Forty-first Annual Report of the Mining Industry of Idaho for the Year 1939

ARTHUR CAMPBELL
Inspector of Mines
Boise, Idaho
FORTY-FIRST ANNUAL REPORT

OF THE

Mining Industry of Idaho

FOR THE YEAR

1939

ARTHUR CAMPBELL
Inspector of Mines

MARIE CARROLL SAVAGE
Secretary
Erected 1906; cost $2,290,000. Outside walls are faced with Boise sandstone. Corridors, floors, wainscoting, and base throughout the building are of Vermont marble. Covers an area of 50,646 square feet.
LETTER OF TRANSMITTAL

To His Excellency,

THE HONORABLE C. A. BOTTOLFSSEN,
Governor of Idaho.

SIR:

In compliance with the provisions of Section 46-111, Idaho Code Annotated, I have the honor to transmit herewith the annual report of the Inspector of Mines for the year ended December 31, 1939.

Respectfully submitted,

ARTHUR CAMPBELL,
INSPECTOR OF MINES.
# TABLE OF CONTENTS

Letter of Transmittal ............................................................................................................ 3
Abbreviations and Symbols ................................................................................................. 6, 7
Foreword .................................................................................................................................. 8
Gold—Its Past and Future, by Merrill E. Shoup ............................................................... 10
The Future of Silver, by Senator Key Pittman .................................................................... 12
The Lead Market—First Half 1939, by Andrew Fletcher .................................................. 14
Resume of the Zinc Industry, by Edward H. Snyder ......................................................... 16
The Prospects for Copper, by P. G. Beckett and Walter Bennett .................................... 18
Strategic Minerals Investigations by the Bureau of Mines,
by John Wellington Finch .................................................................................................... 20
Domestic Sources of Deficient Minerals, by D. F. Hewett .............................................. 27
Experience Under the Reciprocal Trade Agreements, by Edgar B. Brossard .............. 32
Progress in Milling Practice and Equipment, by A. W. Fahrenwald ......................... 41
Idaho Bureau of Mines and Geology:
Director's Report, by A. W. Fahrenwald ........................................................................... 50
Bureau Activities .................................................................................................................. 56
Technical Publications:
Idaho Bureau of Mines and Geology ............................................................................... 57
United States Geological Survey ......................................................................................... 61
United States Bureau of Mines ......................................................................................... 62
Obituaries:
Laney, Dr. F. B. .................................................................................................................. 65
Czizek, Jay A. ..................................................................................................................... 66
Lindgren, Waldemar ......................................................................................................... 66
Hershey, Oscar .................................................................................................................. 66
Public Relations for the Mining Industry, by E. S. Tillinghast ..................................... 67
Men Employed and Wages ............................................................................................... 76
Activities of the Coeur d'Alene Mining District Central Mine Rescue
Station during 1939, by James Wilson ................................................................................ 79
Accidents .................................................................................................................................. 81
Description of Fatal Accidents .......................................................................................... 82
Classification of Accidents .................................................................................................. 90, 91
Twelve Fundamental Rules for Safety .............................................................................. 97
Explosives .......................................................................................................................... 99
General Bibliography of Idaho's Mineral Resources ....................................................... 104
Original Mining Laws of 1866, by O. E. Kirkpatrick ....................................................... 129
United States Law extends time for doing assessment work on mining claims ............ 130
Mining Laws of the State of Idaho ..................................................................................... 131
Occupational Disease Compensation Law ....................................................................... 133
Index—Occupational Disease Law .................................................................................. 140
Air Hygiene In the Mining Industry, by Leroy V. Gardner, M. D. ................................. 142
Idaho Phosphate is Important Issue .................................................................................. 145
Method For Analysis of Molybdenum in low grade materials is given ......................... 147
Gold Cheaply Recovered When Found ............................................................................ 148
Recreational Facilities ....................................................................................................... 149

Ada County ......................................................................................................................... 150
Adams County .................................................................................................................... 151
Bannock County ................................................................................................................ 153
Bear Lake County ............................................................................................................. 154
Benewah County .............................................................................................................. 157
Bingham County .............................................................................................................. 158
Blaine County .................................................................................................................... 159
Boise County ..................................................................................................................... 165
Bonner County .................................................................................................................. 171
Bonneville County ........................................................................................................... 176
Boundary County .............................................................................................................. 178
Butte County ..................................................................................................................... 180
Camas County .................................................................................................................. 182
Canyon County ................................................................................................................ 185
Caribou County ................................................................................................................ 185
Cassia County ................................................................................................................... 187
Clark County ..................................................................................................................... 189
Clearwater County ........................................................................................................... 189
Custer County ................................................................................................................... 192
Elmore County .................................................................................................................. 199
Fremont County ............................................................................................................... 204
Gem County ....................................................................................................................... 204
Idaho County ..................................................................................................................... 206
Kootenai County ............................................................................................................... 223
Latah County ..................................................................................................................... 226
Lemhi County .................................................................................................................... 229
Lewis County ..................................................................................................................... 237
Nez Perce County ............................................................................................................. 238
TABLE OF CONTENTS

Oneida County ......................................... 239  
Owyhee County ......................................... 239  
Payette County ......................................... 245  
Power County ........................................... 245  
Shoshone County ....................................... 247  
Teton County ........................................... 297  
Twin Falls County ...................................... 298  
Valley County ......................................... 298  
Washington County ..................................... 303  

Companies Incorporated During 1939, Reports Not Yet Filed ......................... 308  
Corporations Not Owning Property in Idaho ................................................. 309  
Mine Production of Gold, Silver, Copper, Lead and Zinc in Idaho in 1938— Final Annual Figures, by T. H. Miller and Paul Luff .................................... 310  
Metal Mining in Idaho, 1939—Preliminary Annual Figures, by T. H. Miller and Paul Luff .......................................................... 325  
Inspectors of Mines .................................................................................... 327  
Inspector of Mines Appropriation, 1939-1940 ................................................ 327  
Monthly Average Prices of Metals, 1936-1939 ............................................. 328  
Coeur d'Alene Mines Dividend Record for 1939 .............................................. 329  
Dividends Paid by Mining Companies of the Coeur d'Alene Mining District .... 329  
The Importance of Mining in Idaho ................................................................ 330  
Modern Air System, Sunshine Mine .............................................................. 332

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TABLE OF ILLUSTRATIONS

Anaconda Copper Mine: Conda........................................................................ 331  
Bunker Hill & Sullivan M. & C. Co.:  
  First Aid Class .................................................................................... 78  
  Main Tunnel ....................................................................................... 96  
  Ore Train on Lower Level .................................................................. 244  
  Smelter ............................................................................................... 257  
Clayton Silver Min. Co.: Surface Plant ....................................................... 193  
Contented Workman .................................................................................. 77  
Deer—A Familiar Sight to the Idaho Miner .................................................. 108  
Dredge: Typical of Ten Floating Dredges in Idaho ..................................... 128  
Federal M. & S. Co.: Morning Plant ......................................................... 264  
Finch, Dr. John Wellington, Director United States Bureau of Mines ......... 21  
Forest Highway ......................................................................................... 13  
Hecla Min. Co.:  
  Surface Plant .................................................................................... 268  
  Main Hoist ......................................................................................... 324  
Hercules Min. Co.: Mill ................................................................. 288  
Hydro-Electric Plant, 250 H. P.: Lone Pine Mine ..................................... 209  
Idaho:  
  Recreational Facilities ...................................................................... 149  
  State Capitol ...................................................................................... 2  
Idaho Almaden Mines Co.: General view of open pit cinnabar mining, etc. 305  
Jack Waite: Mill ..................................................................................... 296  
Lakes:  
  Coeur d'Alene Lake ........................................................................... 132  
  Red Fish Lake ................................................................................... 15  
Laney, Dr. F. B. ..................................................................................... 65  
Map:  
  Geological Diagram .......................................................................... 60  
  Triumph, Independence and North Star Mines, Blaine County .............. 160  
  Dry Belt of the Coeur d'Alene Dist ..................................................... 392, 393  
Mine Rescue:  
  New Mobile Unit ............................................................................... 80  
  Paul Breathing Apparatus ................................................................... 89  
Miner: Operating Drill .............................................................................. 31  
Minnie Moore Dev. Co.: Surface Plant ...................................................... 164  
Placer Mining: By Hydraulic Giant ............................................................ 114  
Polaris: Mill and Change House ................................................................. 280  
Salmon River Canyon: Air View ................................................................ 103
TABLE OF ILLUSTRATIONS—(Continued)

Snyder Mines Incorporated, The:
- Map of Triumph, Independence and North Star Mines.......................... 160
- Surface Plant........................................................................................................ 162
Steamboat on Lake Chatcolet.............................................................................. 227
Stench Warning System....................................................................................... 84
Sullivan Min. Co.: Electrolytic Zinc Plant......................................................... 286
Sunshine Min. Co.: Surface Plant.............................................................. 246
Timber .................................................................................................................... 19

Transportation:
- On the Trail to the Mine.................................................................................... 98
- The Pack String.................................................................................................... 141
- Transportation and Mail by Plane........................................................................ 40
- Underground Haulage......................................................................................... 121
- Winter Transportation by Dog Team................................................................. 174

