DEVELOPMENTS IN MINERALS, MINING, ENERGY, AND WATER RESOURCES
IN IDAHO FOR 1979

Idaho Bureau of Mines and Geology
Idaho Bureau of Minerals
Idaho Department of Water Resources
U. S. Bureau of Mines
Idaho Mining Association

Idaho Geological Survey
University of Idaho
Moscow, Idaho 83843

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TABLE OF CONTENTS

DEDICATION .................................................. v
INTRODUCTION ................................................. 1
MINERAL ECONOMICS .......................................... 2
MINERAL OPERATIONS .......................................... 10
   Metallic Minerals ........................................... 10
      Couer d'Alene Mining District ......................... 10
         Sunshine Mining Company ............................ 10
         Bunker Hill Company ................................ 13
         Hecla Mining Company ............................... 14
         Day Mines ............................................ 15
         Other Coeur d'Alene Mining Operations .............. 16
   Other Mining Operations in the State ................. 17
   Nonmetallic Minerals .................................... 21
      Phosphate ............................................. 21
      Other Industrial Rocks and Minerals ................. 21
OIL AND GAS ................................................. 22
MINERAL LEASING ON STATE LANDS ....................... 26
NEW MINING LEGISLATION AND REGULATIONS ............. 29
WATER RESOURCES ........................................... 34
OTHER DEVELOPMENTS ....................................... 36

LIST OF TABLES

Table 1. Nonfuel Mineral Production in Idaho, 1978-79 ........ 3
Table 2. Coeur d'Alene District Mines' Net Production and Earnings in 1979 ............ 11
Table 3. Exploratory Oil and Gas Wells in Progress in Idaho for 1979 .............. 24
Table 4. Historical Summary of Oil and Gas Drilling in Idaho .... 25
LIST OF FIGURES

Figure 1. Mineral Production in Idaho, 1967-1979 .......... 4
Figure 2. Average Monthly Prices of Selected Minerals for 1979 .. 6
DEDICATION

Carleton N. Savage, 1916-1979

We dedicate this cooperative report to Carleton N. Savage, the former associate chief of the Idaho Bureau of Mines and Geology, who died in 1979. Carl would have heartily endorsed this report, and we hope that it will advance along the lines of excellence that Carl followed throughout his professional career. The tribute to Carl is reprinted from the *Gem State Geological Review*, Winter-Spring 1979, (v. 2, no. 1).

Carleton Norman Savage, highly respected geologist and associate chief of the Idaho Bureau of Mines and Geology, died January 23, 1979, of cancer at the age of 62. He was born on July 5, 1916, at Fairfield, Maine. In 1938, he obtained an A. B. degree in geology from Colby College, Maine, and in 1940 an M. S. degree in geology from Northwestern University. During World War II he served as a deputy section chief for Far Eastern studies in the Office of Strategic Services (OSS) under the Joint Chiefs of Staff in Washington, D. C. After the war, he was chief of the China economic section for the U. S. Department of State, Far Eastern sector; later, he worked briefly for the Maine Geological Survey. In 1947 he joined the faculty of Kent State University as assistant and later associate professor. In this job he organized the geology department. Twenty years later he received a special citation of appreciation for this accomplishment, an award given by the geology faculty, the president, and the board of regents of Kent State University.
In 1957, he came to Idaho as economic geologist with the Idaho Bureau of Mines and Geology. As a full-time field geologist for IBMG, he found it necessary to investigate far more than economic geology and to cover every corner of the state in field studies, logging about 8,000 miles of field travel every year. Thus, from the start he was called upon to develop and exercise a broad range of geologic knowledge and expertise. Carl was more properly a general geologist, a position he could ably fill from his experience as a scientist with the federal government, a consulting geologist, and a teacher of geology.

During this time he combined his duties as IBMG geologist with those as professor of geology in the College of Mines at the University of Idaho. He was always dedicated to his teaching, increasing the students' and his own knowledge about the geology of Idaho. He released the results of his research in 27 IBMG publications and in 15 other regional and national scientific journals. One is the popular Idaho Earth Science: Geology, Fossils, Climate, Water, and Soils that he coauthored with Sylvia H. Ross. In the 22 years with IBMG Carl developed a breadth of geologic knowledge about the state that has held him in high esteem among his scientific colleagues.

In 1975 he was appointed associate chief of the reorganized Idaho Bureau of Mines and Geology under the Division of Earth Resources in the Idaho Department of Lands. As associate chief, he continued to use his wide knowledge of Idaho's geology and mineral resources for the best interests of Idaho and its citizens. In this position he worked closely with IBMG chief, Maynard M. Miller, to build a competent staff of geologists and other specialists to meet the growing responsibility of the state to understand and encourage the use of its geologic
resources. He was awarded the honorary title of *Idaho State Geologist* in a special ceremony at the State Capitol on December 20, 1977, with the presentation being made by Gov. John Evans.

His professional associations and listings included the American Association of University Professors, Sigma Xi Scientific Honorary, the Ohio Academy of Science, American Men of Science, Who's Who in the West, American Association for the Advancement of Science, the American Association of Geology Teachers, the Idaho Academy of Science, the Society of Economic Geologists, and the Idaho Mining Association. He was also a Fellow of the Geological Society of America and listed in the *Dictionary of International Biography*. He was registered as a Professional Geologist in Idaho. In 1978 he received recognition as an Honorary Alumnus of the University of Idaho in appreciation of his many years of teaching service to the university and his research and administrative contributions to the Bureau of Mines and Geology.

A memorial fund in honor of Carl Savage has been established to recognize scholastic achievement in graduate research on earth resources at the University of Idaho. . . . Friends and associates should direct their memorial contributions to the *Carl N. Savage Memorial Scholastic Award*, College of Mines and Earth Resources, University of Idaho.
INTRODUCTION

This report is a cooperative effort between several state and federal agencies and industrial organizations. The IBMG would like to acknowledge the contributions of the Idaho Department of Water Resources, the Idaho Bureau of Minerals, the U. S. Bureau of Mines, and the Idaho Mining Association.

