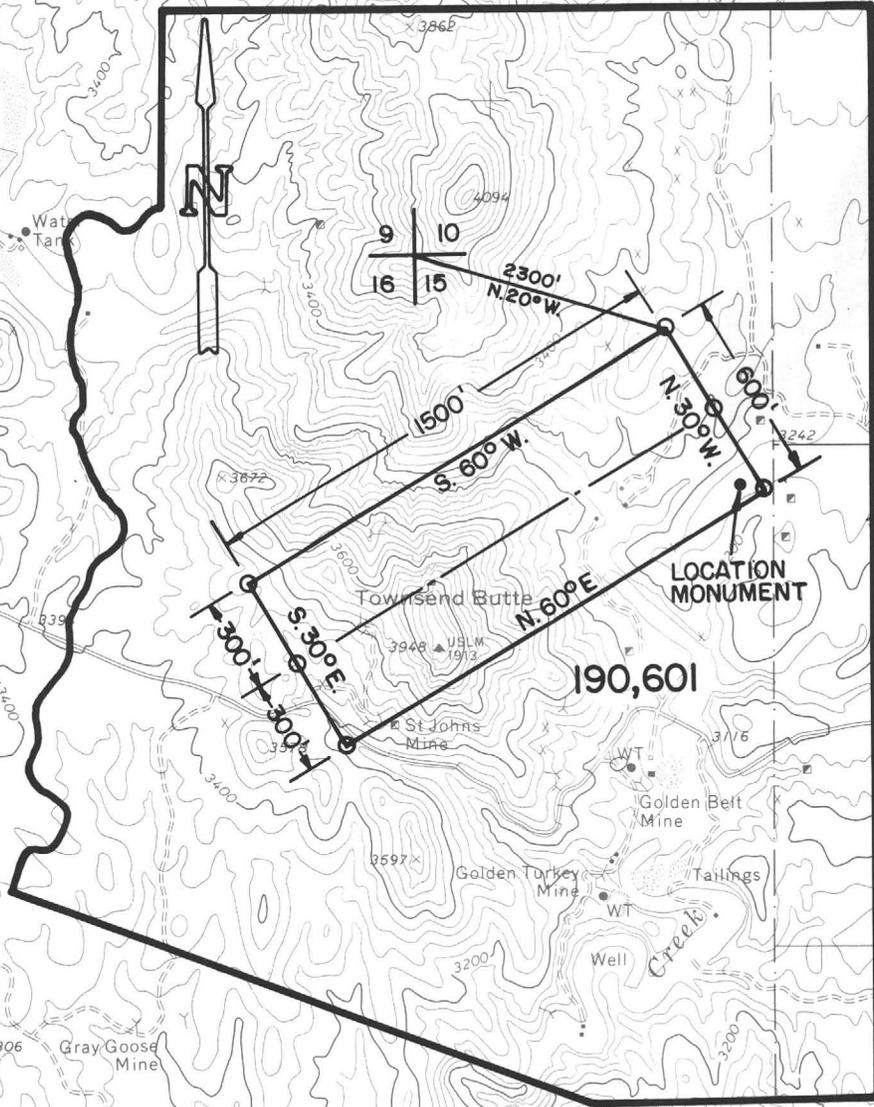


DEPARTMENT OF MINES AND MINERAL RESOURCES

State of Arizona

Phoenix, Arizona

John H. Jett
Director



47TH ANNUAL REPORT
FOR YEAR ENDING JUNE 30, 1986



STATE OF ARIZONA
DEPARTMENT OF MINES AND MINERAL RESOURCES

The Honorable Bruce Babbitt
Governor of Arizona
9th Floor, West Wing Capitol Bldg
Phoenix, Arizona 85007

Dear Governor Babbitt:

In accordance with A.R.S. 27-106, we are pleased to submit the annual report of the Department of Mines and Mineral Resources. The Arizona Mineral Museum is a function of the Department and its activities are included.

The report lists the duties of the Department as established under its recently updated enabling legislation passed by the Thirty-sixth Legislature, Second Regular Session. The activities of the Department for Fiscal Year 1985/86 are summarized with each duty.

