
**SECOND
ANNUAL REPORT**

•
**DEPARTMENT OF
MINERAL RESOURCES**

STATE OF ARIZONA

July 1, 1939 to June 30, 1941

•
J. S. COUPAL, Director

OFFICIAL FILE



DEPARTMENT OF MINERAL RESOURCES

Board of Governors:

Charles F. Willis, Phoenix, Arizona, chairman
Dr. N. H. Morrison, Phoenix, Arizona, vice-chairman
Shelton G. Dowell, Douglas, Arizona
Loyde C. Edmonson, Globe, Arizona
L. V. Root, Kingman, Arizona

Personnel of Department:

Phoenix, Arizona office
J. S. Coupal, director
W. J. Graham, assistant to the director
Jess R. Fickas, secretary
Larry G. Houk, statistician
Jackson Hoagland, director of publications
Anna M. Houser, typist

Field Engineers:

Carl G. Barth, Jr., Prescott, Arizona
Miles M. Carpenter, Tucson, Arizona
Elgin B. Holt, Kingman, Arizona
Newton Wolcott, Globe, Arizona

Offices:

Phoenix, Capitol Bldg.
Globe, County Engineer's Office, Court House.
Kingman, Mohave County Chamber of Commerce
Prescott, Chamber of Commerce, Court House.
Tucson, Chamber of Commerce, 113 S. Stone Ave.

PRINTED IN ARIZONA



In compliance with Chapter 27, Laws of 1939, creating the Department of Mineral Resources, the following report of the activities of the department for the biennium, July 1, 1939 to June 30, 1941, is respectively submitted.

To Honorable Sidney P. Osborn, Governor
State of Arizona
Phoenix, Arizona.

Dear Governor Osborn:

In order to more fully understand and appreciate the scope and importance of the activities of the Arizona Department of Mineral Resources, it seems advisable to review briefly the reasons for the creating of the organization as it was established as an answer to very definite problems confronting the small mine operators of the state.

For many years there had been a marked decadence in Arizona mining, and it was due largely to the fact that new mines were not being started and developed at a sufficiently rapid rate to overcome the mortality of those that had been existing and producing in previous years.

To have a continuing mining industry it is necessary that there be mines in all stages of development from the prospect to the producer, and it is necessary that continuous progress be made in order to provide against any lapse in the state's mineral production.

Statistics, however, revealed that during the past two decades a tremendous gap had developed and that this gap was rapidly widening. Unless a study was made of the reasons for the lack of development of new Arizona mines the state could look forward only to continuously receding industry, even though it were definitely known that there were ample mineral resources to be exploited.

In the period between 1935 and 1937 it was revealed by the Minerals Handbook published by the United States Bureau of Mines that the number of producing small mines in Arizona had dropped from about 2,200 to 1,200.

This alarming drop in number of producing units was of grave concern to civic-minded citizens of the state who were interested in the mining industry and the welfare of Arizona and it was determined that, through organized methods, the steps could and should

be taken to correct this situation by stimulating a public interest in the exploitation of small mines and assist in overcoming their problems and bringing them into the producing class.

This was the basis of the organization of the Arizona Small Mine Operators Association. These small mine operators, prospectors, and many others who were indirectly interested in the development and operation of small mines formed themselves into an association to study the problems of, and work for, the betterment of the Arizona mining industry, particularly relating to the small mines.

The form of organization adopted consisted of a state headquarters office for coordination of the work of independent and autonomous councils located in the various active mining camps and communities.

These local councils were to meet once a month to discuss their problems and to make studies of various subjects which apparently were retarding the normal growth of the industry and report their findings to the state headquarters with suggestions as to plans for correcting them. The state headquarters was to coordinate these suggestions and to furnish information as to both state and federal subjects needing the attention of those engaged in the mining industry.

The state governing body was a state council composed of one representative from each of the local councils. The state council was to be the group of the association where policies and activities of the organization could be freely and frankly discussed by a truly representative assembly. The state council was to meet about once every six months. Membership in the organization was thrown open to all who were actively interested in the welfare and betterment of the small mine industry.

The first council of the Arizona Small Mine Operators Association was organized in Superior on February 11, 1938, and at the time of the first annual meeting in Prescott in August of the same year, 42 councils had been formed and the membership of the Association had passed the two thousand mark.

At the first meeting of the state council held in Prescott a discussion of the problems retarding the growth and condition of the mining industry of Arizona revealed the fact that they were mainly economic and that, to arrive at a solution, it would be necessary to go deeper into study, research and technical assistance in the field than would be possible for a volunteer group. It was also held that

DEPARTMENT OF MINERAL RESOURCES

Statement of Expenses

July 1, 1940 to June 30, 1941

| | | | | | |
|------------------------------------|------------|--|--|--|-------------|
| Allotment | | | | | \$30,000.00 |
| ADMINISTRATIVE | | | | | |
| Salaries | \$6,358.68 | | | | |
| Travel | 810.51 | | | | |
| Printing | 1,148.98 | | | | |
| Postage | 462.50 | | | | |
| Telephone & Telegraph | 153.62 | | | | |
| Miscellaneous | 1,229.42 | | | | |
| | | | | | \$10,163.71 |
| Statistical | | | | | |
| Salaries | \$2,100.00 | | | | |
| Travel | 26.40 | | | | |
| Engineer & Drafting Supplies | 41.66 | | | | |
| | | | | | 2,168.06 |
| Publicity | | | | | |
| Salaries | \$ 550.00 | | | | |
| Travel | None | | | | |
| | | | | | 550.00 |
| Special Projects | | | | | |
| Salaries | \$ 875.00 | | | | |
| Travel | 278.47 | | | | |
| | | | | | 1,153.47 |
| Capital Expense | \$ 409.01 | | | | |
| | | | | | 409.01 |
| FIELD WORK | | | | | |
| Headquarters Field Expense | | | | | |
| Salaries | \$3,150.00 | | | | |
| Travel | 1,476.18 | | | | |
| | | | | | \$4,626.18 |
| Eastern District—Globe | | | | | |
| Salaries | \$2,400.00 | | | | |
| Travel | 1,095.66 | | | | |
| | | | | | 3,495.66 |
| Southern District—Tucson | | | | | |
| Salaries | \$2,400.00 | | | | |
| Travel | 1,256.63 | | | | |
| | | | | | 3,656.63 |
| Northern District—Kingman | | | | | |
| Salaries | \$2,300.00 | | | | |
| Travel | 1,470.05 | | | | |
| | | | | | 3,770.05 |
| | | | | | 15,548.52 |
| | | | | | 29,992.77 |
| Returned to State | | | | | \$ 7.23 |

DEPARTMENT OF MINERAL RESOURCES

Statement of Expenses

July 1, 1939, to June 30, 1940.

Allotment\$30,000.00

ADMINISTRATIVE

| | | |
|-----------------------------|------------|-------------|
| Salaries | \$6,015.54 | |
| Travel | 419.43 | |
| Printing | 303.88 | |
| Postage | 204.12 | |
| Telephone & Telegraph | 161.57 | |
| Miscellaneous | 687.99 | \$ 7,792.53 |

Statistical

| | | |
|---------------------------------------|------------|----------|
| Salaries | \$1,864.77 | |
| Travel | 13.00 | |
| Engineering & Drafting Supplies | 245.57 | 2,123.34 |

Publicity

| | | |
|----------------|-----------|--------|
| Salaries | \$ 977.77 | |
| Travel | 11.64 | 989.41 |

| | | |
|-----------------------|-----------|--------|
| Capital Expense | \$ 512.41 | 512.41 |
|-----------------------|-----------|--------|

FIELD WORK

| | | |
|----------------------------|------------|------------|
| Headquarters Field Expense | | |
| Salary | \$3,150.00 | |
| Travel | 1,608.18 | \$4,758.18 |

Central District—Prescott

| | | |
|--------------|------------|----------|
| Salary | \$2,032.26 | |
| Travel | 858.91 | 2,891.17 |

Eastern District—Globe

| | | |
|--------------|------------|----------|
| Salary | \$2,400.00 | |
| Travel | 1,368.99 | 3,768.99 |

Southern District—Tucson

| | | |
|--------------|------------|----------|
| Salary | \$2,400.00 | |
| Travel | 1,100.83 | 3,500.83 |

Western District—Kingman

| | | | |
|--------------|------------|----------|-------------|
| Salary | \$2,400.00 | | |
| Travel | 1,262.94 | 3,662.94 | \$18,582.11 |

| | | | | |
|-------------------------|--|--|--|--------|
| Returned to State | | | | \$.20 |
|-------------------------|--|--|--|--------|

such a program required the full time and effort of a paid, properly equipped and trained staff and that the results of such work would be of much economic benefit to the entire state. All work previous to that time and since done by the councils and members of the A. S. M. O. A. is voluntary, and naturally the time that any individual is able to devote to it is limited.