Two events occurred in 1979 that emphasise the need for this report. The first was the closure of the Idaho Mine Inspectors Office in the Idaho Department of Labor and Industrial Services. For 78 years...
the Mine Inspectors Office had published an annual summary of developments in Idaho's mineral industry that included a directory of mining operations in the State. The publications were an uninterrupted history of mineral operations in Idaho from 1899 to 1978. The second event was the closure of the U. S. Bureau of Mines' liaison office in Boise. The USBM office gathered annually the production data on Idaho's mining industry. A modified program by USBM is still in existence, but now each USBM liaison officer is responsible for three or more states instead of one.

IBMG has added this annual report to its yearly objectives so that the history of Idaho's mineral industry will continue uninterrupted. IBMG has not included the directory of mining operations as part of the annual summary but may release it as a separate publication in the future.

**MINERAL ECONOMICS**

For 1979, Idaho's mineral production was valued at more than $437 million according to figures released by the U. S. Bureau of Mines (Table 1). This total represents a 46 percent increase over 1978 mainly due to higher prices for silver and lead (Figure 1).

Silver was the leading metallic mineral commodity (Table 1) and accounted for approximately 46 percent of the total mineral revenue generated in Idaho. Silver was followed in decreasing order of value by phosphate rock, lead, zinc, sand and gravel, vanadium, and cement.
<table>
<thead>
<tr>
<th></th>
<th>1978 Value, thousand dollars</th>
<th>1979 Value, thousand dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimony ore and concentrate, antimony content</td>
<td></td>
<td></td>
</tr>
<tr>
<td>short tons</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Clays</td>
<td>27</td>
<td>148</td>
</tr>
<tr>
<td>Copper (recoverable content of ores, etc.)</td>
<td>3,888</td>
<td>5,701</td>
</tr>
<tr>
<td>Gold (recoverable content of ores, etc.)</td>
<td>20,492</td>
<td>3,966</td>
</tr>
<tr>
<td>Lead (recoverable content of ores, etc.)</td>
<td>44,761</td>
<td>33,256</td>
</tr>
<tr>
<td>Phosphate rock</td>
<td>4,461</td>
<td>80,765</td>
</tr>
<tr>
<td>Sand and gravel</td>
<td>8,112</td>
<td>19,290</td>
</tr>
<tr>
<td>Silver (recoverable content of ores, etc.)</td>
<td>18,379</td>
<td>99,249</td>
</tr>
<tr>
<td>Stone (crushed)</td>
<td>2,624</td>
<td>6,670</td>
</tr>
<tr>
<td>Zinc (recoverable content of ores, etc.)</td>
<td>32,353</td>
<td>22,111</td>
</tr>
<tr>
<td>Combined value of barite (1978), cement (masonry and portland), garnet (abrasive), gypsum, lime, perlite, pumice, stone (dimension), tungsten ore, vanadium, and values indicated by symbol W</td>
<td>XX</td>
<td>28,021</td>
</tr>
<tr>
<td>Total</td>
<td>XX</td>
<td>299,227</td>
</tr>
</tbody>
</table>

NA Not available. XX Not applicable.
W Withheld to avoid disclosing company proprietary data; value included in "Combined value" figure.
1 Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
2 Excludes industrial sand; value included in "Combined value" figure.
Figure 1. Mineral Production in Idaho, 1967-1979.
Metallic minerals accounted for 64 percent of the total mineral revenue and nonmetallic minerals accounted for the rest.

Higher metal prices (Figure 2) prevailed throughout the year. Of special importance was the increased value of gold, silver, lead, and copper.

The precious metals market was very strong in 1979, breaking new records almost monthly. The uncertainty in a world situation that was characterized in 1979 by two-digit inflation, the weakening of many national currencies, the overthrow of the Iranian government, and increased petroleum prices from OPEC countries influenced many to convert their monetary holdings into silver and gold. Arab nations converted petro-dollars into gold and silver bullion as a hedge against inflation.

The future for the precious metals market is difficult to predict. But whatever the outcome, fluctuations in the market will directly affect Idaho, since the State produces 48 percent of the nation's newly mined silver.

Higher lead prices also brightened the State's mineral economy. The marked increase in price was attributed in part to heavy buying on the international market by the U.S.S.R. However, the lead market softened at the end of 1979.

Zinc prices remained practically unchanged. Minor price fluctuations occurred; however, no significant increases were noted. Until the financial situation of the U.S. automotive industry improves, an upward shift in the price of zinc appears doubtful.

The price of cobalt remained high, following a phenomenal increase in 1978. Continued unrest in Zaire, Africa, the free world's largest
Figure 2. Average Monthly Prices of Selected Metals for 1979 (Source: Engineering and Mining Journal, 1979, monthly issues).
Figure 2. Continued.
Figure 2. Continued.
Figure 2. Continued.
cobalt producer, may cause cobalt prices to stay high in coming years.

Both molybdenum and copper prices were strong. Copper prices made significant gains, climbing in both spring and fall. The price of phosphate rock increased slightly.

Higher metal prices and strengthening markets should have a positive effect on the mining industry of Idaho through 1980.

**MINERAL OPERATIONS**

**METALLIC MINERALS**

Coeur d'Alene Mining District

Companies operating in the Coeur d'Alene mining district had an excellent year for production and profits as a result of record prices for silver and lead. The total value of ore extracted from mines in the district was an all-time record of $256,834,532 from an output of 1,586,562 tons. The net production and earnings for mines in the district are summarized in Table 2.

Sunshine Mining Company. During 1979 Nelson Bunker Hunt and W. Herbert Hunt of Dallas, Texas, attempted to gain control of the Sunshine Mine, the nation's largest silver mine. Hunt International Resources Company (HIRCO) acquired a 28 percent interest in Sunshine early in the year and placed three of its executives in top positions in Sunshine's management; however, the new Sunshine leadership later resisted further attempts by HIRCO to gain full control of the company. HIRCO backed down in March and sold its 28 percent interest to a
Table 2
Coeur d'Alene District Mines' Net Production and Earnings in 1979*
[Compiled from sworn statements on file with the Shoshone County Assessor]