The Department of Mines and Mineral Resources objectives are to gather, develop, interpret and disseminate mineral information and provide technical assistance to encourage and promote interest and investment in Arizona's mineral resources. The mineral information also applies to and is used by land use planners and resource management groups.

Respectfully yours,

Donald W. Hart

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Department of Mines and Mineral Resources

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Harvey W. Smith, Vice Chairman
Clifford Altfeld, Secretary/Treasurer
Edna Vinck, Member
Larry E. Dietz, Member

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Term Expires 1/31/91

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Term Expires 1/31/88

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Term Expires 1/31/90

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Term Expires 1/31/89

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Member
Term Expires 1/31/87

STAFF PERSONNEL

Phoenix Office - Mineral Building, Fairgrounds, Phoenix 85007 255-3791

John H. Jett Director
Ken A. Phillips Chief Engineer
Richard R. Beard Mining Engineer
Nyal J. Niemuth Mineral Resource Specialist
Arthur W. Bloyd Museum Curator
Ann Turney Administrative Assistant
Diane Bain Secretary
Susie Kile Secretary
Connie Morgan Maintenance

Tucson Office - 416 W. Congress Room 190, 85701 628-5399

Michael N. Greeley Mining Engineer
Clifford J. Hicks Geological Engineer
Frances J. Derrick Secretary

****Front Cover**

According to data obtained from the Bureau of Land Management there were 219,476 active mining claims in Arizona as of May, 1986.

FORWARD

The Department of Mines and Mineral Resources was created to promote the development of the mineral resources of the state of Arizona through technical and educational processes.

The Department is controlled by a Board of Governors consisting of five members from various parts of the state. These members are appointed for five year terms by the Governor of Arizona. The Board of Governors serves without compensation other than actual expenses incurred when attending board meetings which are required by law to be held quarterly. The Board of Governors formulates the programs and policies of the department and employs the director. The director has control of the work of the department and employs such field and office personnel as is consistent with the appropriation and with the policies of the board.

The Annual Report of the Department is supposed to include a report on the activities of the department and a copy of the quarterly reports of the director to the Board of Governors. The quarterly reports are quite detailed and complete with statistical data. A compilation of these reports would be quite voluminous for an annual report. Therefore, the quarterly statistics have been combined to report an annual total. Complete copies of the quarterly reports will be furnished to any that may request them. A complete financial statement is also attached.

GENERAL

The promotion or development of any mineral deposit must start with its being "found" or located. Therefore, prospecting and/or exploration are the first steps on the way to starting a viable profitable mining operation. Each step taken in exploration, if not resulting in an immediate operation, leaves us better equipped with knowledge and skills to do better and more advanced work in exploration and evaluation in the future.

To encourage the prospecting for mineral ore deposits, there must be a ready market and the right price for the end products. Ore can be elementarily defined as something that can be mined at a profit. If there is no profit the deposit is only a resource - something that has no present value but which may have some potential for the future.

Therefore, it becomes very necessary to obtain for permanent files, all data possible on these resources and have it available when the right time arrives in the future. It is a major activity of the Department to collect, develop, analyze, file and disseminate all information possible on each and ever mineral occurrence.

The possible development of mineral resources attracts many different types of people such as prospector, explorationists, mine promoters, investors, product users and others, all usually referred to as "prospectors or small miners". This is usually an optimistic type of person and it is their eternal optimism and hope of making the "big strike" that keeps mineral prospecting and exploration quite active and at a high level. These activities will hopefully lead to the discovery of prospects that can be sold for development either at this time or in the near future. It is to these "prospectors and small miners" that the department disseminates the mineral resource information and provides technical assistance and advice, within the budgetary limits of the department.

BOARD OF GOVERNORS

During the fiscal year four Board of Governors meetings were held. One was held in Flagstaff, one in Tucson and two in Phoenix.

One board member resigned and one was reappointed for a second five year term. A new member was appointed to fill the vacancy created by a resignation.