As a result of the deliberations of this state council meeting held in Prescott in August, 1938, a plan was drafted for a state department to be known as the Department of Mineral Resources. This plan was carefully worked out, submitted to the various councils in the state for their discussion and suggestions, and approved by the second state council meeting held in January, 1939, in the form of a bill to be presented to the legislature.

Immediately thereafter a bill creating the Department of Mineral Resources was presented to the Fourteenth Arizona Legislature, was unanimously passed by both the Senate and the House of Representatives, and was signed by Governor Robert T. Jones on March 1, 1939. At the time Governor Jones signed the bill creating the Department of Mineral Resources he characterized it as "the most constructive legislation that had been enacted."

PRELIMINARY WORK

The major part of the work of the first year was devoted to a resource survey, the gathering of information on many partially developed prospects and known mines, and mineral deposits of the state, and to the study of such problems as seemed to be common to a large number of small mine operators. In addition, extensive personal field service was rendered to the prospectors and small mine operators individually on their special problems.

This work was effectively carried on by close cooperation of the field engineers of the department with the local councils of the Arizona Small Mine Operators Association. At the various council meetings the field engineers were able to meet with the members, assist in the discussion of their problems, and arrange for visits and examinations of the mines in the particular district where their services were required and requested.

The headquarters office of the department at Phoenix was able to act as a clearing house or bureau of information on all phases of small mine activities and to assist prospective capital or purchasers of mining properties in finding and making contact with owners of mines or mineral deposits which fitted their special requirements.

A unique and different policy was formulated in dealing with prospective purchasers of mines in that the effort was made to serve them as customers and to find for them the kind of properties which they were seeking. In other words, it was the state organization "scouting" for mine buyers, rather than the older method of forcing them to scout for themselves and become disgusted and disillusioned by the many wild goose chases that they had been led upon. That the policy was right is indicated by the very large number of properties that changed hands and started up as a result of the department's activities.

Another early phase of the department work was the gathering of the basic statistical and economic information which it was known would be required from time to time in compiling reports and making studies. The department was assisted in this by Dixon Fagerberg, C. P. A. of Phoenix, and many tables and charts were made by his competent organization.

The value of having this data available has been proven many times in that, when preparing and presenting briefs on mining subjects, the time was usually too limited to gather the statistics necessary and, in most cases, it was found that they were already on hand. Had it not been for this work having been completed, it would have been impossible to have presented the data to Washington authorities in the complete and effective form required to win the particular argument.

The department records are now ready to produce statistical and economic data on almost any phase of Arizona mining and its relations to the state and nation. Many cases for its use have come up which have fully demonstrated the great advantage to the state in having the data available for immediate use. These files have already proven invaluable.

The statistical work has also served to give an accurate picture of the changes in conditions and the trends thus giving an opportunity to work upon and clarify the causes of economic problems which have retarded development of the state's mineral resources.

Surveys of special projects, such as roads to serve isolated mining areas, custom milling plants, custom smelters, and numerous other problems relating to mining, were requested and carried out by the department.

This work continued actively up to June 30, 1941, when the state supported status of the department was terminated by the fact that Governor Sidney P. Osborn vetoed the appropriation for the

adjustments would have been impossible. The general feeling has been that we were all working for the welfare of the state and that personal and group interests should take second place to matters of statewide and general interest.

The Board of Governors have given freely of their time and services without compensation. At their quarterly meetings the review of the work of the department for the preceding quarter has been of a most constructive nature. The plans and policies discussed and adopted at the meetings were always impersonal in their motives and were directed toward the betterment and growth of the small mine industry of the state and for the state's welfare. As director, and on behalf of the personnel of the department, the highest appreciation is expressed for the helpful and kind consideration shown by the Board of Governors.

Special appreciation is due Mr. Charles F. Willis, Chairman of the Board of Governors, not only from the department but from the state as a whole. He has given most generously and lavishly of his time and experience and has worked unselfishly for the protection of the small mine industry and the betterment of its opportunities. Although entitled under the law to draw expense incurred in the performance of his duties, he has never put in a claim for one penny.

A statement of the expense of the department for the years July 1, 1939, to June 30, 1940, and July 1, 1940, to June 30, 1941, is attached and made a part of this report

Respectfully submitted,



Director,
Department of Mineral Resources,
State of Arizona.

Phoenix, Arizona
July 15, 1941.

other than was intended by those responsible for the passage of the act.

"I can see no other manner in which this department can be brought to the realization of the error into which it has fallen than to veto this appropriation in its entirety. I feel that in so doing the interest of the prospector and small mine owner is best served. I am confident in the belief that as time goes on, we can obtain a Mineral Resources Board which will function for the sole benefit and protection of those courageous citizens who, with commendable enthusiasm and sublime faith, pit their time and their resources against the forces of nature in an endeavor to produce new wealth.

"Until this can be brought about it appears that the appropriation carried in sub-division 27 of House Bill No. 190 is a waste of public's funds, therefore I feel myself compelled to disapprove said sub-division 27 of House Bill No. 190 and approve all of the various sections of the measure other than sub-division 27."

"Sincerely,

"SIDNEY P. OSBORN,

"Governor."

The activities of the Department of Mineral Resources as shown by this report indicate that the Governor was not fully informed as to the activities and work which the department was doing and had been misinformed as to the relative importance or predominance of certain features. To my knowledge the governor has never made any investigation of the department work and he has drawn his conclusions without full knowledge of the facts.

It is believed that this report speaks for itself in answering the criticism of the Governor.

APPRECIATION

On behalf of the Board of Governors and the personnel of the department, the appreciation of the close cooperation by many other agencies, both state and federal, is sincerely and honestly tendered. Without their cooperation many of the problems encountered would have been extremely difficult to solve and satisfactory

maintenance of the department made by the Fifteenth Arizona Legislature.

BASIC LAW

In order that it may be understood how closely the activities of the Department of Mineral Resources conformed to the objectives listed in the basic law creating it, it seems advisable to quote Section 2 of the law headed "Functions of Department." The law creating it states that:

The Department of Mineral Resources shall:

1. Aid in the promotion and development of the mineral resources of the state.
2. Conduct studies of the economic problems of prospectors and operators of small mines with a view to assisting in their solution.
3. Assist in discovering sources of supply for persons desiring to buy minerals.
4. List and describe available mining properties.
5. Make mineral resource surveys and conduct such other investigations as may interest capital in the development of the state's mineral resources.
6. Serve as a bureau of mining information in conjunction with the Arizona Bureau of Mines.
7. Publish and disseminate such information and data as may be necessary or advisable to attain its objectives.
8. Cooperate with the state land department to encourage mining activity on state lands.
9. Cooperate with the Corporation Commission in its investigations and administration of laws relating to the sale of mining securities.
10. 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.
11. Cooperate with federal and other agencies having for their purposes the development of mines and minerals.
12. Work against all congressional acts favoring reciprocal or duty free imports of foreign minerals.

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

BOARD OF GOVERNORS

The law provided for the appointment of a Board of Governors to serve without compensation other than expense for attending meetings. The first board was to be appointed for varying terms from one to five years and upon expiration of those terms, their successors were to be appointed for five-year terms. The object of the staggered terms was to provide for a continuity of policies, a minimum of political control, and to guard against sudden changes in personnel.

In accordance with the terms of the Act, A. C. W. Bowen of Winkelman was appointed for the term expiring January 31, 1940; Dr. N. H. Morrison of Phoenix for the term expiring January 31, 1941; Shelton G. Dowell of Douglas for the term expiring January 31, 1942; J. Hubert Smith of Kingman for the term expiring January 31, 1943; and Charles F. Willis of Phoenix for the term expiring January 31, 1944.