<table>
<thead>
<tr>
<th>Tons Extracted</th>
<th>Gross Value</th>
<th>Cost of Extraction</th>
<th>Freight and Treatment</th>
<th>Betterments and Repairs</th>
<th>Net Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big Creek Apex</td>
<td>----</td>
<td>$527,897</td>
<td>$166,947</td>
<td>----</td>
<td>$360,950</td>
</tr>
<tr>
<td>Bunker Hill Co.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bunker Hill-Crescent</td>
<td></td>
<td>565,738</td>
<td>45,180,999</td>
<td>6,357,918</td>
<td>24,571,826</td>
</tr>
<tr>
<td>70% Star Interest</td>
<td></td>
<td>198,879</td>
<td>20,837,854</td>
<td>4,856,440</td>
<td>10,727,830</td>
</tr>
<tr>
<td>Callahan Mng.-Galena</td>
<td></td>
<td>181,055</td>
<td>46,015,271</td>
<td>699,696</td>
<td>9,579,454</td>
</tr>
<tr>
<td>Day Mines-Hunter Ranch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portion of Lucky Friday</td>
<td></td>
<td>3,974</td>
<td>1,425,148</td>
<td>505,180</td>
<td>----</td>
</tr>
<tr>
<td>Hecla Mng.-Lucky Friday</td>
<td></td>
<td>171,934</td>
<td>53,533,693</td>
<td>10,839,885</td>
<td>11,132,992</td>
</tr>
<tr>
<td>Hecla-Sunshine Unit-33.25%</td>
<td></td>
<td>51,110</td>
<td>15,198,948</td>
<td>558,846</td>
<td>5,152,274</td>
</tr>
<tr>
<td>Hecla-Star Unit-30%</td>
<td></td>
<td>85,234</td>
<td>11,478,527</td>
<td>5,280,039</td>
<td>4,479,173</td>
</tr>
<tr>
<td>Silver Dollar Mng.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunshine Unit Area</td>
<td></td>
<td>----</td>
<td>4,177,434</td>
<td>1,654,285</td>
<td>----</td>
</tr>
<tr>
<td>Silver Syndicate-Snowstorm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area of Sunshine</td>
<td></td>
<td>----</td>
<td>175,933</td>
<td>145,808</td>
<td>----</td>
</tr>
<tr>
<td>Sunshine Mng. Co.</td>
<td></td>
<td>172,228</td>
<td>32,501,674</td>
<td>596,650</td>
<td>9,897,770</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td>1,586,562</td>
<td>$256,834,532</td>
<td>$32,799,103</td>
<td>$81,180,316</td>
</tr>
</tbody>
</table>

special holding company formed by Sunshine management with a subsequent dismissal of pending lawsuits by both sides in June. Sunshine acquired the HIRCO interest with funds from Middle East investors, Arab Investors Group S. A. This Paris-based company announced that they had no plans to obtain other silver properties in Idaho nor would they attempt to take control of Sunshine. Investors Group S. A. initially secured a 19 percent interest in the company and later exercised the option to increase holdings to 27 percent. In the agreement with Sunshine, Arab Investors Group S. A. will not sell or purchase Sunshine common stock through the end of 1982.

In other developments, Sunshine started construction in August on the new $6 million No. 12 shaft. The 1,500-foot shaft will connect the 3,700- and 5,200-foot levels in the southwestern part of the Sunshine Mine and provide access to the Copper Vein. Production should start from the new shaft in late 1981. The improvement is expected to increase the mine's production of silver from a current yearly average of 5.5 million ounces to 6.5 million ounces in 1982, and eventually to 7.5 million ounces.

The new management of Sunshine announced in late 1979 that to move totally into silver production and marketing the company had sold its manufacturing companies, including Anchor Post Products, Piezo Crystal Company, Premier Metal Products, and Idaho Garnet Abrasive Company. Sunshine purchased J. H. Rayner (Holdings), Ltd., a London-based commodities firm, and announced plans for a new silver refinery using a Sunshine-developed chemical and electrolytic technique to produce refined silver bullion. Construction on the refinery will begin in 1980.
Sunshine estimated its ore reserves at 171.8 million ounces of silver, which is valued at more than $1.5 billion. This estimate is based on less conservative calculations than were used in the past.

In November, Sunshine appealed a state tax ruling that underground utilities and rail were assessed and taxed in addition to the real property.

The company donated a scale model of its mine, valued at $26,500, to the College of Mines and Earth Resources at the University of Idaho.

**Bunker Hill Company.** The Bunker Hill Company, a subsidiary of Gulf Resources and Chemical Corporation and a major producer of lead and zinc in the nation, continued working with the Environmental Protection Agency (EPA) over pollution problems associated with Bunker Hill's smelter. The smelter was shut down in January, because sulphur dioxide emissions exceeded federal air standards during a period of cold stagnant air. The plant was closed for a week and then put back into limited production, but only after it sustained an estimated $100,000 damage when over 100 miles of piping in the facility froze.

Bunker Hill was fined $37,000 by the Occupational Safety and Health Administration (OSHA), which alleged that workers were exposed to lead, dust, and arsenic compounds. The company was ordered by OSHA early in 1979 to pay a $114,640 civil penalty for permit violations on water discharge between 1974 and 1977. These problems persist though Bunker Hill has invested over $21 million from 1967-1977 on pollution control and has had an outstanding employee safety record.

In other legal matters, Bunker Hill initiated civil suits against United Technology Center of California, H. D. Fowler Company of Washington, and Amaco Reinforced Plastics of California, charging that these companies
had sold defective pipes to Bunker Hill. The company filed civil suit against the Sherwin Williams Company for allegedly breaking a contract for the purchase of zinc oxide from the Kellogg smelter. The company also filed suit against Incad Corporation of Washington over a quantity of copper flue dross presently stored on Bunker Hill property.

In 1979, 9.69 percent of Gulf Resources and Chemical Company's stock had been purchased by a subsidiary of Placid Oil Company, a company owned by trusts set up by the late H. L. Hunt. [The $400 million offer from Placid Oil to purchase all common and preferred stock outstanding was rejected by Gulf Resources in February 1980.]

Bunker Hill announced that it would deepen the No. 2 shaft of the Crescent Mine to gain access to deeper ore zones.

Bunker Hill's interest in community projects included the sponsorship of the KHQ-TV program, "High School Bowl," which is televised in northern Idaho.