Subjects discussed by the Board of Governors included budget requests, new office and museum location, museum store, possible agency consolidation, the possibility of charging for the department's services, Memorandum of Understanding between the Department and the Bureau of Land Management (signed), project funding of special projects, an architect for a conceptual drawing of the office and museum needs, new public relations program for the department and a docent program for the museum.

ENGINEERING NOTES

Some unusual activities taken from the quarterly reports included the following: (complete copies of the reports are available on request)

There is increasing interest in industrial minerals. Ninety-seven letters were sent to users, brokers and producers of industrial minerals. Some personal calls were made to some California users.

Discussions were held with a number of architects relating to using decorative stone.

Copper industry discussions were held with research group from England and Democratic National Committee in Washington, D. C.

Negotiated with University of Alabama to analyze some clay samples for the department at no charge. A Florida firm is interested in Arizona's clay for brick and tile.

Took samples of several non-metallics including clays, limestone and gypsum for industrial use.

Research work was done on onyx, aluminum silicate and basic glassy rocks for possible use in making rockwool.

Attended a U. S. Bureau of Mines Technology Transfer Seminar.

The equipment from an assay office was donated to the department. It has a value exceeding \$7,000.

STATUTORY DUTIES

There are thirteen statutory duties for the department listed in its recently revised enabling legislation (ARS 27-101 thru ARS 27-111). Since this is only the second year operating under these duties, it appears desirable and pertinent to list these duties with a short comment to what extent the department responded.

1. PROMOTE THE DEVELOPMENT OF THE MINERAL RESOURCES AND INDUSTRY OF THIS STATE BY PARTICIPATING IN CONFERENCES, SEMINARS, FORUMS, SPEAKING ENGAGEMENTS, PUBLIC NEWS MEDIA AND OTHER FUNCTIONS NECESSARY TO ACHIEVE ITS OBJECTIVES.

There were 35 technical programs provided to prospectors-small miners and others. They were presented in many communities throughout the state such as Arivaca, Tombstone, Globe, Prescott, Congress and other areas. These were presented through mineral resource conferences and Arizona Prospector Small Mine Operator Associations. In addition the museum presented 167 programs to 7,019 school children, adult groups, Boy Scouts, hospital groups and others. Thirty-four club meetings with an attendance of 1,374 held mineral related meetings in the lecture room

2. CONDUCT STUDIES OF THE ECONOMIC PROBLEMS OF PROSPECTORS AND OPERATORS OF SMALL MINES FOR THE PURPOSE OF ASSISTING IN THEIR DEVELOPMENT.

The field engineers made field visits to 146 properties and attended 90 meetings discussing various mineral issues. There were 46 mine reports written on specific mineral properties and added to the files. One hundred seven field interviews were conducted by the staff with people who have mineral properties or interests.

3. MAINTAIN:

- a. AN INFORMATION BANK AND LIBRARY OF MINERAL AND MINING INFORMATION INCLUDING BOOKS, PERIODICALS, FILMS, VIDEO TAPES AND INDIVIDUAL MINE FILES.

- b. UNDERGROUND MINE MAP REPOSITORY FILES, MINING DISTRICT DATA AND AN ARCHIVE OF MINE DATA.

- c. A MINERAL MUSEUM AS THE STATE DEPOSITORY FOR COLLECTING, CATALOGING AND DISPLAYING MINERAL SPECIMENS OF VARIOUS ORES, GEMSTONES, LAPIDARY MATERIAL AND OTHER VALUABLE MINERAL SPECIMENS.

There is no complete inventory on the Department's information bank and library. We are continually adding to the library by subscriptions, developing new data and by encouraging and soliciting those in the industry to donate their library and files to the department. There were 295 new

Statutory Duties Cont.

mine files developed for the information bank plus forty- six new mine reports written. In addition there were eleven publications written, published and made available.

Last year there were over 1,388 items checked out of the library. This included publications of the Arizona Bureau of Mines, Bureau of Geology and Mineral Technology, U.S. Bureau of Mines, U.S. Geological Survey, maps, technical books, trade journals and others. In addition, 1,798 individual mines files were researched.