On February 1, 1940, Loyde C. Edmonson of Globe was appointed a member of the board for a five-year term to fill the vacancy occasioned by the expiration of the term of A. C. W. Bowen. On November 9, 1940, J. Hubert Smith of Kingman tendered his resignation as a member of the board to Governor Robert T. Jones, because he had been elected to the Fifteenth Legislature as senator from Mohave County and could not legally hold the position. Leroy V. Root of Kingman was appointed by Governor Jones on November 12, 1940, to fill the unexpired term of J. Hubert Smith.

In his inaugural speech on January 6, 1941, Governor Sidney P. Osborn demanded the immediate resignations of all members of state boards, agencies, commissions and departments. The two members of the Board of Governors of the Department of Mineral Resources whose terms would have automatically expired during the period for which Governor Osborn was elected tendered their resignations on this demand; namely, Dr. N. H. Morrison and Shelton G. Dowell. These resignations are, at this time, in the hands of the Governor and have not been formally accepted, rejected, or returned.

No new appointments have been made to fill either the vacancy caused by the expiration of the term of membership of

Due, however, to the demand for economy and that budgets be kept within former appropriations, the request to the legislature called for certain cuts in the higher salaries in order to provide for additional office service.

At the hearings before the House and Senate Appropriation Committees of the Fifteenth Arizona Legislature the budget for the department was carefully discussed and resulted in the legislative approval of an annual budget of \$28,700.

The general appropriation bill, in which the department budget was included, was presented to the Governor at the end of the legislative session and the entire budget for the Department of Mineral Resources was vetoed by him.

Following is a copy of the message to the Secretary of State which accompanied the veto of the appropriation made by the Fifteenth Legislature for the Department of Mineral Resources.

"The measure providing for the establishment of a State Board of Mineral Resources was enacted by the Fourteenth Legislature to encourage and protect those engaged in prospecting and small mining operations. This is a worthy purpose and, had the Department of Mineral Resources carried out that purpose, I would not feel called upon to disapprove the appropriation made for its conduct. However, I am certain that those charged with the conduct of the department have lost sight of the purpose for which the measure was enacted and apparently have become imbued with the delusion that the primary purpose of the department is to act as a propaganda agency for the large mining companies of Arizona.

"There can be no criticism of large mining companies for placing their views before the public on matters of taxation, social legislation and kindred subjects. However, there can be proper criticism of any state authority which spends the people's money for that purpose.

"I have hoped the present members of the Board of Mineral Resources would resign so the board could be reorganized in a manner which would permit the operation of the department to be devoted entirely to the protection and progress of the prospectors and small mine owners. However, they have failed to do so, and apparently persist in the mistaken idea that the department shall function

It is felt that if something can be worked out along that line, it might be possible to have at least double the number of field engineers without greater state expense and it would far more than double the benefits to be derived.

Abundant potential production possibilities of practically all of the metals are found in Arizona. The less common metals and the non-metallics, however, offer a very vital and new field for exploration and development. They have scarcely been touched in Arizona. The present crisis is calling for increased production of all metals and non-metallics. This production must come from new mines or from the present partially developed old and abandoned mines.

To attract private capital to the state to undertake the exploration and development of new mines calls for a detailed presentation of the opportunities existing in the highly mineralized areas and rendering assistance to outside capital in finding the kind of mining properties that meet capital's requirements. There seems to be ample money available but it is cautious and is not of the highly speculative kind which existed in the past.

All these mining opportunities will not develop into paying properties, but a large number are worthy of careful investigation and from them many producers may be developed. To get these Arizona must attractively present that which it has available.

It has been shown conclusively that the department has and can continue to create new taxable income to the state greatly in excess of the cost of maintaining the department. Good business policy should demand that the work be expanded so as to make it more effective in the creation of new industries, new payrolls, and new sources of taxable wealth. The most effective way to reduce the tax load is to increase the number of taxpayers. Arizona's remaining frontiers are down into the earth and there are many opportunities yet to be developed if given half a chance.

BUDGET AND APPROPRIATION

The state appropriation for the Department of Mineral Resources for the period from July 1, 1939, to June 30, 1941 was \$60,000—\$30,000 for each year—and the budget was laid out at the rate of \$2,500 per month. In view of the experience gained during the year and a half of the department work prior to presentation of a budget to the Fifteenth Arizona Legislature plans were discussed for a slight increase in order to take care of the added office work necessary with the increasing demands for service and special research.

Dr. N. H. Morrison on January 31, 1941, nor by the resignation of Shelton G. Dowell. Therefore, both of these gentlemen have continued to act as members of the board under the ruling of the Attorney General that they serve until their successors are appointed.

The Board of Governors meet quarterly in January, April, July and October to review and discuss the work of the department for the previous quarter, receive reports, approve financial statements, make budgets, outline policies, and to perform such other duties as may be required of them.

It has been the policy of the Board of Governors to have the field engineers of the department meet with them for personal reports and discussion of ways and means as to how they may better serve the small mine operators.

DEPARTMENT PERSONNEL

The Phoenix office personnel continued for the entire two-year period and was comprised of J. S. Coupal, director; W. J. Graham, assistant to the director and secretary of the Board of Governors; Jess R. Fickas, secretary; Lawrence G. Houk, statistician; Jackson Hoagland, director of publications; and Anna M. Houser, typist.

The field engineers also continued as in the first year and were: Carl G. Barth, Jr., covering the central district with headquarters in Prescott; Miles M. Carpenter, covering the southern district with headquarters in Tucson; Elgin B. Holt, covering the western district with headquarters in Kingman; and Newton Wolcott, covering the eastern district with headquarters in Globe.

Because of a serious illness, Carl G. Barth, Jr., was granted a three months' leave of absence, starting in June, 1940, which was extended another three months in August as he desired to go to Philadelphia for medical treatment. He did not respond to the treatment and notice of his death was received on November 2, 1940.

Changes were made during the period of Barth's leave of absence so that the three engineers covered the entire state. This was done by rearrangement of territory, giving each man a somewhat larger district than he had previously contacted.

Acting upon a request of the meeting of the State Council of the Arizona Small Mine Operators Association in Globe in August, 1940, plans were considered at the October meeting of the Board of Governors to have a study made of the facts and a survey per-

taining to dust conditions in the mining industry and in the state and their relation to silicosis as a compensable industrial disease. In order to make this survey Seton S. Williams, a specialist in industrial dust problems, was engaged for the period from October 15, 1940 to March 15, 1941.

W. J. Graham, assistant to the director, was granted a leave of absence starting January 13, 1941, in order to serve as chief clerk of the Senate of the Fifteenth Legislature, a position in which he had served for a number of years. Mr. Graham acted as clerk of the Senate from January 13, 1941 to May 15, 1941, at which time he returned to his duties as assistant to the director.

Immediately following the veto of the department appropriations by Governor Osborn on March 28, 1941, the Board of Governors employed C. E. Miller, an industrial mining engineer skilled in organization work, to visit each of the councils of the Arizona Small Mine Operators Association and assist them in reorganizing their council activities.

This was done so that they could be ready to take over some of the work which had previously been done by the Department of Mineral Resources with the view to having each council serve, to as great a degree as possible, as a local Department of Mineral Resources contact for that particular community or district after June 30, 1941, when state funds for such work would not be available. Mr. Miller completed the circuit of the A. S. M. O. A. councils on June 21.

ENGINEERS SCHOOL

Inasmuch as the work being started was quite new in character, and men were being sent into the field to advise, cooperate and assist, and as the problems were largely economic rather than technical, it was necessary to give the field engineers and the office staff a comprehensive training in many of the subjects on which they would be called upon for service and advice.

Therefore, upon the beginning of the work a school for engineers covering two weeks of intensive study was started, not alone for the purpose of seeing to it that proper and accurate advice was given, but to coordinate the activities of the department with the various state and federal agencies affecting the mining industry.

The training of the field engineers and the office staff by these conferences, held at the beginning of the department's work, has

some very good bets were overlooked simply because of the inability of the office staff to give service to all of those who asked for it.

The only criticism of the department's activities by the prospectors and operators in the field has been on the limited time that the field engineers have been able to devote to any given area. The four districts into which the mining areas of the state were divided are too large for a single man to cover and do it effectively. In an effort to spread the service evenly over the entire area assigned to the field engineers it required that they cover a large area rather than make a more detailed and concentrated effort in a smaller section.

While the way it has been done was more equitable for all of those being served, it was not for the greatest benefit of the state because of the fact that an opportunity to intensify the field work in certain areas would, under some circumstances, have brought greater state benefits even though it caused less service to be given to other areas. The field engineers time had to be allocated by the demand rather than the need or what could be produced.