Hecla Mining Company. Hecla Mining Company, operators of the Lucky Friday and Star-Morning Unit, had a spectacular year due to the higher price for silver. A corporate debt of over $57 million in the third quarter of 1978 (primarily incurred from a $96 million write off of the Lake Shore, Arizona, copper venture) was reduced to $39 million by October 1979. For the year, Hecla's stock increased in value by 778 percent. In mid-year Narragansett Wire Company, a wholly owned subsidiary of El Paso Natural Gas Company, sold 16.7 percent of Hecla stock to Rosario Resources Corporation. This purchase gave Rosario a total of 19.94 percent of outstanding Hecla shares. In November, it was announced that Amax would purchase Rosario.
Early in the year, Hecla and Sunshine Mining Company reached an agreement that eliminated several long standing operational conflicts in the Sunshine Unit Area. Hecla continued exploration on the DIA (Day, Independence, Abot) project throughout the year. The Lucky Friday vein system was extended into Day Mines' Hunter Ranch property. Hecla also continued to work with EPA to obtain permits for a new tailings pond at the Lucky Friday.

Hecla announced that a new 7,500-foot deep shaft will be constructed at a cost of $26 million to facilitate the mining of ore from below the 5,100-foot level of the Lucky Friday Mine. Current production in the mine extends to about 4,450 feet. An offset shaft had been proposed in 1977. The Silver Shaft should be completed in mid-1984 and will be the deepest in the world outside of South Africa. The extended shaft will also be the first cylindrical and concrete-lined shaft in the Coeur d'Alene district. The new facility will boost production from 750 tons to 1,000 tons of ore per day.

Hecla is also the operating partner with Sunshine Mining Company, Sunshine Consolidated, and Coeur d'Alene Mines in a venture formed in December to revitalize the Silver Summit Mine near Osburn. The new project includes reactivating a 300-ton mill and sinking a deeper shaft after the mine is opened.

Day Mines. Day Mines had a record year in 1979. Day has a 25 percent interest in the Galena Mines and 5 percent interest in the Coeur Mine. A 50-50 interest with Hecla in the Hunter Ranch area adjacent to the Lucky Friday Mine showed a third quarter increase of 156 percent over 1978. Work continued on the DIA project, and some drilling was done in the Tamarack Mine.
Other Coeur d'Alene Mining Operations. Callahan Mining Corporation had higher earnings from its 5 percent interest in the Coeur Mine and from its interest in the Galena Mine, which is owned by Callahan and operated by ASARCO.

An Idaho Supreme Court decision in October upheld Silver Syndicate's claim to 50 percent of the ore mined by Sunshine Mining Company from three ore bodies in the Rambo area near the Chester Vein. Sunshine is in similar litigation with Metropolitan Mines over the Copper Vein system. Both litigations pertain to the control of deep ore bodies in and adjacent to the Sunshine Unit Area (pooled claims of Sunshine, Hecla, and Silver Dollar). Big Creek Apex profited from its share of revenue generated from the Snowstorm area in the Sunshine Mine.

Coeur d'Alene Mines did very well during 1979 from its 40 percent share of ore sold from the Coeur Mine (fourth largest silver producer in the district) operated by ASARCO. The company paid ASARCO, Callahan, and Day Mines their pre-production investment of $20,365,000. Exploration continued on the CAMP property (CDA Mines, Merger Mines, Plainview Mining) adjacent to the Coeur property.

Bueno Coeur d'Alene Incorporated plans to drill a 2,500- to 2,700-foot hole on a geochemical anomaly on Bueno's Allied property adjacent to the Lucky Friday Mine. A similar hole drilled during 1978 stopped short of the target area because of drilling problems. Bueno also plans to drill a hole on the Gold Creek property one-half mile southeast of Mullan.

American Silver Mining Company announced early in 1979 that a joint exploration venture with ASARCO and Coeur d'Alene Mines would start on the American Silver property in the Coeur d'Alene district.
Silver Dollar Mining Company is also a partner in the Consolidated Silver project to reopen the Silver Summit Mine.

Silver Baron Mining continued work on the Gold Back Mine (owned by Gold Back Mines Corporation) east of Murray. Silver Baron announced that the Rex Mill will be placed into operation to process ore from the Gold Back Mine and nearby claims.

Silver Crystal Mines continued shipments of lead, zinc, and silver ore from the Bear Top Mine. The mine is operated in partnership with the owner, Merger Mines Corporation.

Saint Elmo Silver started development work on claims surrounded by the Coeur Mine property.

Production continued from the Little Pittsburgh Mine in the Coeur d'Alene area. Ore from the mine is milled at the nearby Nabob concentrator.

A U. S. Department of Energy aerial survey flown as part of the National Uranium Resource Evaluation (NURE) program detected significant uranium anomalies over parts of the Coeur d'Alene mining district. Capital Silver acted on this information and staked 103 claims over one of the anomalies north of the Dayrock Mine.

The U. S. Forest Service started a revegetation program on the old Jack Waite tailings dump. The dump piles have long been a source of concern to local citizens as a possible source of pollution in the north fork of the Coeur d'Alene River.

Other Mining Operations in the State

Noranda Mines continued exploration and feasibility testing of the Blackbird Mine at Cobalt in Lemhi County. Development of the Blackbird Mine is part of Noranda's plan to become the largest producer of cobalt
in North America. Cobalt retained a high price throughout the year. The mine will go into limited production in 1980, reaching a projected annual production by 1984 of 2,000 tons of cobalt. The Blackbird Mine is the nation's most readily available supply of this strategic mineral and has about 15 to 25 years of reserves in the area. If deposits are found in favorable ground in wilderness areas north and west of the mine, development will be allowed for underground mining only.

Noranda was drilling and exploring on its uranium claims on Basin Creek. The B and B Mining Company, funded by Noranda, was reported drilling and drifting on its molybdenum property at the head of Spring Gulch, north of Shoup on the Idaho-Montana border.

Canadian Superior Mining (U.S.), Ltd., continued work on its cyanide heap-leach operation for gold at Stibnite. The company concentrated on feasibility studies and extensive environmental testing throughout the Stibnite area. Canadian Superior also controls several gold properties in the Thunder Mountain mining district east of Stibnite. Superior Oil Company of Houston, Texas, the parent company of Canadian Superior, has tended an offer for the 4.6 million outstanding shares of Canadian Superior that are not owned by the company.