The mineral museum has a continuing cataloging program. There are 12,530 mineral specimens catalogued with an estimate value of over \$1,000,000. Displays are on loan to Northern Arizona University, State Capitol, and intermittently at libraries, schools, rock shows and others.

4. PROVIDE QUALITY MINING DATA, EVALUATION AND ASSISTANCE RELATING TO MINERAL DEVELOPMENT TO THE LEGISLATURE AND OTHER STATE AND COUNTY AGENCIES.

Assistance was provided more than 96 times to legislators and other governmental entities including many from out of state. See the quarterly report for typical agencies.

5. MAKE SURVEYS OF POTENTIAL ECONOMIC MINERAL RESOURCES AND CONDUCT FIELD AND OTHER INVESTIGATIONS WHICH MAY INTEREST CAPITAL IN THE DEVELOPMENT OF THE STATE'S MINERAL RESOURCES.

This is a continuing activity. However, lack of sufficient resources prevents many detailed studies or written publications. Recent studies were made on beryl, vermiculite, basalt and precious metals. An Industrial Minerals book is being prepared for general use. A study of leachable copper reserves, building stone and limestone are planned.

6. SERVE AS A CENTER OF MINING INFORMATION FOR THIS STATE IN MATTERS RELATING TO ITS MINERAL RESOURCES AND MONITOR CURRENT MINING AND EXPLORATION ACTIVITIES.

Over 11,500 telephone calls, over 2,899 office visitors, almost 6,000 school children, over 40,000 other museum visitors, more than 1,800 mineral properties researched and/or discussed with the engineers, publication of a Directory of Active Mines, a Directory of Exploration Companies, Earth Science Clubs Directory and over 95 other governmental agencies contacting the department all attest to our responding to this duty. There are currently over 219,746 active mining claims recorded in Arizona.

Statutory Duties Cont.

7. PUBLISH AND DISSEMINATE INFORMATION AND DATA NECESSARY OR ADVISABLE TO ATTAIN ITS OBJECTIVES. THE DIRECTOR MAY ESTABLISH REASONABLE FEES FOR PUBLICATIONS.

Mineral reports, directories, information circulars, special reports and other periodicals were developed or reprinted for sale. The publications Laws and Regulations Governing Mineral Rights in Arizona has been revised by an attorney and will be for sale next year. An attorney is updating the department publication relating to determining land status and water rights affecting mining in Arizona.

8. COOPERATE WITH STATE LAND DEPARTMENT TO ENCOURAGE MINING ACTIVITY ON STATE LANDS.

The State Land Department often forwards letters to the ADMMR for answering. The inquiries usually relate to Arizona minerals and laws and regulations concerning same. State Land Department mineral personnel research our files. The State Land Department cannot make their mining laws and regulations readily available to the public. ADMMR publishes the rules and regulations and makes them available. The State Land Department sends their visitors to the Department to obtain copies. We exchange data with their mineral staff.

9. COOPERATE WITH THE CORPORATION COMMISSION IN ITS INVESTIGATIONS AND ADMINISTRATION OF LAWS RELATING TO THE SALE OF MINING PROPERTIES.

This is willingly done. This past year, in addition to the Arizona Corporation Commission, the Department assisted the Internal Revenue Service and several other out of state agencies involved in sales of mining securities.

10. COOPERATE WITH THE BUREAU OF GEOLOGY AND MINERAL TECHNOLOGY AND DELIVER TO THE BUREAU PROBLEMS WHICH THE FIELD WORK OF THE DEPARTMENT SHOWS TO BE WITHIN THE SCOPE OF THE ACTIVITIES OF THE BUREAU.

The Department works with the geology division, referring many people to them for geologic data and mineral analysis, distributes their publication list and promotes and sells their publications. Complete cooperation is evidenced by the numerous visitors and letters each agency refers to the other.