Several of the larger and more intensively mineralized counties and districts could have justly asked that a resident mining engineer be assigned to them exclusively, and there is no question but that the concentration of effort would have been highly beneficial and productive to the county and to the state.

It is thought that it might be possible to work out a plan whereby, without a greater expense to the state, there could be a county and state cooperation in maintaining field engineers which would permit of smaller districts in those counties which cared to cooperate because of more extensive mineral opportunities.

There is no thought that such a program be forced upon the counties in any way but that if, through the use of immigration funds, the county supervisors felt that their county could benefit, they could have the opportunity of sharing, along with the state, the expense of the field engineer for greater concentration of work within that area. Inasmuch as this work is designed almost exclusively to the development of resources and the bringing in of new capital, it is entirely within the scope of the work for which immigration funds are designed.

included in the withdrawal. It was shown that valid mining claims existed and that the area withdrawn was far in excess of that needed for preservation of the Organ Pipe cactus.

With all the facts in the case assembled by the department and the Ajo Council of the Arizona Small Mine Operators Association the matter was taken up with Senator Carl Hayden who had a bill prepared to permit mining and prospecting within the monument area. This bill has passed the Senate and is now in the House of Representatives awaiting action.

A similar situation prevailed in establishing the Coronado International Monument and the Catalina Reserve. Through the assistance and cooperation of Senator Hayden revisions have been made in both of these cases to create monuments which provide for prospecting and mining under regulations provided for by the Secretary of the Interior.

REQUIREMENTS AND RECOMMENDATIONS

It must be remembered that the Department of Mineral Resources started its work two years ago in an uncharted field adapting a program to certain economic needs and in an effort to solve difficulties by new and untried methods. In general, the work has been highly successful but the experience gained during the two-year period has pointed the way to certain changes which would improve and benefit the operation of the department and increase its service to the state.

The department was created as a service organization to the mining industry of the state and particularly, though not exclusively, for the small mine operators. The services that have been made possible within the limits of the appropriation have proven of such large and tangible value that it is evident the foundation plan was sound and that more benefits would accrue to the state by additional work.

The "bottleneck" in the program has been in the office work and the inability of the office staff to adequately serve the customers coming to them for mines and places to invest capital in the state. When a prospective mine purchaser appears, either in person or by correspondence, it is not known whether that particular person is a good or a bad customer. They could not all be served because of financial limitations and it is known that

been of extreme value in that they provided the foundation for continuing cooperation which has had its beneficial effect in solving many of the problems that were confronted from time to time. The subjects covered by these conferences included the following:

- Mining on State Lands, with William Alberts, State Land Commissioner.
- Arizona Water Codes, with Edwin T. Stewart, Assistant Water Commissioner.
- Workmen's Compensation Insurance, L. C. Holmes, Chairman of the Arizona Industrial Commission.
- Arizona Labor Laws, Larry Woods, Manager of the Labor Department of the Arizona Industrial Commission.
- Blue Sky Laws, William M. Cox, Chairman of the Arizona Corporation Commission and Amos A. Betts, member.
- Arizona Bureau of Mines, G. M. Butler, Director, Arizona Bureau of Mines, Tucson.
- Federal Bureau of Mines, E. D. Gardner, Supervising Engineer, U. S. Bureau of Mines, Tucson.
- R. F. C. Mine Loans, Don M. Rait, Examining Engineer, Mine Loan Division, Reconstruction Finance Corporation, Washington, D. C.
- Mining on Forest Lands, F. Lee Kirby, Forest Supervisor, Tonto National Forest.
- Unemployment Compensation Insurance, George D. Locke, Acting Director, Arizona Unemployment Compensation Commission.
- Health and Safety in Mining, E. A. Anundsen, Associate Mining Engineer, U. S. Bureau of Mines.
- Registration of Mining Companies, Howard N. Lary, Regional Administrator, Security and Exchange Commission, Denver, Colo.
- Old Age Assistance and Social Security, Harry W. Hill, Commissioner, and J. R. McDougall, Assistant Commissioner, State Department of Social Security and Welfare.
- Relation of Custom Smelters, Brent N. Rickard, Manager, American Smelting and Refining Company, El Paso, Texas.

Mining on the Public Domain, W. H. Burnett, Special Agent, General Land Office, United States Department of Interior, Albuquerque, N. M.

Wage and Hour Law, Jackson Hoagland, Research Editor, The Mining Journal.

National Labor Relations Act, Charles M. Brooks, Attorney, National Labor Relations Board, Los Angeles, Calif.

A verbatim record of these conferences and the discussion was transcribed and has become available to the mining men of the state. Many copies have been distributed to interested parties in addition to a large number of individual chapters to those concerned in the particular subject of that session.

DEPARTMENT ACTIVITIES

Inasmuch as the first work undertaken by the department was a resource survey to determine the mines and minerals available in Arizona, the call for strategic and critical minerals by the federal government for the national defense program found the department well equipped and ready to give immediate service. Additional data and information as to probable production and conditions necessary to operations were promptly gathered and the subject was given special attention by the field engineers.

The extent of the mining possibilities and opportunities in Arizona is so large that a resource survey such as was initiated by the department will take years to complete. It is not alone necessary to ascertain sources, but also to determine availability and conditions pertaining thereto.

A large number of inquiries for mining properties have come to the department from a variety of sources and approximately 200 of them have been handled by sending reports on properties fitting the specifications called for have been submitted to those seeking information. These inquiries have covered a wide range and, while in some cases the requirements of the buyers could not be fulfilled, in most instances it was possible to submit reports on a considerable number of Arizona mining properties.

A list of mines available for lease, sale, or requiring financing was made and revised from time to time. The last list published was dated March 1, 1941. These properties were classified as to the metal predominating in value and the list contained 304 gold lode mines, 14 gold placers, 84 copper properties, 72 silver, 36 lead, 38 manganese, 20 tungsten, 18 quicksilver, 18 molybdenum, 8 vanadium, 5 zinc, 6 miscellaneous minor metals, and 51 non-metallics.

Defense Program in its most efficient way and, at the same time, developing a substantial future which will be worth much to the state when the present emergency has passed.

WITHDRAWN LANDS

Large areas of the public domain have from time to time been withdrawn from entry for prospecting and mining by presidential decree. Lands have been withdrawn for game refuges, national monuments, wilderness areas, and many other designations, and no opportunity is ordinarily given those who may have valid mining claims or other rights to present their views and defend their rights to continued occupation of their land. It has often been found that old and valid mining rights, and the money spent in developing them, has been lost simply because of lack of knowledge of the situation and no opportunity to present cases.

The Department of Mineral Resources has been very active in straightening out such situations by gathering the facts on individual cases and presenting them to the proper authorities. They have assisted many small mine operators in clarifying titles to land that was justly theirs.

As an illustration, on the Two B's Mine in the Boulder Dam area mineral was found and the discoverer wished to locate mining claims. This particular area was under a double withdrawal. The problem of getting a portion of this area restored to mineral entry was put up to the department. After examination by the field engineer and a rather lengthy correspondence, Section 11, Township 29 north, Range 22 west, which covered the mineral discovery was restored to entry.

In most of the cases handled by the department the problem involved the restoring to entry of whole areas rather than individual mining claims by establishing the fact that they were never legally withdrawn or had been withdrawn on false or unreliable evidence.

The withdrawal of lands and the problems involved, in seeing to it that the prospector and small mine owner are justly treated, have been so numerous that efforts have been made in new legislation to prevent their recurrence. In the case of the establishment of the Organ Pipe Cactus National Monument a request was made to the department for a survey to show if mineralized area was

National Defense Minerals

The providing of minerals and metals for defense purposes is the one place in which Arizona can fit into the national emergency program in a substantial way and, during the past year, it has been demonstrated that a state organization like the Department of Mineral Resources is more necessary than ever before and can serve a beneficial purpose both to the state and the nation.

The search for and opening up of strategic and critical minerals has been greatly stimulated and assisted by the department during the past two years. The mineral resource survey of the state was started before the demand for these metals and minerals became so acute. It has proven a source of valuable and prompt information to those seeking properties which could produce the required minerals. The major part of the past year of service of the department has been concentrated on completing the data relative to the possibilities of Arizona production on strategic and critical minerals.