Production in southwestern Idaho at the DeLamar Silver Mine, owned and operated by Earth Resources, exceeded plant design during 1979. The mine produces approximately 2.5 million ounces of silver per year and has twenty years of reserves blocked out. In late 1979 it was announced that Earth Resources would sell its mining division to Dome Mines (a Canadian gold producer) for $28 million. [This transaction was terminated in early 1980.]
Testing and underground evaluation continued at Cyprus Mines' Thompson Creek molybdenum property near Challis. Cyprus anticipates mining 15 to 20 million pounds of molybdenum annually by 1983. Construction is planned to begin in late 1980.

The impact of new mining ventures in Idaho was recently highlighted in a study by the Idaho Bureau of Economic Resources and Community Affairs. This study estimates that Noranda's Blackbird Mine will generate 300 to 400 primary and secondary jobs and bring 1,200 new people into the Salmon area. Cyprus' Thompson Creek Mine will employ 550 people at an annual payroll of $8 million with a secondary impact of over 2,000 new people throughout the Challis area.

Texasgulf (in conjunction with Silver King Mining) continued an extensive evaluation of the Iron Dyke Mine on the Oregon side of Hells Canyon on the Snake River. Ore was shipped from this mine to Silver King's Copper Cliff mill near Cuprum. The company has also purchased the Red Ledge Mine on the Idaho side of the canyon for a reported $1.5 million. The mines have produced copper, gold, and silver in the past and are important as possible volcanogenic deposits associated with the Seven Devils Volcanics and the Permian-Triassic subduction complex along the Idaho-Oregon border.

The Iron Mask Mine at Talache, located 10 miles south of Sandpoint, was in development this year, and 15 tons of silver ore was shipped to a smelter in British Columbia. Continued exploration and development are planned for this mine.

Talisman Mines started an engineering study on the Bluebird claim, a silver-copper property in Lemhi County.
Sydney Mining continued testing and geologic assessment of its 3,000-acre holding adjacent to the DeLamar Mine in Owyhee County.

Century 21 Mining continued work on its gold placers on Jordan Creek in Owyhee County.

Silver Butte Mining continued to work on the Brown Bear claim in Bonner County.

Clayton Silver continued production from its mine near Clayton with new production coming from the 950- and 1,100-foot levels.

Idaho Gold Fields started feasibility studies on its 320-acre placer gold property near Florence and announced plans to reopen the Golden Dream lode near Murray.

Union Carbide continued a drilling program on Chilco Mountain.

The Washington Public Power Supply System was reported drilling for uranium near Gibbonsville.

Inspiration Development Company leased the Bayhorse and Ramshorn mining properties this year from Bayhorse Minerals, Inc. They have been diamond drilling in the vicinity of Pacific Mountain to delineate fluorspar reserves. The company was also active at the Salmon River Copper Mine west of Shoup and at the Ima Mine in the Blue Wing district.

Other exploration ventures in Idaho included the following: Noranda Mines--Basin Creek, for uranium; Anaconda--Knapp Lakes area, for molybdenum; American Nickel and Copper Company--Knapp Creek area, for uranium; activity at Warren, Florence, and Marshall Lakes, for gold; AMAX--Grimes Pass, for molybdenum; Bear Creek--Triumph Mine, for silver; and ABELLA Resources--Little Falls Creek, for molybdenum.
NONMETTALIC MINERALS

Phosphate

The phosphate industry in southeast Idaho strengthened slightly in 1979. Idaho produces approximately 10 percent of the nation's phosphate needs.

Beker Industries formed a partnership with Western Cooperative Fertilizer, Ltd. The agreement covers phosphate rock products from Beker's Maybe Canyon Mine and other phosphate rock resources.

Alumet continued to have environmental problems with plans to develop leases in the Diamond Creek area. The phosphate rock may have to be transported through a 2-1/2 mile tunnel (cost estimated at $12,000,000), or 19 miles of new railroad may have to be laid to transport the ore.

Other Industrial Rocks and Minerals

The industrial minerals sector in Idaho had a good year in 1979. Record earnings were reported for both the clay and the cement industries. Unfortunately, much higher interest rates and a depressed housing market will adversely affect most industrial mineral producers in 1980.

Increased demand from the construction industry resulted in shortages in the supply of cement in 1979. Idaho Portland Cement in Inkom, the state's only cement producer, had to allocate its supply for a short time. A new plant under construction in Oregon should alleviate the cement shortage in the Northwest.

The clay industry had an excellent year in 1979, with A. P. Green Refractories Company reporting its best year since 1974. The Troy-based
company is a major producer of firebrick, which is used extensively by the lumber and paper industry in the Pacific Northwest.

Idaho Garnet Abrasive Company, a former subsidiary of Sunshine Mining Company, was sold to Emerald Creek Garnet Company. The bulk of the garnets produced in Idaho are used in water filtration systems and in sandblasting.

Sand and gravel companies reported good earnings due to a fairly strong construction industry for most of the year. However, like most other industrial mineral producers, earnings for 1980 may be down if new construction slumps considerably.

OIL AND GAS

Interest in the untapped petroleum potential of the Rocky Mountains has been encouraged by important discoveries in the region, rising oil and gas prices, the real prospect of energy demand exceeding supply, and the possibility of an oil embargo by Iran. Drilling records for Idaho were continually being set by the petroleum industry for the number of wells and footage completed during the year. Interest continues to focus on the Overthrust belt that extends through the eastern part of the State. While drilling has been more extensive in the Utah and Wyoming parts of this region, where significant discoveries have occurred, Idaho has received an important share of the exploration effort; however, a commercial discovery has yet to be found. The future will record more exploratory drilling—and a likely discovery—as priorities and venture capital are directed to Idaho.
In January 1978, a moratorium was imposed upon accepting and processing oil and gas leases until the leasing program was brought under contemporary formal rules and regulations. A public administrative hearing to collect comments on a draft proposal for oil and gas rules and regulations was held on November 30 in Boise. The hearing comments have been reviewed by the hearing officer and his recommendations are being reviewed by the State Attorney General's office. Oil and gas leasing will be reopened following rule adoption.

Seven permits to drill were issued during 1979. Two wildcat wells were completed to total depth under permits issued in 1978-1979. Location and data on completed wells and wells in progress are shown in Table 3. Supron Energy Corporation's Bevans No. 1 Well was only partially plugged to facilitate formational testing in the future.

Union Texas Petroleum's Big Canyon Federal 1-13 test in sec. 13, T. 10 S., R. 43 E., B. M., and Union Oil of California's Hoff 1-8m were completed during 1979 to less than permitted target depths and were plugged and abandoned.