University of Idaho: Administration Building.................................................. 51
Unloading Fuel at Stibnite...................................................................................... 300
Wallace, Idaho: 1888............................................................................................ 276
Wallace, Idaho: 1939............................................................................................ 277

NAMES, ADDRESSES, ABBREVIATIONS AND SYMBOLS USED IN
BIBLIOGRAPHIES

Am. Geology ............................................................................................................ American Geology
Am. Inst. Min. Eng. Trans...................................................................................... American Institute of Mining and
Metallurgical Engineers Transactions, 29 West 39th St., New York City
Am. Jour. Sci.............................................................................................................. American Journal of Science
Am. Mineralogist ................................................................................................... American Mineralogist

California Jour. Tech............................................................................................. California Journal of Technology
University of California, Berkeley, Calif.
Ottawa, Canada
Canadian Min. Inst. Jour........................................................................................ Canadian Mining Institute Journal
Drummond Bldg., Montreal, Quebec, Canada
Columbia School of Mines Quart.......................................................................... Columbia School of Mines Quarterly
Columbia University, New York City
Compressed Air Mag.............................................................................................. Compressed Air Magazine
Bowing Green Bldg., 11 Broadway, New York City
Econ. Geology......................................................................................................... Economic Geology
University of Illinois, Urbana, Ill.
Eng. and Min. Jour.................................................................................................. Engineering and Mining Journal
Tenth Ave. & 36th St., New York City
Eng. and Min. Jour.-Press................................................................................. Engineering and Mining Journal-Press†
Franklin Inst. Jour.................................................................................................. Franklin Institute Journal
15 South 7th St., Philadelphia, Pa.
Geol. Soc. America............................................................................................... Geological Society of America
Museum of Natural History, Columbus Ave. & 77th St., New York City
Inspector of Mines, Boise, Idaho
Idaho Bureau of Mines and Geology, Moscow, Idaho
Int. Min. Cong. Proc. ................................................................................................ Proceedings International Mining Congress
International Mining Congress, Washington, D. C.
Jour. Geology......................................................................................................... Journal of Geology
University of Chicago Press, Chicago, Ill.
Mines and Minerals................................................................................................. Mines and Minerals†
**SYMBOLS**

*—Available in libraries only. Publication out of print.

**—Can be procured from publisher.

§—Not available for general distribution; may possibly be procured from publisher. (Also section reference in law citations.)

†—Can be purchased from Superintendent of Documents, Government Printing Office, Washington, D. C.

‡—Publication suspended.

‖—Address: Washington, D. C.
This is a report of the mining industry for the year ending December 31, 1939, as well as information on the mineral resources of the state and the capital structure of companies doing business in Idaho. The demand for the “Mining Industry of Idaho” is growing from year to year, and copies are furnished on request, without charge, until the supply of 4000 copies is exhausted.

Corporations that have forfeited their charters, and have failed to file their reports as required by law (Idaho Code Annotated, Sections 25-1616, 25-1619-1620 of All Corporations, Domestic or Foreign, And Associations Engaged In Mining And Mining Operations Within The State Of Idaho), have been considered as delinquent and as legally dead; therefore no mention is made of them.

This report is the only publication dealing with the general mining activities issued for distribution by the department. In fact it is more of a handbook than a formal report and serves as an advertising medium for the industry in the state. In the past these reports have proven exceedingly valuable, not only to operators and engineers, but to investors and prospective investors. Every effort has been made to make it as complete as possible by supplemented information and special articles, which we hope will meet with the approval of the general public. This book has a wide distribution in each county of the state, all states in the union and many foreign countries.

Mining is the second largest industry in Idaho. The great diversity of mineral wealth establishes Idaho as one of the principal mining states of the union. The total metal production since gold was first discovered at Pierce City in 1860, amounts to over $1,300,000,000. It is difficult to estimate even approximately the amount of gold bearing gravel and the vein material still left in the hills of our mining districts. But in line with the above reasoning, the logical conclusion is that there are yet to be mined probably billions of dollars in metals from these Idaho deposits.

The present price of gold with the government’s program to purchase newly mined silver, and the increased demand and price advances for the base metals, had a stimulating effect on mining in Idaho. This and the suspension of the moratorium on annual assessment work as to all unpatented mining claims in the United States, including Alaska, resulted in more employment, better wages, new machinery and equipment, larger orders for supplies, greater consumption of foodstuff and increased tonnage on incoming and outgoing freight. New construction and development work was noted at many properties in different sections of the state. Preparations are being made to increase and even double the production at some of these mining operations. This is due perhaps, in a measure, to world conditions and a favorable metal market. Mining on the whole had a successful and prosperous year.

Separate companies carry on a campaign of exploration and expansion, with scouts and engineers in the field for the express purpose of finding new mines and to further develop Idaho’s mineral deposits. Governmental agencies are also making a geological reconnaissance and investigation to determine the extent and value of “strategic minerals” essential to the national defense of this country in case of an emergency. The outlook for the year 1940 is indeed encouraging for the mining industry in Idaho.

The department library is believed to be the largest library of its kind in Idaho. In addition to magazines dealing with mining, which are regularly received, it contains nearly every publication of the U. S. Geological Survey and U. S. Bureau of Mines, most of the U. S. Mint Reports, numerous volumes published by the geological surveys of other states, and many volumes of journals dealing with mining, geology, mineralogy and the mineral resources of Idaho. In order to make this information readily available to the public, this material has been indexed according to counties and subjects and published in the report. The indexing has been kept up to date, and so far as is
known, each county bibliography contains references to all material of any importance that has ever been published concerning the county. Publications relating to specific minerals found in the State are listed also under the “General Bibliography.” The usefulness of the Bibliographies has been further increased by including publisher’s addresses and information as to whether each particular reference can be procured or not. Symbols have been added as a guide to facilitate explaining this information. Most of the publications listed are found in the department library. These publications may also be consulted in all large libraries.

Visitors are always welcome to consult the books of the library or to read the magazines. In the absence of the Inspector, the Secretary is glad to assist visitors in finding desired information.

The department also furnishes metal market information upon request, with the names and addresses of the purchasers and users. This list was furnished by the kindly cooperation of the U. S. Bureau of Mines. Another source of valuable information on this subject may be found in the Engineering and Mining Journal, which is published monthly and placed on file in the department library.

The Inspector’s office has generally published and distributed the mining laws since the department was established. The most recent issue was compiled in pamphlet form and published in July, 1937. It contains mining laws of the State of Idaho, including extracts from the United States mining laws, citations of court decisions pertaining to mining litigation and general interpretations of the law. We believe this issue to be fairly complete with the exception of legislation pertaining to mining passed by the Twenty-fifth Session of the State Legislature in the year 1939. (This new legislation and congressional action effecting assessment work is contained elsewhere in this report.) We have a limited number of the 1937 edition of mining laws which will be furnished to the public, free of charge, as long as the supply lasts.

Safety conditions throughout the state are showing steady improvement. It gives this department great pleasure to acknowledge the support and cooperation given our Safety First program by the operators, their employees, the U. S. Bureau of Mines and the Director of the Central Mines Rescue Station, located in the Coeur d’Alene mining district. The U. S. Bureau of Mines and the Mines Rescue Station Director give first-aid instruction, including mine rescue and helmet training, to the employees of the larger producers. In line of duty, the Inspector of Mines examined properties in every mining county of the state and made many suggestions and recommendations to improve conditions for safety and health of employees working in the mines, mills and smelters of Idaho.

Every effort has been made to cooperate with the various bureaus and departments for the best interests of the state and the mining industry. We want to thank both federal and state bureaus and agencies for their untiring efforts and cooperation, the newspapers who furnished gratuitous subscriptions, and the contributors of special articles and data to make this report not only of general interest but a permanent record.
GOLD — ITS PAST AND FUTURE

By MERRILL E. SHOUP
President, Golden Cycle Corporation

Presented Annual Metal Mining Convention, Western Division, The
American Mining Congress, Salt Lake City, Utah, August 28-31, 1939.

It is easier to review the past history of gold than to predict its future course. The 1938 gold production of the United States was 5,106,109 fine ounces, with a value based upon $35.00 per fine ounce of $178,713,815. The 1937 gold production was 4,834,062 fine ounces, with a value of $169,192,182. The increased production in 1938 over 1937 was accounted for chiefly by Alaska, California, Idaho, Nevada, Oregon, South Dakota, South Carolina, Washington and the Philippine Islands, which alone increased its production from 716,967 ounces in 1937 to 862,397 ounces in 1938.

Based upon present available estimates, the gold production of the United States for 1939 will exceed 1938 by at least the same amount as 1938 exceeded 1937. The world outlook for 1939, insofar as production of gold is concerned, points to the same upward trend which has risen steadily from 19,317,961 ounces in 1929 to 37,109,391 ounces in 1938.

The immediate future of gold, both world-wide and in the United States, insofar as its value and continued use as a medium of exchange is concerned, and the maintenance by the Treasury of the United States of the $35.00 per ounce price, is more difficult to predict. Since the $35.00 price was made effective by the Treasury our gold holdings have increased to the point where we now have more than one-half of the world's known supply. Since 1934 more than $7,000,000,000 has been added to our gold stock. As our gold holdings have increased those of other nations have correspondingly decreased.