11. COOPERATE WITH FEDERAL AND OTHER AGENCIES IN MATTERS RELATED TO DEVELOPING MINERAL RESOURCES IN THIS STATE.

We have had several grants or contracts from the U.S. Bureau of Mines to do projects on resources. We provide data to the U.S. Forest Service and the Department of Interior, Bureau of Land Management to assist their evaluation of mineral potential on Federal lands. We have provided

Statutory Duties Cont.

seminars and field trips to educate the Federal people on mineral activities. We work with the Arizona Department of Health Services, Water Department, and State Mine Inspector to help provide a good climate for development. We anticipate sponsoring a Technology Exchange seminar with the U.S. Bureau of Mines in the next fiscal year.

12. OPPOSE CONGRESSIONAL ACTS FAVORING RECIPROCAL OR DUTY FREE IMPORTS OF FOREIGN MINERALS.

We do not have sufficient resources to properly maintain this activity.

13. USE ITS AUTHORITY IN OTHER WAYS TO ASSIST IN MORE EXTENSIVE EXPLORATION AND DEVELOPMENT OF THE MINERAL RESOURCES OF THE STATE.

This permits the Board of Governors to develop new internal policies when the need arises. In this dramatically changing mineral world, new policies and activities are discussed and developed as needed. See "Future Activities" at the end of this report. A Department sales booth to recover publication funds and generate other funds to assist in recovering some department costs resulted from this activity. This results in more data being published and made available to the public.

OUT OF STATE REQUESTS

Interest in Arizona's mineral resources is quite widespread. Requests for assistance was requested by people with mineral interests coming from twenty-eight different states. Colorado was the leading state with 59 contacts, followed by California with 44, Nevada with 25, Texas with 22, Washington D.C. with 17, New Mexico - 16, Oregon and Florida - 10 each, Utah and New York - 7 each, Illinois, New Jersey, West Virginia and Virginia with 6 each, New York - 5, Michigan, Washington - 4 each, Idaho, Oklahoma, South Dakota and Wyoming - 3 each, Iowa, Minnesota, Ohio and Louisiana - 2 each, Kansas, Alabama, and Arkansas - 1 each.

OUT OF COUNTRY REQUESTS

Interest in Arizona's minerals continued beyond the limits of the United States. Requests for assistance came from Canada -11, England - 14, Turkey and West Germany - 2 each, Japan and Western Australia - 1 each.

NEW MINE START-UPS

There was considerable "small mine" activity in the fiscal year with more than 65 companies and individuals filing "start-up" notices with the State Mine Inspector. A considerable portion of the work was development work with some planned for continued operation. It is interesting to note the variety of minerals involved and the mining or treating methods. There was a perlite mine, two silica mines (one precious metal bearing), one onyx, one cinder, one decorative stone, one gypsum, one tuff (for oil slick and kitty litter), one hematite-magnetite, one slag (Ajo smelter - used for ship ballast and sand blasting), three copper mines (one in-situ, 2 leach), one underground silver, four precious metal cyanide operations, six silver-gold (three underground), five gold-silver not classified, and twelve gold placer operations. In addition there were refinery and mill plans. There were four deep drilling programs, one for gold, two for copper and one for uranium-copper.

PROSPECTING AND EXPLORATION ACTIVITY BY COUNTIES

Prospectors, small miners, companies and others interested in Arizona minerals came to the Department to investigate and study mineralized areas and prospects and/or to discuss these mineralized areas and prospects with the Departments technical staff.

There is no attempt made to define areas researched and discussed in terms of mining claims or acreage. Some groups of claims can easily represent hundreds of claims in one specific group.

| <u>County</u> | <u>Mine Files Studied</u> | <u>Engineers Discussions</u> | <u>Total</u> |
|---------------|---------------------------|------------------------------|--------------|
| Apache | 4 | 0 | 4 |
| Cochise | 110 | 44 | 154 |
| Coconino | 28 | 8 | 36 |
| Gila | 136 | 12 | 148 |
| Graham | 21 | 2 | 23 |
| Greenlee | 9 | 8 | 17 |
| La Paz | 139 | 20 | 159 |
| Maricopa | 378 | 67 | 445 |
| Mohave | 210 | 45 | 255 |
| Navajo | 2 | 2 | 4 |
| Pima | 99 | 64 | 163 |
| Pinal | 131 | 24 | 155 |
| Santa Cruz | 55 | 38 | 93 |
| Yavapai | 530 | 90 | 620 |
| Yuma | 51 | 8 | 59 |
| TOTALS | <u>1903</u> | <u>432</u> | <u>2335</u> |

Prospecting & Exploration Activity Cont.