In 1978 May Petroleum's Federal 1-8 test well at 16,750 feet was the deepest ever drilled in Idaho. Actual drilling operations exceeded ten months. An investment record for a single well was also set, with expenses incurred believed to be near $7 million. Gas was found near 11,000 feet with an initial flow of 240,000 cubic feet per day. However, the flow ceased and the zone was abandoned as an isolated trap.

The regulatory agency for oil and gas exploration and production is the Idaho Oil and Gas Conservation Commission. A historical summary of known oil and gas drilling in the state is shown in Table 4. Average annual footage during the past four years has increased more than
Table 3
Exploratory Oil and Gas Wells in Progress in Idaho for 1979

<table>
<thead>
<tr>
<th>Operator</th>
<th>Well Name</th>
<th>API No.</th>
<th>Location 1</th>
<th>County</th>
<th>Depth (Ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Completed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Union Texas Petroleum</td>
<td>Big Canyon</td>
<td>11,007</td>
<td>13-10S-43E</td>
<td>Bear Lake</td>
<td>11,734</td>
</tr>
<tr>
<td>Union Oil of California</td>
<td>Hoff 1-8m</td>
<td>11,011</td>
<td>8-1S-39E</td>
<td>Bingham</td>
<td>8,942</td>
</tr>
</tbody>
</table>

| **In Progress**      |           |         |            |         |             |
| Supron Energy Corporation| Bevans No. 1| 11,081  | 33-5N-44E  | Teton    | 12,530      |
| Ladd Petroleum       | Bennington No. 3-24| 11,007  | 3-12S-43E  | Bear Lake | 9,183       |
| Cities Service Corp. | Rigby "A" Williams No. 1| 11,007  | 29-13S-46E | Bear Lake | 8,245       |
| American Quasar      | North Eden Federal No. 21-11| 11,007  | 21-16S-45E | Bear Lake | 1,000       |
| American Quasar      | North Rabbit Creek Federal No. 6-21| 11,007  | 6-16S-46E  | Bear Lake | 55          |
| Phillips Petroleum   | Stoor "A" No. 1| 11,029  | 29-5S-44E  | Caribou  | 810         |

1Location coded as Section-Township-Range.
### Table 4

**Historical Summary of Oil and Gas Drilling in Idaho**

<table>
<thead>
<tr>
<th>Area</th>
<th>Pre-1963 Well/Footage</th>
<th>1963-1975 (13 Year Period)</th>
<th>1976-1979 (4 Year Period)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Idaho</td>
<td>21</td>
<td>5</td>
<td>15(8)</td>
<td>41(8)</td>
</tr>
<tr>
<td></td>
<td>81,849*</td>
<td>32,466</td>
<td>102,860(52,499)</td>
<td>217,183(52,499)</td>
</tr>
<tr>
<td>Southwest Idaho</td>
<td>36</td>
<td>5</td>
<td>1</td>
<td>42</td>
</tr>
<tr>
<td>Idaho</td>
<td>69,921</td>
<td>41,231</td>
<td>14,006</td>
<td>125,158</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>5</td>
<td>---</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>14,308</td>
<td>25,761</td>
<td>---</td>
<td>40,069</td>
</tr>
<tr>
<td>Wells Drilled</td>
<td>65</td>
<td>15</td>
<td>16(8)</td>
<td>96(8)</td>
</tr>
<tr>
<td>Footage Drilled</td>
<td>166,078</td>
<td>99,458</td>
<td>116,866(52,499)</td>
<td>382,402(52,499)</td>
</tr>
<tr>
<td>Average Depth</td>
<td>2,555</td>
<td>6,631</td>
<td>7,304</td>
<td>3,983</td>
</tr>
</tbody>
</table>

Data on wells in various stages of development.
* Represents total footage figure for the number immediately above in each case.
354 percent over that recorded in the first thirteen years of the commission's existence. Lithologic logs, electric logs, hydrocarbon logs, geologists' reports, drill stem tests, and other records filed with the commission are maintained for public access and review. A one-year confidentiality period following the well completion is observed on most records.

MINERAL LEASING ON STATE LANDS

Revenues generated by mineral leasing increased considerably during Fiscal Year 1979 (July 1, 1978, to June 30, 1979) due primarily to new metalliferous and uranium leases. Land under mineral lease increased by 43,543 acres for a total of 75,910 acres. Rentals and royalties collected under this leasing program totaled $99,460. Additional revenues were realized from the leasing of navigable waterways for minerals (other than oil and gas and geothermal resources). Rentals and royalties from navigable waterway leasing totaled $11,601.

Mining claims on State-owned lands increased considerably. Total claims at the end of the year exceeded 150, compared with 13 valid claims in existence at the end of 1978.

Revenues and acreage under geothermal resource leases increased during Fiscal Year 1979 with the first simultaneous filing period held under this leasing program. Total acreage under lease as of June 30, 1979, totaled 322,468 acres. Rentals of $323,428 were received by the State from these leases.
Income from existing oil and gas leases totaled $700,225 for 1,115,892 acres. The moratorium on further oil and gas leasing remained in effect during the formulation of rules and regulations to govern future procedures.

Leases upon lands under the administration of other State agencies provided $6,066 to those agencies. Miscellaneous royalties from temporary permits and trespass payments totaled $231.

Combined revenue received from all mineral leasing and miscellaneous programs was $1,143,857. This sum represents the largest income of record ever received by the State for the management of its mineral estate. The increase was largely realized due to the reopening of active geothermal resource leasing, the settlement of pending oil and gas lease applications under Bear Lake, and the adoption of royalty schedules which had delayed final action upon many mineral lease applications.

Of the total revenues, rentals generated $1,113,194, and production royalties earned $30,662. Regulations for the oil and gas leasing program were under legal review at the end of the year.

During Fiscal 1979, the Department of Lands processed 92 new reclamation plans encompassing 2,983 acres. Reclamation was completed on 15 plans covering 6,228 acres. At the end of Fiscal Year 1979, a total of 526 approved reclamation plans were on file, bringing the total acreage under plan to 19,972 acres.