The heavy additions to the United States gold stock, both from newly mined sources and importations during the past few years have created considerable fear in the minds of economists and gold producers that the rest of the world might go completely off the gold standard and leave the United States as practically the only large nation remaining on it. This possibility has led to the advancement by economists and other well informed persons of various proposals relative to some form of legislative or executive action which Congress or the President of the United States, or both, should take to preserve and perpetuate the use of gold as the monetary standard of our nation.

Propositions which seem to have gathered considerable support are that the President or Congress, or both, should either take the steps necessary to again return into circulation the vast hoard of gold held in safekeeping by the United States Treasury, or else issue gold certificates in payment for newly mined gold produced in the United States and its territories.

In 1914 practically all nations of the world were on the gold standard, and had managed to stay on it for several decades. The use of gold as a medium of exchange had become common throughout practically the entire civilized world, due to the fact that gold possessed qualities desirable for a monetary medium in a larger measure than any other known commodity.

Throughout the ages men had tried various commodities to facilitate and expedite the process of exchange. In the very early stages barter was used. In later stages, among numerous articles used as a medium of exchange were shells, beads, furs, grain and various precious metals. Gold finally became the generally accepted medium of exchange due to the fact that it possessed more than any other commodity the necessary requisites for a satisfactory medium.

The chief requisites are a commodity in unfailing demand with wide acceptability existing in sufficiently large quantities to meet exchange needs, yet not so abundant as to lose its desirability; so durable that it will not lose its exchange power through decay or deterioration; can be divided into small units and used in transactions involving small or large amounts; is homo-
genuine and all parts or units have a uniform value and can be equally divided; is portable and possesses cognizability; has stability of value so that when contracts are made which involve the future payment of money both parties can have reasonable assurance that payments made in the future in gold will have the same absolute and relative position at the end of the contract as at the beginning. Gold possessed, and still possesses, more completely than any other commodity these characteristics and throughout the decades no other medium has been found which so fully satisfies these standards.

The above requisites were based on the proposition that gold would circulate freely, would pass readily from hand to hand, and never upon any idea that gold would be sterilized, buried in the ground, or used as a basis for managed currency. Gold has, in addition to its use as a medium of exchange, value in connection with use in the arts. Therefore, all of the above factors combine to make it the most all around satisfactory medium of exchange and it has been accepted by mankind as the result of decades of experience.

Today we hear considerable discussion about a return to the old days of absolute barter, particularly by such nations as Germany, etc., or the substitution of some other medium of exchange in the place of gold. Most of this talk comes from the leaders of the so-called “have not” nations. If they possessed enough gold to continue upon the gold basis little barter talk would be heard. It is hard to believe that a medium which has been in use for more than twenty-six hundred years will ever be entirely replaced by some other medium of exchange. The long history of man’s search for a satisfactory medium substantiates this.

The present world chaotic conditions cannot continue indefinitely. Sooner or later order and stability will return and the other nations which have or had been on a gold standard so many hundreds of years and may temporarily have abandoned it will return to the use of gold. The gold standard, when in force, is the strongest basis for international goodwill and trade and the world must and will ultimately return to it.

It has been estimated that since 1492 there has been produced in the world more than 1,190,000,000 fine ounces of gold weighing approximately 41,000 tons, worth on the $35.00 an ounce basis, approximately $41,600,000,000; this huge stock has been accumulated through the ages because men believed in gold, based upon centuries of satisfactory experience, and had found it the most satisfactory medium of exchange.

Much of the gold which has come to the United States, particularly since 1934, has been sent in, either by individuals or foreign nations, to be kept in safekeeping until the present world chaos has disappeared and become history. This gold will flow out of the United States to these nations when order and confidence have been restored and the world gold distribution which existed prior to 1934 among nations will again be re-established on some new basis and gold again become the accepted world-wide medium of exchange.

As far as the immediate future of gold is concerned, insofar as its continued value and use as a medium of exchange, complex problems are presented which can produce a series of different answers. Probably no one in the world today can foretell what will happen and one person’s guess is as good as another’s. It seems generally agreed that insofar as the United States is concerned the return of gold into circulation as an actual medium of exchange is a desirable thing. Just how this is to be accomplished and with what methods is the problem to be determined.

The immediate future price of gold is something which no one can forecast with any assurance. One thing is certain, however, gold’s value may change, but its acceptability will remain. Gold possesses all the desirable factors which a medium of exchange should possess, and will return to its proper place in the world’s affairs as the most desirable and acceptable medium of exchange yet devised by man to carry on the nation’s and the world’s business.
THE FUTURE OF SILVER

By SENATOR KEY PITTMAN
Senator from Nevada

Presented Annual Metal Mining Convention, Western Division, The American Mining Congress, Salt Lake City, Utah, August 28-31, 1939.

When I had the pleasure and honor of addressing this mining congress at Los Angeles a year ago, I was urging those engaged in the mining industry to stand together or they would continue to fall together. They had not stood together, to my knowledge, since the beginning of my experience in the United States Senate 26 years ago. The copper men stood together, the lead men stood together, the zinc men stood together, but nobody stood by silver. That has all changed now. Every bit of it has changed. You have stood together during the last session of congress and you proved what standing together means.

For the first time in 68 years you have the coinage of American silver at 71 cents an ounce without the discretion of anyone or the interference of any department on earth, and in my opinion that price can never be reduced, nor that law ever changed, unless the price be increased, and I think it will.

Our fight at the last session of congress was not a monetary fight. It was purely an economic fight. We had to prove the facts. We had to prove what would happen. And then, when our proof was not accepted there was but one thing to do and that was to make a last desperate fight to take the price of silver out of the hands of the bureaucracy of the United States and we did it by a very narrow vote. Let me say to you that had not the mining fraternity universally stood behind us in that fight it would never have been accomplished.

For 26 years I have watched the parliamentary practice of those two bodies. To kill that conference report meant the end of the legislation, because the conferees of the house had been discharged. That would have required the introduction of a new bill. It would have to pass the house, come to the senate. Do you suppose that ever again I could have gotten those violent opponents of silver on both sides of the chamber to vote again for our silver amendment? No! No! They knew they never had a chance with their side of it, and we would have never had another chance on our side. That is the present situation with regard to silver.

Now what is the future with regard to silver?

I introduced this last session, and referred to the banking and currency committee, a bill to coin American silver at $1.29 an ounce, the monetary value. That fight in the next session of congress will be a monetary fight. The last fight was an economic fight. I intend to take up but a very few minutes of your time discussing the future monetary fight, but I can say to you that the Rocky Mountain Metals Foundation, which was established a little more than a year ago under the direction of Walter E. Trent, has assembled facts which are absolutely conclusive. For the first time in 50 years the statistics of the various departments have been coordinated, and the relation of one metal and one commodity to another has been brought out by proper comparative graphs.

With all this subterfuge with regard to money, did it ever occur to you that silver is now and always has been the one metal in every great war? Does any one deny that during the World war, without government action of any country whatever, silver rose steadily until it reached the price of $1.29 an ounce. And just on the threat of this war, silver is going up in London now, although our government is not buying any silver. And yet it is a worthless commodity!

Credit should not control money. Money is a government function. Credit is the function of those that lend. They should be kept separate and distinct at all times.
If there is no question of inflation involved, and silver money is sound, then there is left only the question of seigniorage which is charged to manufacture of silver into coins. Today the government charges us 45 per cent, or 58 cents an ounce, leaving the producer 71 cents out of the 129 cents an ounce, the monetary value of the silver in a dollar. I have introduced a bill to require the government to charge only 2 cents an ounce to coin American silver, leaving the producer $1.27 an ounce. The government can not justly make creditors accept a dollar on a basis of $1.29 and circulate it at that value and deny the same value to the producer.
THE LEAD MARKET — FIRST HALF 1939

By ANDREW FLETCHER
Vice President, St. Joseph Lead Company

Presented Annual Metal Mining Convention, Western Division, The American Mining Congress, Salt Lake City, Utah, August 28-31, 1939.

Both foreign and domestic prices of lead were remarkably stable during the first half of this year, the New York price fluctuating within a ten point spread—$4.75 to $4.85 Cwt. The year opened with lead at 4.85 and it was at that level that the first half closed. The average price for the first half of 1939 was 4.80, compared with 4.51 for the same period last year. In London, the futures price fluctuated between a low of £14—2s—6d (2.96c) and £15—8s—9d (3.18c), a spread of 22 cents per Cwt. this year, whereas during the first half of 1938 the range was $1.02 Cwt., the high being 3.96 and the low 2.94. There were times during the first half of this year that higher domestic prices were perhaps justified, but an advance in the domestic quotation with the London market so depressed would have invited importations at a time when domestic mines were operating at less than full time and were fully capable of supplying all domestic requirements.

Sales of lead as reported by the Lead Industries Association, for the first half of this year were 223,933 tons, a monthly average of 37,322 tons. This was 24% better than the 181,274 tons sold during the first six months of 1938, which sales averaged 30,212 tons per month. With the exception of January, when the sales were 29,000 tons, the rate of sales this year has been very stable, ranging from 36,200 to 40,800 tons monthly.