Mica, manganese, tungsten, vanadium, fluorspar, asbestos, and many other minerals on the strategic and critical list have come into production from Arizona mines as a direct result of the department activities. The state has an abundant supply of many of the needed minerals, but exploration and development are required to get them into production.

A statement has been made by the German High Command that, for each man in action in the present mechanized warfare, seven tons of various kinds of metal are required to equip him. Even though the large mines of Arizona and the rest of the country are producing at full capacity, the nation is critically short of practically all of the metals and minerals required. This shortage must be met by production from new mines in the United States.

While many of the essential metals and minerals can be obtained from foreign countries, shipping shortages are bound to have their effect on available ocean transportation. Therefore, it is essential to the welfare of the country that domestic sources of supply be prepared for production as expeditiously as possible.

Never in the history of this country has the need for new mines been of such vital importance and all possible facilities should be made available to the prospectors and the small mine operators in preparing to fulfill the nation's requirements. In serving in this capacity Arizona is playing the part in the National

Under non-metallics were a wide variety of minerals such as mica, asbestos, bentonite, amethyst, iceland spar, barium, fluorspar, talc, graphite, dumortierite, beryllium, feldspar, opal, jadite, garnet, thenardite, gypsum, turquoise, vermiculite, jeffersite, strontium, onyx, diatomaceous earth, sericite, dolomite, limestone, tremolite, obsidian, and numerous others.

This list has been made available to mine buyers and has resulted in numerous inquiries for more detailed information regarding the properties that were previously described briefly and, in the investigation of many of the properties listed. A considerable number of these have since been placed into operation and production. The latest list was more comprehensive than former lists and contained a larger number and variety of properties.

The disinclination to list mining properties available with the department and to furnish descriptions of the same which existed earlier has largely been removed by observation of the fact that the department was efficiently performing its function in bringing in new capital and that the property owners were not being exploited.

In addition to the work of finding properties for new capital for exploration, development, and operation, an important phase of the service of the field engineers was that of rendering direct and personal assistance to the owners of small operating mines and prospects and thus enable them to carry on new development work, increase production, or overcome some of the operating difficulties. This work has resulted in a larger production, increased employment, and continued activity at many properties.

The service offered by the Phoenix office, in cooperation with the field engineers, on questions of conflict with state and federal agencies relating to mining covered a very wide range of subjects and was made use of by a large number of people. These were largely confined to the straightening out of individual difficulties and attempting to find an equitable solution. Included in such problems were those which required the maintenance of personal contact and cooperation with the various state and federal agencies concerned.

Many special projects were studied and reports written and presented to the proper places. Among them were mine-to-market roads, custom mills, smelter projects, centralized treatment plants (with special work on manganese), a protest and briefs on the inclusion of the copper excise tax in the reciprocal trade agreement

with Chile, a compilation of statistical data on Arizona mining and its place in the economic picture of the state, a survey of dust conditions and causes in the mines, regulations governing mining on the various types of land within the state, a survey on copper costs and prices and the possibilities of increased production from high cost and marginal mines, and a host of minor subjects which were of much personal interest to individual prospectors and mine operators.

Many of the less common metals and practically all of the non-metallics do not have an open market and prices are not regularly quoted. The department has maintained a close touch with the purchasers of these materials, market conditions, prices, sources of supply, and so forth and has been able to make many contacts for Arizona operators who had production to sell whereby a market was found.

Numerous conferences have been held by both the chairman of the board and the director of the department with Dr. T. G. Chapman, director of the Arizona Bureau of Mines, in order to more closely coordinate the work of the department with the bureau. These conferences have resulted in a number of changes and additional service from the Bureau of Mines. One of the most important has been the publication of a new series of information circulars on the less common metals and minerals, particularly those which were strategic or critical.

Another phase of the cooperation between the department and the Arizona Bureau of Mines was the establishment of an ore testing department by the bureau for small mines where, at low cost, flow sheets might be worked out and more satisfactory milling results obtained. The work relating to this was done by the Bureau of Mines research staff with the Department of Mineral Resources' engineers doing that part of the work which was in the field.

The work of the department has been carefully planned so as not to overlap or duplicate any of the work of the Arizona Bureau of Mines. Department of Mineral Resources activities have been limited to the economic side of mining and to field problems confronting the small mine operators. In this the full cooperation of the Arizona Bureau of Mines has been obtained, and they have made available the services of their organization on the technical and laboratory problems arising.

The cooperative relation between these two departments has demonstrated that neither the Bureau of Mines nor the Department

interested in conducting a complete detailed engineering survey on the strength of the preliminary work done by the department. Definite headway has been made on this project.

This would be an outstanding accomplishment for the department if completed. Many of the mines producing, or capable of producing, low-grade complex lead-zinc ores are unable to operate at profit on account of the costly freight hauls for lead and zinc ores to smelters in Texas and other areas. Once facilities are provided for smelting Arizona ores, with moderate freight and hauling charges, many new properties would open up for exploration and development.

Custom Mills Mineral surveys for a number of custom mills have been made by the department. By cooperation with the Congress Mill, facilities for custom milling in that area were provided and six to eight small mines in that district were able to ship low grade ores at a profit. Similar surveys have been made for the Cherry district and the Groom Creek district, both in Yavapai County, and at Arivaca, to serve mines in Pima and Santa Cruz Counties. In all three instances private capital has been interested and has made its own investigations with a view to constructing the necessary plants.

Present Copper Tariff Work The increased demand for copper due to the defense program and the threatened shortage of copper supplies within the very near future, resulted in a survey showing the added production that could come out of Arizona by an increase in the price of copper to 14, 16 and 18 cents per pound was undertaken by the department on the request of the Arizona Copper Tariff Board.

Study Of Dust Conditions When definite information was received that an occupational disease bill would be presented at the Fifteenth Arizona Legislature, the Arizona Small Mine Operators Association requested that a study and research work on the dust conditions in the mines of the state be made. As little factual data regarding the problem were available such a study was undertaken by the department and a dust expert was engaged and carried on the necessary work from October 15, 1940 to March 15, 1941. The factual information gathered was made available to the association which in turn presented its findings to the Fifteenth Legislature when the occupational disease bill came before it. No attempt was made to oppose or favor proposed legislation but to present the facts upon which intelligent legislation could be enacted which would solve the problem equitably.

Resources and by the various councils of the Arizona Small Mine Operators Association with the result that copper was not included in the reciprocal trade agreements.

Class C Mining Loans William J. Graham was assigned to the work of getting a bill to provide for "Class C" or small mine loans out of a committee in Washington and presented before Congress. His transportation and time were provided by the department and his sustenance expense provided by A. S. M. O. A. Later a revision of the "C" loan bill was prepared and in cooperation with Senator McFarland was placed before the present session of Congress. A study of the Arizona mines that would benefit by such a loan was made and the results forwarded to Washington. Statistics showing how practically every state in the union would benefit by such loans were also prepared and submitted.

Mine-To-Market Roads Field engineers, in the course of their work, were assigned to study and report on the important third and fourth class roads needed to facilitate the moving of ores to railroads and markets. With the assistance of the local councils of the Arizona Small Mine Operators Association served by such roads, progress and better facilities have been provided. Furthermore, many communities have become conscious of the economic value of transportation facilities.

A number of such plans have been projected and are being followed up. The road from Clifton up San Francisco Creek is definitely underway. Headway has been made on plans for a road connecting Aravaipa in Graham County with Winkelman in Pinal County. An alternate survey showing the mining districts to be opened up by a re-routing of the Phoenix-Kingman highway so as to pass through Hillside was made. Assistance was given in presenting a proposal for a temporary bridge across the Bill Williams River at Alamo.

On such road projects representatives of the department would appear before either the County Supervisors or the Highway Commission in order to show the mines which would be benefited and the possibilities for increased production arising from better transportation facilities.

Smelter Survey A preliminary survey of the potential production of complex lead-zinc ores in Mohave County was made in order to determine the feasibility of a reduction plant to make use of the low cost electric power from Boulder Dam. The survey showed that such an installation was feasible. Private capital was

of Mineral Resources could efficiently do the work of the other, one being of a technical and research nature, while the other is more or less promotional and concerned with many problems that are economic in character rather than scientific. The work that has been done already has laid a foundation for even closer and more cooperative plans in order to fully cover the requirements of the mining industry but eliminate any possibility of overlapping.