The Idaho Dredge and Placer Mining Protection Act, Title 47, Chapter 13, Idaho Code, and the Idaho Surface Mining Act, Title 47, Chapter 15, Idaho Code, were passed to insure that all lands in the State affected by surface mining would be reclaimed and restored to
productive use. Both laws require that the mining operator submit a reclamation plan and bond.

Under the Dredge Mining Statute, ten new applications were received, seven of which have been subsequently approved. This brings the total active permits to nine, covering 162 acres. Eight applications for dredge mining permits are currently pending approval or bonding.

Permits were given for operations on the Middle Fork of the Boise River and for an area near Lolo Creek (not in the creek) in Clearwater County. A permit was denied to dredge a section of the American River near Elk City. An application was filed late in the year to dredge part of the Salmon River from the Middle Fork of the Salmon east to Spring Creek.

A request for a dredging permit by Bear Valley Associates of Houston, Texas, for heavy minerals in Bear Valley was submitted to the Idaho Land Board. State officials expressed great concern that this operation might pollute the Middle Fork of the Salmon River and threaten a chinook spawning ground. Members of the State Land Board toured the area in November. The company has withdrawn its dredge application until further engineering studies can be completed.

The recent increase in gold prices has stimulated much interest in placer mining in Idaho. Even for the weekend prospector, any dredging activity must comply with the Idaho Dredge Mining Act. All dredge operations must obtain a stream channel alteration permit from the Department of Water Resources in Boise. More information on dredge mining may be obtained from either the Idaho Bureau of Minerals in Boise, the Idaho Department of Water Resources in Boise, or the Idaho Bureau of Mines and Geology in Moscow.
Regulations for both the Idaho Surface Mining Act and the Idaho Dredge and Placer Mining Protection Act are under legal review at this time with adoption planned during 1980.

The Idaho Land Board approved a coal lease on 4,950 acres of State land in Teton County.

NEW MINING LEGISLATION AND REGULATIONS

Significant legislative and regulatory actions were proposed, debated, enacted, or implemented during 1979 that affected Idaho's minerals industry. These actions included the publication by EPA of comprehensive regulations governing hazardous waste; the completion of the National Academy of Sciences' COSMAR study to determine the applicability of the federal coal Surface Mining Control and Reclamation Act and regulations on noncoal mining reclamation practices; a debate over the mineralized area of the proposed Central Idaho Wilderness; and an examination of the General Mining Law of 1872 for proposed revisions.

Other actions included the finalization of the U. S. Forest Service's Roadless Area Review and Evaluation (RARE II); the completion of the U. S. Bureau of Land Management's wilderness inventory; the registration of all nonpatented claims; and the suit by the Idaho Land Board against the Secretary of the Interior regarding Idaho's acquisition of "in lieu" school sections.

The Resource Conservation and Recovery Act of 1976, Public Law 94-580, commonly referred to as "RCRA," is an omnibus, cradle-to-grave statute and regulatory plan for the control of all wastes classified as hazardous
which are generated by manufacturing, industry, and mining in the United States. RCRA is the most comprehensive regulatory undertaking ever attempted by the EPA. In scope it is equivalent to all of EPA's existing air and water quality regulations.

RCRA affects the mining industry through defining and determining the characteristics of hazardous wastes and through its rigorous monitoring, manifesting, and disposal requirements. Mining wastes are included as "special wastes" or "other mining wastes" and were proposed to be included because of residual heavy metals and low-level radiation in mining and mineral processing wastes.

The final regulations were scheduled for promulgation on December 31, 1979, and were subsequently delayed until April and August 1980. Because of their potential significant effect on the mining industry, thousands of hours have been spent by Idaho's industries in preparing for compliance.

RCRA also contains a section that authorizes states to administer the Act if the State has a "mirror image" regulation and the capacity and ability to manage a comprehensive hazardous waste program.

The Surface Mining Control and Reclamation Act of 1977, Public Law 95-87, commonly referred to as "SMCRA," was enacted with a specific provision in Section 709 to determine the applicability of the Coal Surface Mining Act to noncoal mining. Section 709 authorized a comprehensive study for that determination under the direction of the Council of Environmental Quality, which contracted with the National Academy of Sciences for the study. The report from the study is titled "Surface Mining of Non-Coal Minerals" and is commonly referred to as the "COSMAR report." This 18-month study was completed and published
in December 1979 and delivered by the National Academy of Sciences to the Council of Environmental Quality. The Council of Environmental Quality is now mandated by legislation to recommend to Congress whether hard rock mining in the West, including that conducted in Idaho, should be regulated directly or by legislation similar to the Coal Surface Mining Act.

The conclusion of the COSMAR report was clear in its strong recommendation that noncoal or hard rock minerals should not be regulated by the Surface Mining Control and Reclamation Act of 1977, but the Council of Environmental Quality is not required to accept that recommendation.

Throughout the second half of 1979 senators and congressmen debated the Central Idaho Wilderness Bill, S-2009. The major points of contention were the size of wilderness, the removal of areas not included in wilderness from any further consideration as wilderness (release language), and the access to critical and strategic minerals, especially in the Panther Creek drainage area, for exploration and mining. The Senate version of the bill as finally passed provided access for the exploration of minerals in the Panther Creek area and for the subsequent deep mining of minerals. In the House subcommittee, Chairman Udall requested that Subcommittee Chairman Seiberling further amend the Senate version to provide for specific surface access for mineral exploration and to remove any major constraints to subsequent deep mining. Udall's request was approved. Before the Interior Committee, Mines and Mining Subcommittee Chairman Santini requested that the Panther Creek area be totally excluded from the wilderness proposal because of proven uranium and molybdenum reserves. Santini's request was also favorably received.
During the debate, Noranda Mining, Inc., operators of the Blackbird Mine, 6-1/2 miles south of and outside the proposed wilderness boundary, stated unequivocally that its plans to mine cobalt would proceed regardless of the outcome of the proposed wilderness debate. Noranda also stated that any cobalt found in the proposed wilderness area would not affect its plans for at least twenty-five years since the company had identified at least twenty-five years of reserves at the existing Blackbird Mine site. The legislation is now scheduled for floor debate in the House and then for a Senate-House conference committee. Final action is not expected until late 1980 or early 1981.