State statutes require that each mining claim when originally located must be recorded with the county recorder in which the claim is located. The county recordation fee is \$5.00 per claim. In addition to the \$5.00, the county recorder has the option to add an additional fee up to \$4.00 per recording. In addition, Federal Statutes requires that on each mining claim until patent has been issued that \$100.00 worth of labor shall be performed or improvements made during each year on each claim. However, in most instances considerably more work is done than the required \$100.00. It is estimated that an average of \$300.00 per claim may be quite realistic. The following table shows this mining claim activity and the actual and potential dollar effect it has on each county.

| <u>County</u> | <u>Active* Mining Claims</u> | <u>Original County Recorder Fees</u> | <u>Required Minimum Assessment Work</u> | <u>Estimated Assessment Work</u> |
|---------------|--------------------------------------|--|---|--|
| Apache | 894 | \$ 4,470 | \$ 89,400 | \$ 268,200 |
| Cochise | 7,288 | 36,440 | 728,800 | 2,186,400 |
| Coconino | 14,899 | 74,495 | 1,489,900 | 4,469,700 |
| Gila | 21,210 | 106,050 | 2,121,000 | 6,363,000 |
| Graham | 7,388 | 36,940 | 738,800 | 2,206,400 |
| Greenlee | 2,940 | 14,700 | 294,000 | 882,000 |
| La Paz | 13,303 | 66,515 | 1,330,300 | 3,990,900 |
| Maricopa | 27,171 | 135,855 | 2,717,100 | 8,151,300 |
| Mohave | 54,931 | 274,651 | 5,493,100 | 16,479,300 |
| Navajo | 203 | 1,015 | 20,300 | 60,900 |
| Pima | 9,480 | 47,500 | 948,000 | 2,844,000 |
| Pinal | 19,305 | 96,525 | 1,930,500 | 5,791,500 |
| Santa Cruz | 6,428 | 32,140 | 642,800 | 1,928,400 |
| Yavapai | 30,627 | 153,135 | 3,062,700 | 9,188,100 |
| Yuma | 3,679 | 18,395 | 367,900 | 1,103,700 |
| TOTALS | \$ 219,746 | \$1,098,730 | \$21,974,600 | \$65,923,800 |

* Some duplication when a claim is located across a county line.
 Figures taken from Bureau of Land Management files.

ARIZONA MINERAL MUSEUM

Donations to the mineral museum consisted of cut stones, mineral books, slide projector with screen and 1500 slides, display case and a mine car, financial contributions and the contributed time and talent of numerous volunteers. Donations of the cut stones, minerals and books were valued at \$50,466. Cash donations were almost \$2,000 with \$989 coming from the donation box.

The sales store operated the full year. Gross sales were \$23,000 with a resultant gross profit of \$9,000. Some operating expenses were paid and consigned inventory purchased for resale.

STATISTICS

Statistics are a good record of the public demands on the Department's staff and the variety of services used. Activities representing these statistics are listed below. These statistics are taken from the Director's Quarterly Reports to the Board.

PUBLIC CONTACTS

| | |
|--------------------|--------------|
| Telephone contacts | 11,383 |
| Office visitors | <u>2,899</u> |
| Total | 14,282 |

MUSEUM ATTENDANCE

| | <u>No. of Groups</u> | <u>Visitors</u> |
|---------------|----------------------|-----------------|
| School Groups | 158 | 5,645 |
| Other Groups | 34 | 1,374 |
| Curator | 9 | 270 |
| Public | | <u>41,031</u> |
| TOTAL | 201 | 48,320 |