Both the Phoenix office and the field engineers have become known and accepted throughout the state as sources of accurate information and service for the prospectors and for the public who have shown an increased interest in the small mine activity. Much of the service rendered has been to newcomers in the field of Arizona mining and they have made free and frequent use of the department as a starting point for information and assistance.

NEW MINING OPERATIONS

It is rather difficult to get an exact measurement of the new mining operations started as a direct result of the work of the Department of Mineral Resources, because there have been no facilities available for following through and there undoubtedly have been many properties on which work has been started but which do not show in our records.

However, there are definitely 40 new mining operations which can be named as direct results of this phase of the department's activities, and the total expenditures on these 40 properties is in excess of one million dollars with a yearly payroll running over half of that sum. The work has resulted in the employment of approximately 400 men and thus furnishes support for several thousand people.

Based upon the present tax rates the newly created state taxes, both direct and indirect, resulting from the expenditures of new capital for labor and supplies on these operations started by department activities is approximately three times the cost to the state of the maintenance of the service.

There is, of course, a large additional cumulative value in that many of the properties started during the past year will be contributing to the state in taxes, business, employment, and other ways for years to come.

Space does not permit of a complete description of all transactions relating to the bringing of new capital into the state for mine

development and, therefore, only a few typical ones are listed. They are as follows:

Diatomaceous Earth W. G. Staley of Tucson was seeking a diatomaceous earth deposit and the property owned by Andres Herrera of Tucson, at Mammoth was submitted to him by the department. The property was taken over; the Arizite Corporation was organized, and work started. A processing plant was erected at Mammoth. Numerous inquiries for their products have been received by the department and have been turned over to the company. It is estimated that in excess of \$100,000 have been spent on the property and plant and that a permanent Arizona industry has been started.

Muscovite Mica C. L. Orem of Phoenix had been at work on the preliminary exploration of a muscovite mica property, about four miles south of Buckeye, and needed capital to clear titles and start operations on an enlarged scale. Tucson parties were interested in the project by the department and they furnished the capital needed to get started. The Minerals Products Company was formed and new work was undertaken. An industrial engineer was referred to the company for assistance in the marketing of the finished material and the development of new uses.

Williams Tungsten The Continental Mining Company, 80 Broad Street, New York, was seeking tungsten properties and was invited to look over some of the Arizona mines. Several properties were submitted by the department and the company finally took over one of them, the Ed Williams property, located in Bill Williams Mining District about 72 miles southeast of Kingman. The property was developed and a 50-ton mill was installed and is now in production. It is estimated that in excess of \$200,000 has been spent on this property and a new producer added to the state's output of war defense metals.

Conlig Tungsten Dewey Chadwick of Tombstone, owner of the property which is located in the Little Dragoon Mountains about five miles west of Benson, applied for department help to get his property equipped with a mill for development and production. An examination and report was made by one of the department field engineers and tests to determine a flow sheet was undertaken. The data compiled showed a feasible working program, a plan developed and the money with which to start work was made available.

The director of publicity also edited and prepared for publication the annual reports issued by the department. These two reports covered the work of the department during the two-year period from July 1, 1939 to June 30, 1941. The director of publicity also handled the preparation, laying out and printing of all forms used by the department.

The Department of Mineral Resources was extremely fortunate in being able to find a capable director of publicity who could work part time and handle the problems as they arose on a regular basis. If an outside engineer had been employed to make any one of the special studies undertaken, or to compile the statistical articles alone, the cost would have been much greater than the entire salary paid to the director of publicity for the two-year period.

MISCELLANEOUS PROJECTS

Statistical work, research, and study have been undertaken on a number of special projects affecting the mining industry of the state. Some of these have been of statewide concern and some have been of local interest.

Copper Excise Tax When information was received that copper was to be included in the reciprocal trade agreement with Chile and that a cut in the 4-cent copper excise tax was under consideration, the Arizona Copper Tariff Board was without sufficient funds and the necessary data to prepare the briefs needed for presentation as a protest against such action.

Fortunately the Department of Mineral Resources had been conducting statistical studies of the dependence of Arizona on the mining industry and, as copper mining is a source of the major production in the state, these statistical studies had much of this information ready and available for such an emergency. A comprehensive brief was prepared and submitted.

Mass Meetings on Excise Copper Tax Even with the brief on the copper excise tax before it, the State Department in Washington looked very favorably toward the inclusion of copper in the trade agreement with Chile. A series of mass meetings throughout the state were held and a protest forwarded to the State Department and to the President with resolutions adopted at the various mass meetings. The organizing and planning of these mass meetings was carried on by the Department of Mineral

mining on state lands, water code regulations, workmens' compensation insurance, Arizona labor laws, blue sky laws, corporation procedure, cooperation with the state and federal bureaus of mines, RFC loans, mining on forest lands, unemployment compensation, health and safety in mining, registration of mining companies, old age assistance and social security, relations of custom smelters, mining on the public domain, the wage and hour law, and the national labor relations act.

Press releases relating to mining activities in the state, mining problems, and the work of the Department of Mineral Resources were sent out on the average of once a week during the entire time the department was in existence. Much of the data was gathered by the field engineers and press releases were prepared from the facts sent in.

Each month the director of publicity prepared a feature statistical article on Arizona mining and the series was printed later in a 46-page book containing about 45,000 words. The articles told of the importance of mining to the state, compared mining with other industries, discussed taxation problems, and told of the dependence of other industries such as railroading, farming, lumbering, and others on mining as well as the dependence of various communities in the state on the industry. This work has provided the statistical basis and foundation for many of the projects on which the department was called upon to work.

In addition to these feature stories dozens of shorter articles were written and were published in and out of Arizona. It is believed that these have done much to bring a better appreciation of what mining really means to Arizona and the need for stimulating its future development. Publicity outside the state was designed to call attention to its mining opportunities.

In carrying out its program of encouraging capital investment in mining properties in the state, it was necessary for the department to compile a list of mining properties available for sale, financing, and leasing in the state, and the publicity director prepared a special mine owners' report form for collecting this data. As the forms were returned by the mine owners, a list of the properties available was drawn up and described in brief form and this was handled by the director of publicity. The mine list now contains descriptions of nearly 700 properties. In addition to this list, a tabulation of the inquiries received for mines and minerals was made to assist those seeking to sell or finance their properties.

Belcher Mine W. Z. Allen of Palm Springs, California made inquiry of the department for a property which would warrant the installation of an experimental electric smelting furnace for copper ores. A number of properties were submitted and from these the Belcher mine was selected and, the property was taken over under lease and option, and additional mine development was started.

Globe-Arizona Mine Fred Vollmer, a New Jersey copper rolling mill operator, asked assistance of the department in locating a copper property which would warrant the erection of a small copper smelter. From the properties submitted he selected the Globe-Arizona mine, located near Superior, and started a development program in order to prove up additional ore reserves.

Gibson Mine The development work on the Globe-Superior property did not satisfy Fred Vollmer so he looked over some of the other mines available and, on the department recommendation, took on the Gibson mine and started further development on it.

Better-Pay Mine A. M. Humphries of Tucson asked the Tucson field office to find a property that he could open up and start shipping ore. After looking over several properties submitted Mr. Humphries took over the Better Pay mine and, with a limited amount of development, started in shipping.

Vermiculite Mine C. H. Butler of Eagle Rock, California, had been hunting for a worthwhile vermiculite property, and the department made connections for him with Kingman parties which resulted in his taking over a property about 14 miles from Kingman on the north slope of the Hualapai Mountains. Development exposed a large deposit of high-grade vermiculite. After taking over the property the field engineer in that district assisted in straightening up titles on three different types of land, and assistance was given Mr. Butler in obtaining a substantial freight reduction so that the ore could be mined, screened, and shipped to California for further processing.

Carlota Mine Neilson and Company, of Seattle, Washington and the Philippine Islands, was looking for properties in this country, so a contact was made with it and a group of properties including the Carlota Mine, located about six miles from Miami, owned by John Alexander of Phoenix, were submitted to it. After examination the Carlota was taken over and equipped for production. The

property is now shipping 75 tons of copper ore per day and is carrying on an extensive development program.

Gorham-Hall Mine Harley A. Sill, mining engineer from Los Angeles, was looking for a property for California associates. Several were submitted by the department and the Gorham-Hall property, about seven miles southwest of Superior, was taken over and equipped and extensive development by shaft and drifting was started.