A considerable amount of time was spent during 1979 by Idaho's mining industry and by western mining companies and organizations on proposals by Congressman Udall, Chairman of the House Interior Committee, and others to revise the General Mining Law of 1872. The primary change sought was the conversion to a leasing system for hard rock minerals. However, in late 1979, Congressman Udall announced in his home district in Arizona that he was no longer interested in pursuing revisions to the mining law and that he was satisfied that no good purpose would be served by attempting to revise this generic statute. Thus, Congressman Udall formally announced the end of his long attempt to revise the General Mining Law.

The Roadless Area Review and Evaluation (RARE II) Program of the U. S. Forest Service concerning 7.7 million acres of federal land in Idaho was published in January by the U. S. Forest Service. The USFS recommended that 4.4 million acres be returned to multiple use, 2.1 million acres be placed in wilderness, and 1.2 million acres be set aside for further study. The Governor's office was asked to submit a
separate set of recommendations for the RARE II areas later in the year. Based on the Governor's recommendations and the Forest Service review, the Energy and Natural Resource Committee of the U. S. Senate approved a bill that would create a 2.2 million acre River of No Return Wilderness in central Idaho.

The U. S. Bureau of Land Management has completed a wilderness inventory of approximately 96,000 acres in northern Idaho and 713,000 acres in southern Idaho. This inventory was mandated by the Federal Land Policy and Management Act (Organic Act) of 1976. The inventory in southern Idaho included federal lands in the Overthrust belt, the Challis area, and Owyhee County. Of the total inventory area, 53,921 acres in northern Idaho and 569,768 acres in southern Idaho were found to have wilderness characteristics and were recommended for "Intensive Wilderness Inventory."

The federal BLM concluded the registration of all nonpatented claims on federal land on October 21, 1979, as stipulated in the "Organic Act" of 1976. All claims not filed with BLM were considered abandoned and invalid after that date. All future claims and annual proof of labor must be filed with BLM. Approximately 43,000 out of an estimated 80,000 claims in the state were filed with BLM prior to the deadline.

The Idaho Land Board filed suit charging the Secretary of the Interior with blocking Idaho's acquisition of 24,485 acres of federal land entitled the State "in lieu" of school sections taken by the federal government for the National Forest Program and other lands. In a related court case the U. S. Ninth Circuit Court of Appeals upheld Idaho's claim to three million acres of desert land--most of it
south of the Snake River from Hagerman to the Kuna area—under the Carry Act of 1894.

WATER RESOURCES

The First Session of the 45th Legislature funded four major projects concerning water resources in Idaho. These studies, conducted by the Idaho Department of Water Resources, are the Bruneau Plateau Water Development Project, the Weiser River Basin Water Storage Project, the Upper Snake Recharge Project, and the Soda Springs Dam Project.

The Bruneau Project involves the diversion of unappropriated water from the Snake River at Milner Dam and conveying this water to the land in the area for irrigation.

The Weiser River Basin Project addresses several water-related problems. Storage in this basin would provide an additional water supply for irrigated agriculture development and act as a flood control, since the Weiser River floods almost every year. Additional storage on the Weiser River would augment water flow in the Snake River to assist in the passage of anadromous fish, as well as provide water during lowflow periods for the much needed hydropower generation in the Snake River complex of Idaho Power's dams and the federal Bonneville Power Administration system on the lower Snake River.

The Upper Snake Recharge Project will study the possibilities of recharging the Snake River Plain aquifer.

The Soda Springs Dam is on the Bear River near the town of Soda Springs. This reservoir could be used for irrigation and hydropower
as well as thermal power plant cooling, and industrial or possibly municipal water supply. The Utah Power and Light Company is interested in this dam as the company anticipates that it will need additional water for a thermal plant it would like to construct in the area.

The Idaho Department of Water Resources has cooperated with the U.S. Department of Energy for the past three years in collecting basic data on the geothermal resources of the State. The major part of this effort has been to update the inventory of known hydrothermal occurrences and assess their potential. The inventory formed the data base for a geothermal resources map of Idaho, printed by the National Oceanic and Atmospheric Administration. Several earlier State-funded publications related to regional geothermal assessment and hydrothermal inventories. Regional geology and geothermal assessments for the Nampa-Caldwell and Tygee-Pocatello areas were part of last year's State-DOE cooperative program. These two studies will be printed as special research publications.

The Department of Water Resources' Landsat Technology Application Project has been using Landsat digital data analysis to develop an operational Landsat classification procedure for inventorizing irrigated crop land. A secondary objective of the program is to provide a laboratory for learning and evaluating the Landsat software. The Department of Water Resources has developed with the help of the Pacific Northwest Regional Commission (PNRC) a substantial Landsat and remote sensing capability. This capability may enable a yearly evaluation of the changing land and water use patterns in the State.
OTHER DEVELOPMENTS

The Agri-Energy Corporation announced that an $8 million gasohol plant will be built in the Idaho Falls area in 1980. The corporation was formed by local investors and will use potatoes and barley to make alcohol.

Several northern Idaho mining companies tried to get the Idaho Fish and Game Commission to change the opening day of elk season from midweek to the weekend. According to company spokesmen, the midweek opening doubles absenteeism and disrupts the work force.

The Idaho Power Company plans to conduct extensive studies on the possibility of harnessing the North Fork of the Payette River for generating electrical power.

The U. S. Geological Survey celebrated its centennial in 1979. The federal agency is active on many projects in Idaho and has contributed greatly to the understanding of Idaho's geology and mineral deposits.

The $1.2 billion Northern Tier Pipeline that will move oil from Port Angeles, Washington, to Minnesota was approved by the Department of the Interior and authorized by President Carter. The pipeline will cross northern Idaho around the south end of Lake Coeur d'Alene, over the Coeur d'Alene River near Cataldo, and across the Bitterroot Mountains into Montana.

The Northwest Mining Association convention held December 6 through 8 in Spokane, Washington, broke all attendance records. Two thousand miners heard technical papers and mineral-related talks by congressmen and other dignitaries and enjoyed the convention's scheduled and nonscheduled social functions.
The governor appointed seven people to the Radioactive Waste Task Force that will study waste disposal procedures at the Idaho National Engineering Laboratories. The State is concerned over the practice of disposing radioactive liquid waste in the Snake River Plain aquifer, the largest aquifer in the State. The problem arose when minute traces of plutonium and other radioactive elements were found in water beneath INEL. Contamination is believed to be caused by INEL's waste disposal injection wells.