According to the American Bureau of Metal Statistics, domestic shipments January to June 1939, inclusive, were 232,406 tons, a monthly average of 38,734 tons, compared with 182,208 tons, or an average of 30,368 tons, during the first half of 1938, an increase of 50,198 tons or 27%. The distribution of the shipments was as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>1939 Net Tons</th>
<th>1938 Net Tons</th>
<th>Increase or Decrease Net Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable</td>
<td>25,769</td>
<td>26,502</td>
<td>- 733</td>
</tr>
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<td>Ammunition</td>
<td>10,346</td>
<td>6,705</td>
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</tr>
<tr>
<td>Foil</td>
<td>9,372</td>
<td>12,078</td>
<td>-2,706</td>
</tr>
<tr>
<td>Batteries</td>
<td>27,768</td>
<td>11,529</td>
<td>16,239</td>
</tr>
<tr>
<td>Brass, Sundries and Jobbers</td>
<td>23,752</td>
<td>20,354</td>
<td>3,398</td>
</tr>
<tr>
<td>White lead, red lead, litharge, pipe,</td>
<td>135,399</td>
<td>105,040</td>
<td>30,359</td>
</tr>
<tr>
<td>sheet and unclassified</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>232,406</td>
<td>182,208</td>
<td>50,198</td>
</tr>
</tbody>
</table>

The lead content of the litharge produced during the first five months of this year was 30,520 tons, compared with 21,699 tons during the same period last year; red lead 12,214 as against 7,957; white lead, dry and in oil 31,919 as compared with 26,180; lead pipe and sheet 13,592 as against 12,643 tons. The total production of the foregoing commodities for the first five months this year was 88,245 tons compared with 68,479 tons for the same period last year, an increase of 29%.

Total stocks of lead, including refined lead, ores and concentrates, bullion, and antimonial lead, amounted to 215,711 tons on July 1, 1939. These stocks at the beginning of the year were 209,956; however, on March 1, 1938 said stocks amounted to 216,070 tons, indicating that over a sixteen month period ending July 1, 1939, production and consumption were in balance. Refined stocks were 129,131 tons on January 1, 1938; 115,902 tons on January 1, 1939; and 129,366 tons on July 1, 1939. The present stocks represent a reserve supply of lead equivalent to about three months' requirements at the present rate of
consumption, and are good insurance against any shortage of metal in the event of a sudden increase in consumer demand.

Stocks of lead owned by customers, but held at refineries, amounted to 76,000 tons on January 1, 1937; 31,000 tons on January 1, 1938; 22,500 tons on January 1, 1939; and 22,975 tons on July 1, 1939. The stocks now at refineries, owned by customers, are equal to a little over two weeks shipments at the current rate of consumption. However, said stocks are probably held by a few companies, and most companies have no such reserve stock.

Inventories of pig lead in consumers' plants are generally lower than at this time last year. On June 1, 1939 certain pigment manufacturers held 19,000 tons this year, compared with 25,400 tons on the same date last year; certain metallic lead products manufacturers 17,800 tons compared with 14,000; total 36,800 tons compared with 39,400 tons. The lead content of stocks of white lead, dry and in oil, in certain manufacturers' plants on June 1, 1939 were 24,100 compared with 24,600 tons on June 1 last year. Litharge stocks on May 1, 1939 were 7,236 tons compared with 9,000 tons; red lead 5,310 tons versus 6,300 tons.

With a view to protecting and enlarging the market for its most important product today, the Lead Industry launched a program in the spring of 1939 to promote the wider use of white lead in paint. Without devoting any time to a sales talk on the merits of white lead, the fact remains that this pigment is the basis of all fine painting today, just as it has been for centuries. All the experimentation and research that have been done in the paint industry have not produced anything equal, from the standpoint of economy and durability, to white lead. It remains the only pigment that can be used alone, with linseed oil, to give a satisfactory paint job. Other paints require the admixture of different ingredients. The lead industry, therefore, has embarked on a long term program to tell the American public about the merits of white lead paint. The program is unique in that the lead mining industry is the most important contributor to it. Mining companies may forget that they have an important interest in the ultimate disposition of their mined product. The lead mining industry, by recognizing that the responsibility of the miners towards the use of lead in its many forms does not end with its delivery as concentrate to the smelter, is only doing something which other industries more thoroughly integrated, notably nickel and aluminum, have been successfully doing for years.

Some people believe that a definite prospect of world peace might have a detrimental effect on lead because purchases by Governments for re-armament would cease. While some lead is used as war munitions, we believe that with the absence of a general war, and a restoration of confidence in a lasting peace, consumption of lead throughout the world will be accelerated to a point where the peace-time use of the metal will far exceed any amount that could possibly be consumed for munitions purposes.
RESUME OF THE ZINC INDUSTRY

By EDWARD H. SNYDER
Combined Metals Reduction Company

Presented Annual Metal Mining Convention, Western Division, The American Mining Congress, Salt Lake City, Utah, August 28-31, 1939.

Taking into consideration the character and forcefulness of the producers of other metals in this audience, I have no intention of doing any bragging as to the superiority of zinc or stating my opinion as to its relative importance in the general economy. However, patients who are battling to regain health after a long illness or an "accident" generally are allowed to monopolize a reasonable period of time in which to tell of their experiences, aches, pains, and complications. I am going to take advantage of this custom to deal briefly with some of the conditions of the zinc industry, avoiding as much as possible reference to "afflictions" that plague all metal producers and business in general.

The domestic zinc industry during the nine long years from 1930 to 1938, inclusive, has suffered the adjustment involved in absorbing an average weighted price decrease of 31.3% and at the same time a reduction of 31.5% in output, resulting in an average yearly gross income of only 47% of the average for the five years 1925 to 1929, inclusive.

During 1929, with the average London price 5.4 cents per pound, the foreign industry produced approximately 989,000 tons, which was the highest production ever obtained up to that time. In 1938, foreign production totaled 1,274,000 tons for a new record high, with the average London price at 3.05 cents. The increase of 28.8% in production in the nine year period was made in spite of an apparent average price decrease of 43.5%.

While domestic production has decreased by 169,000 tons from approximately 625,000 tons in 1929 to 456,000 tons in 1938, foreign production has increased 285,000 tons from 989,000 tons in 1929 to 1,274,000 tons in 1938.

The average gross recoverable value of metals other than zinc in domestic zinc ores is less than half of that in the ores of Mexico, Canada, Australia and India, and about 60% of the values of other metals in the ores of Poland, Spain and Yugoslavia. In some cases, zinc has degenerated into a straight by-product metal in connection with the production of lead and the precious metals from high grade complex ores.

High grade foreign ores coupled with cheap labor (except in Canada) are not the only reasons for the large increase in world production, while a large portion of the domestic industry is facing a slow death. The so-called drives for self sufficiency of metals involving subsidies of various types account for a substantial production of foreign zinc under conditions not controlled by the London price level, but by the abnormal demand for gold due to the shortage of foreign exchange in most nations except the British Empire and the United States.

Germany is the outstanding example of the nations driving for self sufficiency and suffering from a shortage of foreign exchange. German zinc production increased from 56,000 short tons in 1933 to 180,000 tons in 1937, and 212,000 in 1938. The 1938 production was not quite four times that of 1933 and twice that of 1929.

The drives of other nations for self sufficiency and for something to use for money in the world's markets will continue, and the further expansion of the foreign zinc industry is expected. Proposals covering the building of two electrolytic plants in South America and a third in Canada are being considered at this time. Improvement in metallurgy will also continue to add materially to the world's supply of zinc.

On the other side of the picture, the world's apparent consumption of zinc outside the United States was 21% greater in 1938 than in 1929. The 1938 consumption is estimated at 1,196,000 short tons, excess production over con-
sumption 77,000 tons, and stocks at smelters as of January 1, 1939, 300,000 tons, equivalent to a little more than three months consumption at the current rate. No accurate figures are available as to quantities of concentrates on hand at mills and smelters, but it is believed substantial additions were also made to concentrate stocks during the past year.

A large portion of the increase in foreign consumption appears to be due to the metal used or stored for military purposes. No statistics have been published as to the quantities of zinc in the hands of governments or other consumers. Reliable opinion is that foreign consumers' stocks are large.

All factors relating to the foreign zinc situation indicate that over production of zinc outside the United States will continue at an average price closely approximating 3.0 cents per pound London until such time as Europe destroys itself with war or the leading powers agree to policies that will again permit normal world trade.

The average price differential between St. Louis and London for the first six months of 1939 was (4.5-2.89) 1.61 cents per pound, as compared to (6.76-6.46) a differential of 0.3 cent per pound for the five year period 1925-1929, inclusive.

The duty on zinc was reduced 20% on January 1, 1939 from 1.75 cents per pound to 1.4 cents per pound for metal, and from 1.5 cents per pound to 1.2 cents per pound for zinc in ore.

In spite of the prevailing low price of 4.5 cents per pound St. Louis (2.89 cents London), foreign imports for the first six months of 1939 of zinc plus recoverable zinc content of ores totaled 21,720 tons, of which only one-seventh came from Canada. During this period domestic stocks increased by 8,472 tons from 126,769 tons on January 1, 1939 to 135,241 tons on July 1, 1939.

The London price of zinc increased to 3.03 cents per pound late in July. This plus a sharp increase in shipments in the domestic industry boosted the domestic price to 4.60 cents on July 27 and to 4.75 cents on August 7. United States stocks decreased by 3,459 tons in July from 135,241 tons July 1 to 131,782 tons on August 1. This is the first month since the tariff reduction was announced in November 1938 that domestic stocks were reduced.