Red Cloud Mine The Penn Metals Company of Yuma was looking for property and, through the department, the Red Cloud Mine was taken over in connection with other operations on the Black Rock Mine. A 50-ton mill was installed and the properties are now shipping concentrates. Over \$150,000 has been spent on equipment and operations to date.

Twin Buttes Mine E. L. Williams asked the department for a copper property with possibilities of developing into a steady producer. The Twin Buttes Mine northwest of Tucson was the one selected after looking over several others, and extensive development is being carried forward at the same time that regular shipments are being made.

Ellis Mine A fluorspar property, owned by Robert T. Ellis and located near Duncan, was taken over by the Western Minerals Associates, equipped and put on a producing basis. The Western Minerals Associates now have several other properties under consideration which were submitted to them by the department.

Custom Milling Six small mines,* which required milling facilities but without sufficient ore to warrant individual mill installations, were able to ship to the Congress mill after new crushing and sampling facilities were provided. A survey made by the department of the mines in this area indicated the need of milling facilities. This survey was submitted to the Congress management and, by making certain changes in their mill flow-sheet, arrangements were made to accept custom ores.

Surveys have been made by the department engineers for custom mills at Cherry, Groom Creek, and Arivaca. Private capital has been interested in looking into the possibilities of custom mills in these areas and plans are now pending for a more intensive survey by the capital interested.

* Since above was written the number of shippers has increased to 15.

defense needs. It was revealed in that report that a price of 14 cents a pound would permit an additional production of approximately 80,000,000 pounds of copper yearly by Arizona mines, and that the capital cost would be approximately \$3,000,000.

Although the price had been pegged at 12 cents a pound by the Office of Price Administration and Civilian Supply when that project was undertaken, Washington authorities evidenced a willingness to relax price restrictions when the details and conclusions of the study were made available. This survey also was undertaken at the request of the Arizona Copper Tariff Board.

Still another special study, which has not yet been completed and is being done by the Arizona Department of Mineral Resources in cooperation with the Arizona Copper Tariff Board, relates to a bill now under consideration by Congress which would permit government departments and agencies to abolish tariffs and excises on "defense articles". While no objection is made to the importation of articles duty free for defense when adequate supplies are not available in the United States, the particular bill is viewed as a serious threat to the future stability of the domestic mining industry and is being opposed on that basis.

A report prepared by the publicity department contends that there is no need for such legislation because present statutes give the government all the authority it needs to import whatever is necessary without being penalized by duties.

One of the most complicated special projects to be undertaken by the publicity bureau of the department was the compilation of the various rules and regulations for mining on each of the many types of land existing within the state. There are literally dozens of different kinds of land in Arizona and each have their peculiar and particular rules and regulations confronting mining activities thereon. They had never before been compiled and codified, yet ignorance of them had caused untold difficulty. This work has practically been completed and is being published in mimeograph form with a separate chapter for each kind of land so that those who make inquiry may get either the chapter on the particular kind of land in which they are interested or the whole book.

The proceedings of the school for field engineers, which was held immediately after the department was created, were edited and prepared for mimeographing and binding by the publicity director. The 260-page document discussed problems involved in

The work of the director of publications was divided into four principal classifications, the preparation of articles having been along the following general lines:

1. Stories relating to mining opportunities in the state to encourage new capital investment in Arizona properties.
2. Analysis of economic and legislative problems faced by the industry to create a better understanding of the importance of mining and the obstacles preventing progress in getting new capital into the state.
3. Press releases and bulletins telling of the work and problems of the department and stimulating interest in its progress.
4. Special studies on problems threatening the Arizona mining industry and demanding immediate attention.

One of the first special studies undertaken was the compilation of a brief and economic argument opposing a reduction in the four-cent copper excise tax when a reciprocal tariff treaty was being negotiated with Chile in the fall of 1939. That brief, which contained 60 pages of text, tables, charts and photographs, was credited in Washington as having been an important factor in preventing a reduction in the copper excise tax which appeared inevitable at the time.

The brief emphasized the great extent to which Arizona is dependent on the mining industry and pointed out that copper mines in the state could not compete with producers in South America and Africa where wage scales are lower and the grade of ore is higher. All compilation and publicity work on this project was done by the department at the request of the Arizona Copper Tariff Board which did not have funds available to complete the work that it was necessary to do.

A second special project which required publicity arose in connection with the report and investigation on dust control, its effect on the health of workers in dust creating industries and the analysis of legislative precautions necessary when dealing with the subject. While the director of publicity had no part in the gathering of the data nor in the compilation and preparation of that report, he was called upon to edit it and get it out in book form.

Another special project involved a study and analysis of the possibilities for increased copper production in Arizona to meet

Manganese Production Through contacts made by the department several manganese properties have been able to start shipping. Shipments have been made from the Big 4 Mine, near Bosque, owned by J. D. Lynch of Glendale; from the mine owned or leased by D. L. Solomon of Coolidge, on the Apache Indian Reservation; the Steamboat Mine near Kelvin, owned by Mrs. Florence Netherlands of Phoenix; a property about 30 miles south of Casa Grande, by Elmer Lambert of Wickenburg; and an option has been taken on the War Eagle Manganese owned by S. J. Curtis of Bouse. It is being examined by eastern interests for large scale production.

R. F. C. Loans The department has assisted in several applications for loans from the Reconstruction Finance Corporation. The George Washington Mine near Wickenburg, owned by Steve Loncar, had difficulty in renewing a loan and assistance was given so that work could be resumed. Assistance was also given to A. S. Lewis on the Maricopa Mine at Cave Creek in the renewal of his loan and a resumption of operations resulted. A loan on the Moon Mountain Gold Mine near Quartzsite and owned by G. P. A. Schaaf is pending.

Permits to Finance Several applications for permits to sell stock to finance development and operation of mining properties have been made to the Corporation Commission and the engineers of the department have been called in for examinations and reports as to the physical conditions existing on the properties. Among others were the Squaw Peak Copper Company, Edison Thacker, manager, which is located near Camp Verde; the Sombrero Butte Mining Company at Sombrero Butte; and the South Pilgrim Gold Mining Company south of Chloride.

Saddle Mountain Quicksilver Mine V. O. Welch, manager of the Saddle Mountain property, had met with many obstacles in getting that mine into production and was about ready to stop operations. He called on the department for advice and a plan was discussed in detail and recommendations made. Operations did stop for a while pending this discussion but have since resumed and the property is now in steady production.

In addition to the new work underway there are a large number of incomplete projects and inquiries on which work has been started. A survey of the potential production of complex zinc-lead ores in the Mohave area indicated the feasibility of a reduction plant to be located so as to take advantage of the low cost electric

power from Boulder Dam. Private capital was interested in this project and preliminary arrangements have been made for a more intensive survey of the economic factors involved in such an installation.

One of the large eastern steel companies has been investigating the possibility of production of molybdenum from Arizona properties and special assistance has been given by the department. New York interests are investigating various copper properties in the state available for large scale production and the department is assisting them in finding one that meets their specifications.

A preliminary survey on the opportunities for production of Arizona asbestos by one of the field engineers came to the attention of the Asbestos Corporation of America, and the department was asked to assist in formulating plans for large scale exploration, development and operation of such properties as could supply the increase in domestic production needed for the defense program. This work was undertaken in the closing days of the department and gives promise of becoming one of the most active new projects in the state.

There are a great number of inquiries in department files for the strategic and critical metals and minerals for national defense production, and the data and information in the records of the department as a result of the mineral resource survey are of real value and assistance to those seeking new properties or production from known sources.

FIELD ENGINEERING SERVICE

The general plan of the department was to bring to the prospectors and small mine operators in the field assistance in working out problems and solving difficulties encountered in their work. The establishment of the field engineering service met this objective. Those engaged in trying to explore and develop the mineral resources are often not capable of properly expressing their thoughts by letter and personal interviews are required to bring out the problems. In many instances the particular problem confronting a small operator has been met and solved in other mining camps and he has struggled along without actually recognizing that his problem can be easily solved.

The schedule for the field engineers called for a trip by each engineer into every mining section in his district at least every 60 days with definite dates of visits set forth in advance. Contacts

simply because those who owned them did not know where and how to sell them nor did they understand the specifications of the users.

Lists of consumers and buyers of the less common metals and minerals have been compiled by the department and made available to those requesting such information. Likewise those seeking to buy metals and minerals have been referred to the proper sources within the state. Sellers have been placed in touch with buyers and buyers with sellers.

