approximately 50,000 tons annually.

An interesting feature of the Granite Reef orebodies is the presence of silver in the form of cerargyrite, and the company is planning to do considerable diamond drilling in some of the better showings in order to determine the extent of the silver-bearing ore.

### Cement:

The Arizona Portland Cement Company is well along toward completion of a modern cement plant at Rillito, about twenty miles northwest of Tucson. The work is being done under contract by the Fisher Construction Company of Phoenix, and it should not be many months until the plant is in operation.

Practically all of the necessary raw materials are available within a distance of less than ten miles. Transportation of the



The new cement plant at Rillito

At present, some work is being done toward the production of chips for terrazzo, and it is hoped that this outlet may furnish sufficient income to permit the purchase of needed equipment and the further development of the deposits.

**Lime:**

One of the oldest and most successful producers of non-metallic materials in Arizona is the Paul Lime Company which operates its properties at Paul Spur, about 10 miles west of Douglas. The company produces burned lime products and crushed stone for building purposes. It is also reported that the company is installing a reverberatory furnace preparatory to resuming the manufacture of rock-wool from limestone and smelter slag.

The quarry and plant are served by a spur from the main line of the Southern Pacific Railroad and by a short, paved connection to U. S. Highway 80. Products are shipped to many points, both in and outside the State of Arizona.

**Gypsum:**

Production of gypsum from the property of the Union Plaster Company, south of Winkelman, has continued steadily throughout the past year. All of the crude gypsum is shipped to the company's plant at Phoenix for processing into plaster, plaster products and agricultural gypsum. The installation of a large feeder at the crushing plant at the mine has materially increased the productive capacity of the property and the deposit shows no signs of becoming exhausted.

**Pumice:**

The pumice deposit just south of Williams has produced almost continuously throughout the year, and has proven to be more extensive than was originally estimated. The quality of the material is very satisfactory and the market has expanded considerably. The product is shipped to Phoenix and Mesa where it is used by the Builders Supply Corporation in the manufacture of light-weight building blocks.

Another very promising deposit of high-quality pumice was partially developed during the year in an area about 17 miles north of Flagstaff. Although the ultimate extent of this deposit is not yet known, it has already been proven to be considerable.

Other deposits have been reported at various places in the state, but none has been sufficiently developed to allow any evaluation as to quantity or quality.

**Perlite:**

No new operations were started in this field during the year, but most of the older producers have maintained a fairly

Congress has removed the excise tax on copper imports until June 1950, and foreign metal will come in duty-free until that date. There is little likelihood that the rate of importation will drop during the coming year.

If anything, it may increase and, unless Congress sees fit to reimpose the full four-cent protective tariff, the future of our domestic copper industry will not be bright. It is to be hoped that our legislators will not permit a repetition of the tragic mistakes which glutted our markets with foreign copper in the thirties and which closed nearly every mine in the United States.

The tonnage of lead mined in Arizona during 1948 surpassed that of any previous year, and the value of the metal, something more than \$10,000,000, was approximately 25 percent greater than the former high record set in 1947. In spite of high freight and smelting rates, numerous small lead mines in the state were able to operate because the price of lead reached an all-time high of 21½ cents. Rapid successive drops in price in the spring of 1949 have had their inevitable effect, and production for the current year will probably show a sharp decline.

Zinc production will likewise be adversely affected—possibly to an even greater extent than lead. Extremely high transportation and treatment costs leave the primary producer a very small profit margin, and unless the smaller mines can devise some method of reducing their production costs, many of them will be forced to suspend operations. A zinc smelter in the state would help.

During 1949, the price of zinc was advanced until it reached a maximum of 17.5 cents. The tonnage of metal mined fell a little below the mark set in 1947, but the high average price resulted in a new record production value of over \$14,000,000.

**Miscellaneous Ores & Minerals:**

The Anderson brothers are continuing to develop their claims in the pegmatite area northeast of Morrystown, and are producing a small amount of bismuth concentrates from their mill. During the past year, they have stripped several new areas in the pegmatites and have uncovered additional promising exposures of beryl, amblygonite and spodumene. Some tantalite has also been found in one place on the property.