With the present United States duty of 1.4 cents per pound and a 3.0 cent price for zinc in London, the slow destruction of a large portion of the United States zinc industry is inevitable, with further tearing down of the other industries it supports.

Reviewing the previously stated facts, even those not associated with the United States zinc industry should be able to agree that any industry that has suffered an average reduction of 53% in gross income over a period of nearly ten years is "sick". It should also be apparent to all that the future welfare of the domestic zinc industry is now controlled not only by the uncertainties of future business conditions in the United States, but also definitely by those in Europe.

Only two possible solutions of our domestic zinc problem are apparent. One is the raising of the world’s price level for raw materials by the international adoption of trade and monetary policies that will permit free interchange of goods between raw material producing countries and those depending on manufacturing. Under present world conditions, chances of the adoption of sane trade and monetary policies are remote, but until this is accomplished, the only practical solution of our problem is a United States duty on zinc sufficient to maintain (with balanced production and consumption) an average domestic price above the cost of production, including the cost of development and depletion. A duty of 2.25 cents per pound is required. Our battle must continue until it is had.
THE PROSPECTS FOR COPPER

By P. G. BECKETT and WALTER BENNETT
Phelps Dodge Corporation

Presented Annual Metal Mining Convention, Western Division, The American Mining Congress, Salt Lake City, Utah, August 28-31, 1939.

In considering the prospects for copper, attention should be given to the rate at which the metal is being consumed.

The consumption of copper in the United States showed a steady rate of increase from 1900 through 1929, although the trend was interrupted by high consumption during the war period and reduced consumption in the post-war period. Since 1929 the rate of consumption has fluctuated greatly, the following table showing Refinery shipments for the last several years:

\[
\begin{array}{|c|c|}
\hline
\text{Year} & \text{Shipment} \\
\hline
1929 & 1,119,000 \text{ tons} \\
1930 & 809,000 \text{ } \\
1931 & 601,000 \text{ } \\
1932 & 336,000 \text{ } \\
1933 & 382,000 \text{ } \\
1934 & 417,000 \text{ } \\
1935 & 578,000 \text{ } \\
1936 & 809,000 \text{ } \\
1937 & 878,000 \text{ } \\
1938 & 522,000 \text{ } \\
\hline
\end{array}
\]

It is difficult to predict at this time whether domestic consumption will again rise to that shown for the year 1929—1,119,000 tons.

The average yearly consumption for the last ten years was approximately 645,000 tons, and strangely enough, the average rate of consumption over the last five years was approximately the same, or 640,000 tons. Domestic consumption for the first six months of 1939 was at the rate of approximately 600,000 tons per annum, so that for a period ten years and six months the monthly rate of consumption in the United States was approximately 53,000 tons.

The demand for copper in this country follows general economic conditions closely, so that in any consideration of the prospects for copper due allowance should be made for changing conditions in business.

The world is passing through a period of large governmental purchases of metals. In the United States the consumption of metals has undoubtedly been affected by governmental action such as the pressure by the government against utility corporations on the one hand, and governmental expenditures for housing, etc., on the other; also the reduced purchasing power of the railroads. These conditions may in part account for the drop in consumption below the secular trend, and may, as indicated above, necessitate the resumption of the trend curve at a lower rate.

A study of the statistics in relation to consumption of copper in the United States since August 1938 indicates that the rate of consumption has varied little during that period, although refinery shipments to consumers have fluctuated widely. This is accounted for by changes in consumers' stocks and represents the psychology of the buyer with regard to the price trend of the market. It may be expected that during periods of price weakness the consumer will take in less copper than he needs, whereas during periods when the price is advancing he will purchase and take in more than his actual requirements. At the present time domestic consumers are well covered for the next quarter at least, at about the present rate of consumption. It now appears that general business in this country may improve between now and the close of the year, and although the continuation of war clouds in various parts of the world will have the tendency of holding back any normal improvement which could take place here, it would still appear that the chance of some improvement prevails. It should not be expected that such improvement will take place rapidly, or that the domestic con-
sumption of copper will rise sharply. Domestic stocks of refined copper rose slowly during the first six months of this year, but it may be expected that for the next two or three months at least, this trend will be reversed and domestic stocks will decrease. A decline in domestic stocks of 18,000 tons has already been reported for the month of July.

The market price of copper is now 10 1/2 cents per pound, and considering average prices for previous periods, and also prices of various other commodities, the present price of copper cannot be considered high.

Conditions in the world market are quite different from those affecting the domestic market. The consumption of copper in Great Britain, France and Germany combined was lower during the war period than during the period just prior to the war, and although there were of course fluctuations from year to year in world consumption, the trend has continued to increase since 1900. The period beginning with June 1934 through June 1939 shows a very sharp increase in consumption, the per capita consumption for Great Britain, Germany and France rising from 7.88 pounds in 1935 to 9.90 pounds in 1938 as compared with the United States of 9.07 pounds in 1935 to 8.01 pounds in 1938.

Shipments of copper to consumers outside of the United States for the years 1937 and 1938 and the first half of 1939 were at a rate in excess of 100,000 tons per month. Foreign deliveries, as reported by Copper Institute for May 1939, reached 121,000 tons, and for June 127,000 tons, and the problem in connection with these figures is to determine just what part represents governmental purchases for armaments, etc., and what part is for private industry. However, with the present upset conditions in the world, it can probably be expected that at least for a considerable period ahead, world consumption will continue at a very high rate.

The continuance of the tariff on copper by the last Congress has again steadied the relative prices on the two markets. The importance to the domestic industry of the continuance of this copper duty cannot be too strongly emphasized, this being quite obvious when one considers the large tonnage of copper produced as a by-product in Canada and the tonnages of low-cost copper which are produced in Chile, Peru and Africa.

In conclusion, and taking into consideration the various factors discussed above, it would appear that the prospects for copper, both domestic and world, over the next few months are for a slowly rising rate of consumption. Increases in consumption usually precede advances in price, and it would appear that the industry will benefit more by an increase in the volume of production and sales rather than by a quick advance in price.

IDAHO—ALSO FAMOUS FOR TIMBER
STRATEGIC MINERALS INVESTIGATIONS
BY THE BUREAU OF MINES

By JOHN WELLINGTON FINCH
Director, Bureau of Mines

Presented Annual Metal Mining Convention, Western Division, The
American Mining Congress, Salt Lake City, Utah, August 28-31, 1939.

Introduction. The large number of inquiries from many sources received
by the Bureau of Mines during recent months indicates that there is wide­
spread public interest in the so-called “Strategic Minerals Act”—Public No. 117,
76th Congress, 1st Session (S. 572), approved by the President, June 7, 1939.

In view of this interest, because of considerable misunderstanding of the
provisions of the Act and because of the interest expressed in procedure of
the Bureau of Mines and the Geological Survey under the Act, it seems ap­
propriate to discuss it briefly on this occasion.

The Act, Public 117, is entitled “An Act, To provide for the common de­
defense by acquiring stocks of strategic and critical materials essential to the
needs of industry for the manufacture of supplies for the armed forces and
the civilian population in time of a national emergency, and to encourage,
as far as possible, the further development of strategic and critical materials
within the United States for common defense.”

Section 1 of the Act further defines its purposes, among which, of particu­
lar interest to the mining fraternity, is encouragement of the development of
mines and deposits of these materials within the United States. Sections 2 to
6 inclusive prescribe the modus operandi for making ·the act effective and
authorize appropriations therefor. In this connection it should be noted
that the Act does not appropriate money but is merely an enabling act under
which appropriations may be made. Although it was approved by the Presi­
dent June 7, 1939, Congress did not make it effective by an actual appropria­
tion of funds until August 5.

Broadly the Act may be divided into two parts; first, that part authoriz­
ing appropriations for the accumulation of stockpiles of strategic materials,
and second, that authorizing appropriations for the investigation of domestic
deposits of “Ores and other Mineral Substances” by the Bureau of Mines and
Geological Survey.

Strategic Minerals During the World War

The seriousness of our strategic mineral problem was emphasized with
distressing effect during the World War when grave consequences were avert­
ed only by the adoption of a hastily conceived national program which ulti­
mately proved to be absurdly extravagant both in man power and money.
The demoralization of international trade by submarine warfare and the com­
mmandeering of shipping facilities for military needs forced the nation to face
the problem of speeding up its industrial machine for the prosecution of a
major war with supplies of many essential raw materials drastically cur­
tailed because of complete lack of advance planning for such a contingency.
Emergency measures were adopted. Production from remote and totally un­
economic domestic deposits was stimulated and industry was forced to accept
off-grade materials to which it was unaccustomed. This resulted in delays
and confusion and inefficiency in the use of labor. Ultimately the Army and
Navy were forced to lower their specifications for military equipment and
the meager supplies of strategic minerals available were rationed to con­
sumers under strict regulations. Prices skyrocketed to unprecedented levels
and despite the terrific cost disaster frequently was avoided only by a narrow
margin. The most serious procurement problems were encountered in manga­
nese, chromium, tin, platinum, tungsten, nitrates, potash, pyrites, mica, anti­
mony and vanadium.
During the 20 years that have elapsed since the close of the war our strategic mineral position has been improved in some directions and aggravated in others. We no longer are vitally dependent on Chile for nitrates as a substantial part of our consumption is supplied by synthetic material made from atmospheric nitrogen. We now produce a large part of our requirements of potash and we possess sufficient capacity to supply all our needs if necessary. Domestic production of platinum has increased materially as a result of recent new operations in Alaska that were financed by the Reconstruction Finance Corporation. Molybdenum is now produced in abundant quantities, and reserves of vanadium apparently are adequate to take care of expanding production under favorable prices. During the World War our chemical industry existed to a very large extent on Spanish pyrite but today domestic pyrite production has been increased substantially and our domestic sulphur industry has grown to major proportions and maintains stocks sufficient to guarantee two years' consumption. We no longer are dependent on Asiatic sources of antimony owing to the establishment of a smelter at Laredo, Texas, which is equipped to supply large tonnages of antimony derived from Mexican ores. The Bureau of Mines has played a vital part in many of these developments. In addition the Bureau has made many contributions toward improved technology in the treatment of some of
our low-grade deposits of strategic minerals. These as yet have not resulted in any peace-time commercial developments but they should be of inestimable value in emergency exploitation of sub-marginal resources.