There are 100 or more minor metals and minerals upon which lists of consumers and buyers have been made, and several thousand copies of these lists have been sent out to interested Arizona small mine operators to assist them in finding markets for their products. Current quotations and market conditions have been compiled from various trade journals and financial papers in order that proper information may be given as to prices.

Through this phase of the department's activities contacts have been made for many mineral products of the state, and new work has been stimulated in the search for new sources when prices and demands justified. While the department's activities may have been responsible for the starting of a mining property, the results of such work are not measurable and, in many cases, not known. They represent, however, a very substantial accomplishment by the department to the welfare of the state, even though no actual figures or estimates are available as to the dollars and cents value.

PUBLICITY

Because public relations work was considered essential to the achievement of the fundamental purpose of the Department of Mineral Resources—encouraging and stimulating the development and exploitation of the state's mineral wealth—the organic act creating the department provided that the department "publish and disseminate such information and data as may be necessary or advisable to attain its objectives." Although there was ample opportunity for sufficient work to keep a full time director of publicity employed, the funds permitted only a man working part time.

Over 30,000 column inches of space have been devoted to Arizona mining in state and national publications as a direct result of this program of the department which is excellent testimony as to its achievements.

such instances only the physical facts relating to the property were presented to the Corporation Commission so that its decision could be made fairly and on factual information. The department has also been called upon by persons desiring permits to sell stock to intervene with the Corporation Commission and assist in gathering the data which would present their cases more effectively.

There have been numerous instances of insufficient or inadequate service by those holding franchises for hauling ores and supplies to and from isolated mining camps. These have been referred to the department for investigation and assistance in obtaining proper hauling service. When the facts relating to such services, or lack of them, were gathered and presented to the Corporation Commission, satisfactory adjustments have been made. The department has been of much value in clarifying inadequate hauling situations.

Freight rates and proper service for the moving of low grade ores is of vital importance in opening up the mineral resources of the state. When difficulties in such matters were encountered in a mining district, the question was quickly referred to the department for assistance and, if the facts justified, action taken. The department has been instrumental in obtaining lower freight rates in several instances which have resulted in operation of mines which otherwise could not have been worked. Surveys have also been made where requests for abandonment of local freight agents and freight stations have been made also by the railroad, and assistance has been given to several districts in the presentation of their arguments for retaining service.

The Department of Mineral Resources has likewise cooperated with the Arizona Land Board, Arizona Highway Commission, United States Forest Service, Reconstruction Finance Corporation, and numerous other state and federal agencies in their work relating to Arizona mining. The department has become looked upon as an authoritative source of factual data whose research and surveys could be depended upon for accuracy. Many difficulties have been ironed out through the factual data gathered and the proper presentation in the right place.

MARKETS AND PRICES

For many of the minor metals and non-metallics no open market exists. In most cases markets have to be developed by direct negotiation between the producers and consumers of these materials. Many metals and minerals have been left in the ground

with engineers could be readily made at or through the officers of the various councils of the Arizona Small Mine Operators Association or through the Phoenix office.

The increased public interest in strategic and critical minerals and in the rarer metals and non-metallics has attracted many new comers into the mining field who have had no mining experience. The field engineers as well as the Phoenix office have been able to render special assistance to many of those who were so interested and has been able, through its information service, to get them started along sound lines.

A record of the service calls show that an average of over 300 such services per month has been rendered by the field engineers and the Phoenix office. Many of these calls are for information regarding prices, markets, operating problems, conflicts with other agencies, general mining advice, and innumerable other subjects. A number of these inquiries have resulted in the starting of new work, the added employment of labor, and increased production and activity in mining which does not show in the record of accomplishments of the department.

The benefits of these services to the prospectors, small mine operators and new comers into the mining field have had as much, if not more, to do with the increased activity in the opening up of the resources of the state than the more tangible and measurable results shown by the new properties brought into production. On this type of service the accurate measurement of results is impossible.

COOPERATION WITH AGENCIES ON LAND PROBLEMS

There are many classifications of lands within the state upon which varying rules and regulations affecting mining exist. A complete compilation of these classifications and the regulations pertaining to them has been made and is now available. Due to the overlapping of interests and regulations many conflicts have arisen which have threatened ownership and title to mining property.

On problems involving such conflicts the facts are ascertained from the plaintiff, from the agency involved and, if necessary, checked in the field by one of the engineers and steps are then taken to try to correct injustices. This particular phase of the service work of the department has been under the supervision of William J. Graham, assistant to the director, and a brief review of some of the major cases of adjustment are mentioned.

Roy E. Wright This man, who lives in Mohave County, lost title to certain mining claims located on Section 2, Township 23 North, Range 18 West on which he had developed commercial ore. When Wright located the claims, he had no knowledge that the section on which he had filed his locations was state land. Application was made to the State Land Department by C. L. Sermans for a lease on the claims Wright had developed. The Land Department had no knowledge of the facts regarding the Wright locations and granted the lease to Sermans. When all of the facts pertaining to the case were presented to and checked by the Land Department, the lease to Sermans was cancelled and Wright was reinstated in possession by a state land lease.

Atos Mine E. O. Albiez of Yavapai County operated the Atos Mine located in Section 29, Township 9 North, Range 3 West. The Land Department, in an exchange of lands subsequent to the location of the Albiez claim, secured patent title to the section on which the claims were located. From a survey by one of the field engineers the validity of the claim was established and the Land Department expressed its willingness to reconvey the mining claims to Albiez.

H. G. Oliver Claims Certain sections in Township 4 South, Range 29 East had been selected by the state for patent. H. G. Oliver and the Dover Copper Company had owned and operated certain mining claims in Sections 30 and 31 of the selected area for many years. When the facts regarding the locations were presented to the Land Department, assurance was given that the mining property would be reconveyed to the claim owners.

Alec Lucy Claims Alec Lucy, mine operator and owner of mining claims in the Hillside District, filed a complaint of difficulties covering a 10-year period with the claimant of range rights on certain areas covering his locations. The facts were determined by field investigation and assurance given by the Land Department that a satisfactory adjustment of the difficulties would be made.

Schell Property Mr. and Mrs. Schell of Camp Wood had located certain mining claims in the Camp Wood area and had developed a showing of ore. In 1940 the state, in an exchange of lands, acquired patent to sections on which these claims were located. The facts regarding the showing of mineral in place and the validity of the locations were determined and presented to the State Land Department and full recognition of the Schell title to the claims was given.

Ferguson Claims Mrs. Ethel Ferguson, a widow, inherited mining claims located 32 miles southwest of Florence in 1923. Script and homestead filings were made and patent issued to others, which included the mining claims, without Mrs. Ferguson's knowledge. Entrance to the property was forbidden by the parties securing the patent and, after unsuccessful attempts to straighten matters out, Mrs. Ferguson made an appeal to the department. The facts were investigated and were presented to the Department of Interior and, after investigation by their officials, Mrs. Ferguson was given assurance that title and access to her property would be assured.

Wolf Claims Fritz Wolf and partner located claims near Roosevelt Lake in 1906, performed the necessary work and erected a home and operating camp. Federal grazing leases were granted at a later date on sections in that area and the Wolf claims included in the lease. Threats were made to dispossess Wolf and an appeal was made to the department. The facts were investigated and presented to the grazing officials who sustained Wolf's rights.

Bouden Claims Ralph W. Bouden of Wickenburg made valid mining locations prior to the exchange selection for patent by the Land Commission of an area which included the Bouden claims. Upon proper presentation of facts showing priority and validity of the mining locations title was restored to Bouden.

These are but a few of many cases which have been submitted to the department for advice and assistance in restoring or retaining rights on valid mineral locations. The maze of laws and regulations on the many types of lands and the cost to prospectors and small mine owners to protect their rights on valid mine locations has been a source of trouble for many years.

There was no recourse excepting through a knowledge of the laws and regulations and a complicated procedure through many agencies to correct these injustices until this service was rendered by the Department of Mineral Resources. This pointed to the need for a careful study and compilation of the regulations on various types of land which has been made by the department and will be made available to those interested.

COOPERATION WITH OTHER AGENCIES

At the request of the Arizona Corporation Commission the field engineers of the department have been called upon to examine and make reports regarding ore occurrences, feasibility of projects, and so forth in connection with applications for the sale of stock. In