MISCELLANEOUS STATISTICS

| | |
|--|-------|
| Educators Kits | 64 |
| Field Trip Information - Collecting | 197 |
| Programs Provided | 35 |
| Meetings Attended | 90 |
| Mine Visits | 146 |
| Mine Reports Written | 46 |
| Field Interviews. | 107 |
| Conferences & APSMOA | 9 |
| New Mine Files Developed. | 295 |
| Publications Developed and Printed | 11 |
| Publications Sold | 1,805 |
| Library Uses, Includes MILS Maps | 1,928 |
| Other Government Agencies Assisted | 96 |
| Mineral Identification | 1,280 |
| Mine Files Used (mineral properties) | 1,903 |
| Mineral Properties Discussed With Engineers. | 432 |

FUTURE ACTIVITIES

Consistent with good forward planning processes, a long-term view must be maintained. Therefore, additional objectives have been established for future activities. However, they may be modified as industry needs, technology or regulations change. They have not been placed in a specific planning cycle at this time.

1. Establish a mineral exploration program data depository and maintain a composite map of location and type of exploration activity.
2. Develop a mineral property sampling capability, including equipment to collect and analyze samples with emphasis on non-metallic minerals. Necessary equipment will include hand-sampling tools, a core drill, a bulk sample analytical and processing plant such as a small portable mill.
3. Establish an ore buying station so there will be a market for small lots of ore minerals.
4. Develop a regional mineral resources evaluation program to study groups of old properties for suitability for cooperative development (custom mill-type studies) or as a mineral exploration target.
5. Develop an active "abandoned mines" safety and environmental hazard program to:
 - a. locate and map abandoned shafts, adits, open pits and caved areas
 - b. evaluate them for mineral potential or as anchor points for sophisticated mineral exploration programs
 - c. propose solutions to the safety hazard presented by abandoned shafts, adits, open pits and caved areas
 - d. assist in environmental cleanup programs by filing excavations found to be of no value with waste and tailings.
6. Function as an administering agency for Federal and state mineral lands reclamation plans.
7. Establish a touring mineral museum to provide statewide educational programs, lectures and displays.
8. Establish a position of Public Information Officer in the Department's Phoenix office.
9. Prepare an inter-library cross reference index of publications on Arizona's mineral resources and mines.

Two items recently placed in a specific time cycle include:

1. Study of leachable oxide copper deposits with emphases on 50,000 tons or less, overlooked in past activity.
2. Study of industrial minerals including present consumption in Arizona, Arizona deposits and proximity of possible markets outside of Arizona.

DEPARTMENT OF MINES AND MINERAL RESOURCES

Financial Statement

Fiscal Year 1985-86

| | <u>Appropriation 1985-86</u> | <u>Claims Paid Through Year End</u> | <u>Balance at Year End</u> |
|-------------------------------|----------------------------------|---|--------------------------------|
| Personal Services | \$302,563 | 306,341.80 | (3,778.80) |
| Employee Related Expenses | 67,939 | 62,443.33 | 5,495.67 |
| Professional & Outside | Ø | 15.00 | (15.00) |
| Travel (In State) | 7,200 | 7,448.28 | (248.28) |
| Travel (Out of State) | 1,100 | 1,240.54 | (140.54) |
| Operating | 32,400 | 33,367.22 | (967.22) |
| Advertising | 0 | | |
| Communications | 5,348.44 | | |
| Rent | 6,000.00 | | |
| Insurance | 3,500.00 | | |
| Lease/Rental Other Machine | 15.04 | | |
| Lease/Rental Other | 480.12 | | |
| Printing & Photography | 170.08 | | |
| Repair/Maint. Non Contract | 2,034.36 | | |
| Repair/Main. Contract | 2,582.86 | | |
| Operating Supplies | 1,245.64 | | |
| Repair & Maintenance Supplies | 680.84 | | |
| Utilities | 7,898.42 | | |
| Miscellaneous | 2,857.92 | | |
| Computer Software | 553.50 | | |
| Total | <u>33,367.22</u> | | |
| Equipment | 800 | 1,143.03 | (343.03) |
| TOTALS | \$412,002 | \$411,999.20 | \$ 2.80 |