All of the foregoing accomplishments have eased considerably our strategic position in the minerals mentioned, but unfortunately the rapid increase in the use of alloys has made us more dependent than ever on foreign sources of manganese, chromium, and nickel. The situation in these materials has been further aggravated by the depletion of the very limited high-grade reserves of manganese and chrome ores during the last war and, in the case of nickel, by the transfer of refining operations from the United States to Canada. Since 1923 manufacturers of aluminum in this country have obtained much of their ore from South American bauxite deposits. We still depend almost entirely on overseas supplies of tin, the use of which has increased greatly.

Purchase of Stocks

Thus we see that the World War served to emphasize our dependence upon foreign sources for certain minerals that are not produced in this country in sufficient quantity for our industrial needs or of a grade considered suitable for use in current technologic practice. That some of these minerals are not developed, and may not exist, in this country in sufficient quantity and of a quality commensurate with our needs, is generally recognized. That some of them do exist in such quantity and quality in the United States is a controversial subject, which it is not my purpose to discuss. That a matter of years would be required to explore and develop them to a productive stage where they could supply our industrial and emergency needs is not controversial.

It follows that for hurried accumulation of adequate stocks under an impending crisis, resort to foreign sources would be necessary, and at present, the extent to which domestic deposits of some of the strategic minerals might contribute to our needs is not definitely known, notwithstanding the lessons of the great war.

Sections 2 to 6 of the Act cover the procedure for acquisition of stocks of strategic materials. In brief, the Secretaries of the War, Navy, and Interior are authorized to act jointly through the Army and Navy Munitions Board, to determine which materials shall be considered strategic and critical. The Secretaries of the War and the Navy, when they deem such action appropriate, shall ask the Secretary of the Treasury to purchase these through the Procurement Division of the Treasury Department, in accordance with specifications prepared by that Division and approved by the Secretaries of War and Navy.

It should be noted that the Bureau of Mines and the Geological Survey are not charged with any duties whatsoever in connection with such purchases. Producers in a position to supply mineral for stockpile purposes, therefore, should address inquiries to the Treasury Department, attention of the Procurement Division.

Following is a list of Strategic and Critical Materials issued by the Army and Navy Munitions Board Commodities Division and dated January 7, 1939:

List of Strategic Materials (17)

<table>
<thead>
<tr>
<th>Aluminum</th>
<th>Manila Fiber</th>
<th>Quartz Crystal</th>
<th>Silk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimony</td>
<td>Mica</td>
<td>Quinine</td>
<td>Tin</td>
</tr>
<tr>
<td>Chromium</td>
<td>Nickel</td>
<td>Quicksilver</td>
<td>Tungsten</td>
</tr>
<tr>
<td>Coconut Shell Char</td>
<td>Optical Glass</td>
<td>Rubber</td>
<td>Wool</td>
</tr>
<tr>
<td>Manganese, ferro-grade</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

List of Critical Materials (20)

| Asbestos | Fluorspar | Nux Vomica | Scientific Glass |
| Cadmium  | Graphite  | Opium      | Tanning Materials |
| Coffee   | Hides     | Phenol and | Titanium |
| Cork     | Iodine    | Picric Acid | Toloul |
| Cryolite | Kapok     | Platinum   | Vanadium |
| Flaxseed |           |            |                   |
In the above tabulation, "strategic materials" are defined as those "essential to the national defense for the supply of which in war, dependence must be placed in whole, or in part, on sources outside the continental limits of the United States, and for which strict conservation and distribution control measures will be necessary." "Critical materials" are defined as those "essential to the national defense, the procurement problems of which in war, while difficult, are less serious than those of strategic materials because they can be either domestically produced or obtained in more adequate quantities or have a lesser degree of essentiality, and for which some degree of conservation and distribution control will be necessary."

Differences of opinion and failure to adopt a realistic attitude on the extent of domestic resources have delayed an adequate solution of our deficient mineral problem all these years and public interest demands that an authoritative answer to this question be determined once and for all. Because the hope of profitable investment of capital in such an enterprise is remote, proper consideration by private enterprise is precluded.

Investigation of Domestic Deposits

Section 7 (a) of the Act defines the duties of the Bureau of Mines and the Geological Survey with respect to the investigation of domestic deposits of essential ores and other mineral substances. These duties are shown clearly in the analytical exposition, copies of which have been distributed at the door.

The Secretary of the Interior is authorized and directed through the Director of the Bureau of Mines and the Director of the Geological Survey to make scientific, technologic and economic investigations concerning the extent and mode of occurrence, the development, mining, preparation, treatment and utilization of ores and other mineral substances found in the United States or its territories or Insular possessions which are essential to the common defense or industrial needs of the United States.

It has been the function of the Geological Survey for years to investigate the extent and mode of occurrence of mineral deposits, and thus appropriations under the present act merely enable expansion of the Survey's functions with respect to deposits of certain minerals. This will be discussed by Mr. D. F. Hewitt, Chief of the Division of Metalliferous Deposits of the Survey.

Likewise, the Organic Act establishing the Bureau of Mines provides for "inquiries and scientific and technologic investigations concerning mining and the preparation, treatment and utilization of mineral substances * * * * *." Thus the new law, Public 117, 76th Congress, as quoted in this paper provides for similar investigations to those authorized in the Organic Act but with emphasis on certain minerals.

The Act of 1939 provides, however, for additional investigations not previously authorized specifically. Quoting further, this Act specifically provides as follows: "to explore and develop on public lands and on privately owned lands with the consent of the owner, deposits of such minerals, including core drilling, trenching, test pitting, shaft sinking, drifting, crosscutting and sampling, * * * * * necessary to determine the extent and quality of such deposits and the most suitable methods of mining and beneficiating them." Although it might be possible to conduct investigations of this nature under the earlier Act establishing the Bureau of Mines, the operations just recited have not been undertaken except by special Act of Congress, as in the case of core drilling for Potash in Texas and New Mexico (S. 1821, 69th Congress), and the development of helium in the Amarillo field.

It should be noted that the Act does not authorize loans or grants to owners of deposits of strategic minerals. This is emphasized because of an apparent general misunderstanding on this point. The intent of the Act is that certain facts regarding such deposits be determined by the Bureau of Mines and the Geological Survey as they relate to the needs of the United States and that the Government is not concerned with the development of the property of any individual or corporation for his or its benefit. On the other hand, it is hoped that, as a by-product of the investigations, private enterprise may be stimulated.
The policy of the Bureau of Mines in selecting projects for investigation is governed by the intent of the Act as expressed in the words, "to provide for the common defense." Therefore, projects are being selected on a broad national basis without reference to their possible local effect, and State and district boundaries are ignored. The Act does not provide for allotments of funds to State or regional agencies for carrying out its provisions, but the Bureau of Mines will welcome any information that such agencies may be prepared to offer that will aid in successful prosecution of its program.

In effect the Strategic Minerals Act imposes additional duties to be performed by the Bureau of Mines, particularly as they relate to exploration of ore deposits. As related to research designed to develop new methods of beneficiation and treatment for extraction of the metals, the Act requires an expansion of work in an established field of the Bureau.

The investigations of the Bureau of Mines under the Act are thus of two different but interdependent kinds and will be handled by two divisions working in close cooperation.

**Prospecting and Development**

Prospecting or exploration will be handled by the Mining Division and the organization is being built around the present staff of that division. Additional employees are being engaged from the Civil Service registers. Others are not eligible.

It is at once evident to mining engineers that the funds provided under the Act are inadequate to accomplish extensive development, as that term implies the blocking out of ore in preparation for production. It is, therefore, proposed to limit the investigations to surface and underground exploration to moderate depths, to determine the lateral extension of known deposits, provide additional information regarding their probable continuation in depth, and to ascertain the grade of ore exposed by the exploratory work.

In selecting deposits for investigation, the Bureau of Mines is being guided by the Geological Survey, and during the progress of exploratory work the Survey will cooperate with the Bureau of Mines by observing disclosures made on each project and aiding in the interpretation of them. Since the Survey has studied present exposures of most of the known deposits in the United States, those have been selected for investigation by the Bureau, which in the opinion of the Survey geologists, offer possibilities of providing substantial reserves of strategic minerals, and concerning which more information is needed than that supplied by outcrops and existing underground developments.