The Andersons deserve a great deal of credit for their efforts to demonstrate the potentialities of this pegmatite area, and it is to be hoped that they may eventually interest some chemical concern or other similar consumer of the above-mentioned materials. They have already proven that the pegmatites carry commercially valuable quantities of various desirable minerals, and that the area is worth a careful and extensive investigation.

There has been little activity in the mining of other miscellaneous ores such as manganese, tungsten and mercury. Foreign cartels have driven the price of quicksilver down to a point which has forced the closure of practically every mercury mine in the United States - a classic example of what uncontrolled foreign competition can do to American industry.

Interest in manganese properties has increased considerably during recent months, possibly because of the Russian threats of cutting off exports to this country. Eventually, we will be forced to utilize our own enormous low-grade deposits, even though the cost may be much higher than we have been accustomed to paying. We should surely realize by now that dependence upon imports of any strategic materials from abroad is a dangerous path to follow, and the sooner we develop our own resources, the more secure will be our future existence.

This department has recently been informed that the Molybdenum Corporation of America, 406 South Main Street, Los Angeles, California, is in the market for tungsten concentrates with a minimum content of 60 percent WO<sub>3</sub>. They were offering (at the time of the notice) \$23.52 per unit at points of accumulation. Some Arizona producers may be interested in the announcement.

## ARIZONA NON-METALLICS

### Asbestos:

There has been a considerable increase during the past year in the development and operation of Arizona asbestos properties. Market conditions at present are reported to be quite favorable.

Globe continues to be the center of operations for properties in the Chrysotile and Sierra Ancha areas. The principal producers have been the Globe Asbestos Company and Guy Phillips, both of whom produce a finished product. The Globe Asbestos Company operates the Regal Mine near Chrysotile and the mill at Globe. It also handles custom ore from some of the smaller producers. Phillips mines and mills ore on his property near Chrysotile, and is at present opening up a new mine which is located approximately half a mile distant from his original workings.

Other operators who are either producing or developing properties for production are: R. G. Robertson on the old Frank Lund property at Bear Canyon, and Chas. Ireland on his Fibre King group. Roger Kyle is reported to be building a road into his property in the Sierra Anchas, and Mr. Enders is milling tailings from the old Johns-Manville property.

### Mica:

The production of ground mica and scrap mica has continued without much change during the past year. Various grades of ground muscovite are being produced by the Pumice Corporation of America on the Sunshine Mica property a few miles southwest of Ajo. The company mills the material in a small but efficient plant, using both air and electrostatic separation. The bulk of their production is being used by paint manufacturers on the Pacific coast. Operations on the property are under the management of B. L. Gammel, Box 652, Ajo.

Walter Tocco is continuing to produce sericite mica from the mines of the Buckeye Mica Company, three miles south of Buckeye. The crude material is hauled to Buckeye and processed in a small plant in that town.

No other production in quantity is known to have been made in the state during the past year, although there have been various inquiries made to the Department by people who were looking for mica properties or products.

### Feldspar:

The only commercial production of feldspar in Arizona at present is coming from the plant of the Consolidated Feldspar Corporation at Kingman. The company is producing approximately 1,400 tons of processed feldspar per month and, in addition, about 200 tons of silica. The products are used in the manufacture of ceramics, tile, sanitary ware and glass.

### Fluorspar:

So far as is known, fluorspar is being produced from only two properties in Arizona. The largest production is coming from mines operated by Cooper Shapleigh, Jr., in the Whetstone Mountains southwest of Benson. Occasional shipments are being made also by the Campbell brothers from a mine about 12 miles northwest of Morristown. None of the Fluorspar properties in the Duncan area have been active for a considerable time.

### Marble:

The Ligier Marble Quarry at Dragoon has operated during the past year on a curtailed basis. Marketing problems have hampered the development of what is probably one of the largest deposits of high quality decorative marble in the United States. It is ironic that, although the Ligier marble is acknowledged by experts to compare favorably with the finest quality of imported stone, large producers in the United States apparently prefer to import material from abroad.

The Ligier Quarries produce large blocks, but do not have the equipment necessary to produce sawed slabs. Their marble shows a wide variety of colors and patterns - ranging from blacks to reds, yellows, browns and variegated mixtures. Tonnage possibilities appear to be unlimited.