Certain kinds of deposits lend themselves to systematic exploration but others do not, and it is upon the first kind that the Bureau of Mines will concentrate. Thus tabular deposits, either dipping or in flat beds, and having or likely to have, considerable lateral extent, can be explored systematically. Deposits in the form of short, disconnected lenses, erratically distributed over a large area, may contain important tonnages in the aggregate, but do not lend themselves to such exploration; the reserves that could be established would not be commensurate with the amount of money expended. This immediately narrows the field, as is desirable, because funds must be expended each year on individual projects in sufficient amounts to secure significant results whether they be favorable or unfavorable; expenditures over a large number of small scattered deposits could yield no adequate or conclusive information.

In the light of present knowledge, the outlook for disclosing large deposits of deficient strategic minerals of present commercial grade is admittedly not promising. The prospect becomes more hopeful when viewed from the objective of disclosing reserves for strategic purposes, that need not necessarily be of immediate commercial grade but might be commercial under the stimulus of war prices or of strategic value when price would be relatively unimportant. Thus, relatively small deposits of commercial grade may be accompanied by much larger "halos" of lower grade material that contain sufficient quantities of needed metal that could be extracted "at a price."
It is understood that the Geological Survey contemplates continuing its investigations of areas known to contain deposits of strategic minerals, which, during the course of the 4-year program provided by the Act, it is hoped will lead to the designation of additional individual deposits for exploration by the Bureau of Mines.

Information regarding deposits that deserve attention is welcomed by both the Bureau of Mines and the Geological Survey. In this connection, it is probable that many established mining and exploration companies have in their files detailed reports on deposits that have not been of interest to them because they are of sub-commercial grade, but which may well be of considerable interest because of their potential value as a strategic reserve. It is hoped that such companies will offer access to their maps and files by Government engineers and geologists engaged in the present investigations.

**Metallurgical Investigations**

The Act authorizes and directs that investigations be made concerning the “preparation, treatment, and utilization of ores and other mineral substances found in the United States or its territories or Insular possessions * * * * * to devise new methods for treatment and utilization of lower grade reserves and to develop substitutes for such essential ores and mineral products * * * *.”

This part of the investigations authorized by the Act has been assigned to the Metallurgical Division of the Bureau. That Division will also do the analytical work on samples obtained by the Mining Division during the course of its exploratory work and these results will be used for guidance in continued work and in calculation of tonnages and grade. In turn, the Mining Division will procure and supply to the Metallurgical Division, material in such quantities and from such deposits as the Metallurgical Division may require for research and testing for treatment processes.

In order to comply with the requirements of the Act, additional Civil Service personnel is being employed by the Metallurgical Division, which will work under the direction of the present Division staff, and some additional equipment is being installed at existing Bureau of Mines field stations.

From the nature of the problem and the wording of the Act, it is anticipated that the new work will be directed largely toward methods of beneficiating material that cannot at present be classed as commercial, first for the purpose of devising methods by which such material could be utilized in a national emergency, and second, in the hope that such material might be raised to commercial grade.

The stated objective of the Act is to carry out such investigations “as may be necessary to determine the extent and quality of such deposits, the most suitable methods of mining and beneficiating them, and the cost at which the minerals or metals may be produced.”

Thus, the cost of production of needed metals from domestic deposits is to be determined in addition to the objectives previously discussed. This will be an end-product of the investigations which must be borne in mind during the course of the work, but probably cannot be conclusive until near the end of the program, except with respect to some individual projects that may be completed earlier.

It is hoped that this may be but the beginning of a long-range program permitting a comprehensive and systematic examination of our strategic mineral position, which should include not only the determination of reserves and the cost of production, but also the preparation of complete detailed plans for developing and mining those deposits that may be found to contain substantial reserves, and for the beneficiation and the extraction of the metals from their ores in usable form. Should a crisis arise suddenly, much larger annual appropriations than authorized by the present Act would be required to expedite the program.

It is planned tentatively to publish progress reports from time to time during the course of the investigations, as information is gained that may be of public interest, and that final reports will be published jointly by the
Bureau of Mines and the Geological Survey summing up the different phases of the problem—geological, mining, metallurgical and economic.

(Strategic Minerals Investigations Enabling Act)

Public, No. 117, 76th Congress
Chapter 190, 1st Session, S. 572

To PROVIDE for the COMMON DEFENSE

by acquiring STOCKS of STRATEGIC AND CRITICAL MATERIALS essential to the needs of industry for the manufacture of supplies for the armed forces and the civilian population in TIME OF NATIONAL EMERGENCY

and to encourage, as far as possible, the FURTHER DEVELOPMENT OF STRATEGIC AND CRITICAL MINERALS within the United States.

Sections 1 to 6, condensed.
The Secretaries of War, Navy and Interior to act jointly, through the Army and Navy Munitions Board, to determine which materials shall be considered strategic and critical. In doing so, and in determining the qualities and quantities to be purchased, each Secretary shall designate representatives to cooperate in carrying out the provisions of the ACT.
The Secretaries of War and the Navy, when they deem such action appropriate (for certain reasons that are specified) shall direct the Secretary of the Treasury to make purchases through the PROCUREMENT DIVISION of the Treasury Department, in accordance with specifications prepared by that Division and approved by the Secretaries of War and Navy; and to provide for the storage and if necessary, the rotation of material purchased. Such storage to be made on military and naval reservations or elsewhere, as approved by the Secretaries of War and the Navy.

Section 7 (a)

The Secretary of the Interior—

Through the Director of the Bureau of Mines, and the Director of the Geological Survey

is authorized and directed

to make scientific, technologic, and economic investigations concerning the extent and mode of occurrence, the development, mining, preparaton, treatment and utilization of ores and other mineral substances found in the United States or its territories or Insular possessions which are essential to the common defense or the industrial needs of the United States, and the quantities or grades of which are inadequate from known domestic sources,
in order to determine and develop domestic sources of supply, to devise new methods for the treatment and utilization of lower grade reserves, and to develop substitutes for such essential ores and mineral products.
to explore and develop on public lands and on privately owned lands, with the consent of the owner, deposits of such minerals including core-drilling, trenching, test-pitting, shaft sinking, drifting, cross-cutting, sampling—and metallurgical investigations and tests
as may be necessary to determine the extent and quality of such deposits, the most suitable methods of mining and beneficiating them, and the cost at which the minerals or metals may be produced.
DOMESTIC SOURCES OF DEFICIENT MINERALS

By D. F. HEWETT

Chief, Metalliferous Deposits, U. S. Geological Survey

Presented Annual Metal Mining Convention, Western Division, The American Mining Congress, Salt Lake City, Utah, August 28-31, 1939.

You have doubtless heard the statement made, that no equivalent area in the whole world contains the diversity, quantity, and richness of metals as does the area included within the United States. I subscribe to that statement. Considered with the supplementary resources of nonmetals and fuels, as well as those of soil, forests, water, climate, and configuration of the land, these resources constitute such a basis as does not exist elsewhere in the world for a balanced industry that permits and will continue to permit, for many years, the highest standard of living for so large a population.

This concept of abundance of the metals has arisen rather recently, for until about 1850, we were largely an agricultural people. The abundance of timber and of anthracite coal permitted the early development along the Atlantic Seaboard of a modest iron industry which moved westward with the development of coking coal and iron ore in the Ohio Valley. Then followed the copper and iron of Michigan, the lead and zinc of the Mississippi Valley, and, gradually, the gold, silver, and copper of the West Coast and the Rocky Mountains. The idea of abundance spread widely with the extraordinary production of iron and copper in the Lake Superior region and of gold, silver, copper, lead, and zinc in the western states from 1890 to 1915. During this epoch, few were impressed by the deficiencies of such metals as tin, nickel, manganese, and chromium in our national economy.

In my opinion, the war from 1914 to 1918 not only revealed these deficiencies clearly but the efforts to secure these metals gave the first aspects of a clear picture of the nature and the limitations of our supplies. A nation accustomed to abundance in many things does not readily concede or adapt itself to the idea of scarcity in some things, and those who warn of impending problems are never popular.

Few realize that in the history of our production of the metals, we are conforming rather closely to a cycle that has been experienced by many other countries. De Launay, the French geologist, first noted that in most countries there is a tendency for the production of gold to attain its zenith first and that it is succeeded by peaks in production of silver, copper, lead, zinc, and iron.

How shall we approach the problem of the reserves of strategic metals in the United States so as to obtain the necessary data and convey a clear idea to many classes of persons, professional, as well as lay, just how much of each may be produced from time to time, at what price, and for how long? We all know that minerals are a wasting asset and that advances in technology make material of progressively lower grade available at the same or lower prices. Many persons assume, therefore, that this tendency continues indefinitely and that we shall never face shortage or scarcity. A careful review of Europe during the 19th century, as well as our own Atlantic Seaboard, will dispel this illusion.

The basic data for any appraisal of our resources of the metals are three-fold: Geologic, technical, and economic. The geologic data include all of those elements of mineral content which determine grade and recovery; those elements of environmental control, such as the enclosing rocks, sedimentary and igneous, which determine distribution; and those structural features, which determine form and persistence of ore bodies and finally, in rare cases, even physiographic history which sometimes limits distribution and depth. The technical data include all of the elements of mining methods, which affect recoverability from the ground, and of milling and metallurgical processes, which determine recovery from the mined ore. The economic data include all of the elements that affect price, such as accessibility, markets,
and competitive position, since many metals compete with each other and with nonmetals.

What are the geologic problems and what are the needed data in a national program of study of the deficient metals—tin, nickel, manganese, chromium, tungsten, mercury, antimony, and aluminum? As I see it, they are the problems inherent, first in the chemistry and mineralogy of those elements which affect their regional distribution and their persistence in depth, both primary or hypogene, and secondary or supergene. Secondly, there are those structural features, such as the attitude or form of the stratified rocks, or of the foliation of metamorphic rocks and the fractures in all varieties of rocks, generally unique in each district, which determine the shape, attitude, and persistence laterally and in depth, of the minable bodies.

Among the 21 metals which are regarded by the Army and Navy Munitions Board as essential, critical, and strategic, it would be hard to select eight that present more geologic problems than those that are included in the group classified as "strategic". Without burdening you with a long discussion on the subject of the origin of ore deposits, I should say that the important accumulations of these metals clearly have been formed in many ways. In some, the metals were present in solutions which have risen from deep sources and have been deposited in simple veins or replaced diverse varieties of rock; some represent supergene enrichments below the surface, generally near water-level; others have accumulated on the surface of the land under conditions of prolonged weathering, such as arise during peneplanation; others have been laid down as sediments in marine basins, and, finally, some are placer deposits in stream channels.

To me, a geologist, an adequate picture of the extent, shape, and grade of an ore deposit, as well as the most efficient method of exploiting it, should be based upon a thoroughly sound concept of its mode of origin. I recognize that many good mines have been developed "without benefit of the geologic clergy", and I realize that the science of economic geology has developed rather recently and slowly. I believe, however, that no picture of our reserves of ore can be sound without good geology.

I shall try to summarize briefly some of these problems for each of the eight strategic metals.

Tin should be considered first because we consume half the world's supply and yet we produce far less than 1 per cent of our needs. The oxide, cassiterite, is not only heavy but it resists decay near the surface; consequently, it accumulates readily in placer deposits. Curiously, like gold, it is first recognized in and recovered from placers, but, unlike gold, in only a few of the important districts, have workable lodes been found nearby; notably Cornwall, the Erzgebirge, and Bolivia. During recent years, about 65 per cent of the world's production has come from placer deposits in districts that have yet revealed few workable lodes. This is true of Alaska thus far, as well as of the East Indies. Important placers appear to arise out of exceptional processes of erosion. Therefore, in viewing the ten districts in the United States in which tin is found in appreciable quantities, the evidences of erosional history that bear upon the accumulation of placers, such as the development of mature river systems and of peneplains which permit the accumulation of cassiterite in any channels should be carefully considered. Noteworthy cassiterite-bearing veins have been found in about ten districts in the United States but it has not yet been proven that any are rich enough or extensive enough to be worked at a profit at present prices. As studied thus far, the principal mineral is cassiterite but the associated minerals are diverse and it seems that about five types of mineral assemblages can be recognized. It is hoped that by close study and careful sampling of these deposits some idea of their persistence in depth, as well as horizontally and of their grade, can be gained.

Next to tin comes nickel of which we consume 40 per cent of the world's supply, but produce only one-half of 1 per cent of our consumption. Even though small quantities of several nickel minerals are found in many places in the United States, the outstanding concentrations of nickel appear to be those silicates that result from supergene enrichment of small quantities,
less than 0.25 per cent, present in such basic rocks as serpentine and its
antecedents, peridotite, and norite. Actually, we produce no nickel from
these sources, and that which we do produce, represents metal recovered in
the refining of other metals, such as copper. The first step in studying our
outstanding sources seems to be the determination of the areal extent, depth,
and grade of the enriched superficial zone, and these may be related to the
local physiographic history. At a few places, such as Lancaster Gap, Pa.,
and Key West, Nev., lenses of sulphides containing several per cent of nickel
appear to be related to deep circulations in the nickel-bearing basic intrusives.
The known deposits of this type are relatively small.

Among the eight strategic metals, I would say that the Geological
Survey possesses more information about our resources and the geologic problems of
manganese, than any other. As the result of a campaign of intensive study
of outstanding districts during the war, and a continuing but less intensive
study since then, we have the record of appraisals by competent geologists
and engineers, within and without government employ, of about 1,500 mines
and deposits. In addition, there are further records, mostly poor, of nearly
500 more occurrences of manganese minerals that probably should be examined.
This record contains a wealth of information about the manganese minerals,
their distribution, relations, and geologic environment, as well as the shape,
sizes, grade and persistence of deposits. It is my confident belief that among
the common metals, manganese deposits present a greater diversity of features
and of geologic problems than any other. The superficial portions of its
deposits are commonly extremely puzzling and deceptive. Among the dozen
common oxides which are most desired by the industries because they contain
more than 50 per cent metal, only a few persist below water-level, which
is commonly one to two hundred feet below the surface in the east, and three
hundred to six hundred feet in the west. I know at least a dozen mining
and milling plants, each of which cost between $300,000 and $1,000,000, which
were built on the assumption that the oxide ore bodies near the surface were
widespread and persisted downward, and which were scrapped and abandoned
when a little deep exploration showed that they were not.

In 1918, when prices were five times normal, high-grade ore from domestic
mines yielded 19.3 per cent of the metal needed as ferromanganese by the steel
industry, and low-grade ore, 15.9 per cent of that needed as spiegeleisen,
or a total of 35.3 per cent of our needs in both alloys. As the result of explorations and studies since 1918, noteworthy reserves of low-grade and mangani-
ferous iron ore have been developed, but there has been little change in the
outlook for high-grade ore. There is cause for some optimism that improved
mining, milling, and metallurgic technique may permit the recovery of note-
worthy quantities of manganese oxide or metal to supply our needs but at
costs well above present prices.

Numerous deposits of chromite, like manganese, are known in the United
States, principally in California and Oregon, and the war-time prices, three
times normal, brought out 45 per cent of our needs at that time. In an attempt
to appraise our resources of chromite, we are fortunate in that all of the
concentrations are found in rocks that show a narrow range in composition.
These are the ultrabasic rocks, high in magnesia, that are called peridotite,
norite, etc., which, in most places, are altered to serpentine. In most regions,
the first step in appraising the resource is the accurate mapping of the areal
distribution of such rocks, where they are known to contain bodies of chromite,
and geologic parties are now doing this in three areas in California, Oregon,
and Wyoming. In other parts of the world, single bodies of chromite have
yielded as much as several hundred thousand tons of ore, but of the thousand
deposits recorded in the United States during the World War, the largest
production from a single deposit is about 16,000 tons, and several hundred
other deposits have been regarded as exhausted after yielding a few hundred
tons or less. Some of the largest known domestic bodies are tabular or lenticu-
lar and it is hoped that careful study may reveal some of the elements that
control form and perhaps size. It is fortunate that magnetic surveys of
chrome-bearing areas can yield significant information concerning their size
and shape in advance of exploration. The results of one experimental study
MINING INDUSTRY OF IDAHO

on Casper Mountain, Wyo., hold out hope that, where applied to small areas, magnetic surveys may accurately reveal a buried deposit.

For many years, prior to the war period, all of our domestic tungsten was recovered from simple vein deposits in a few districts, some of which yielded wolframite and some scheelite, relatively unmixed with other metallic minerals. The war-time campaign of search revealed many deposits of a different type and these are now the main source of our supply. I refer to the tabular bodies of highly altered limestone which contain disseminated scheelite, rarely more than one per cent, but readily recoverable by flotation. There is reason for believing that precise areal mapping of the favored limestone beds in regions known to contain scheelite-bearing bodies, may greatly extend the favorably areas. Detailed mapping of the districts that contain wolframite—or scheelite-bearing veins may reveal some that are not known, but I suspect that only exploration by trenches and diamond drilling will lead to actual discovery.

More mines have produced mercury in the United States than in any other country, and the New Almaden mine, in California, was one of the great mercury mines of the world. A review of our record of production seems to indicate that we have passed the zenith, at present prices. Even though our mercury deposits occur in several kinds of rocks of diverse ages, accumulating evidence indicates that most of them formed in recent time, Tertiary or later, and that their distribution coincides roughly with that of existing hot springs. Most exploited bodies are tabular and several persist a thousand or even 2,500 feet below the surface but many have been exhausted at shallower depths. There are real problems in exploring mercury deposits far in advance of actual mining, and I believe we geologists can make our best contribution by careful study and mapping of some productive areas in the hope that such a study will reveal the environment under which the veins are found.

In recent years, domestic mines have yielded 10 to 15 per cent of our needs of antimony metal; the maximum was 30 per cent in 1915. Most of this has come from about a dozen mines in Idaho, Nevada, and California. As prevailing prices of the metal have been low, and the only market for ore is a single smelter, there has been little incentive to operate mines. The program of work on antimony includes detailed study of the productive districts in the hope that it will throw light on the extent and distribution of the deposits.

As with mercury, a review of the record of domestic production of bauxite, taken into consideration with our present knowledge of the deposits, indicates that we have passed the zenith of production of this ore of aluminum, although a recent review indicates that large reserves of low-grade ore are known to exist. As the result of a project undertaken by the Survey in Arkansas, several years ago, it appears that a campaign of exploration by drilling will be necessary to greatly increase our knowledge of reserves.

The foregoing resume of some of the geologic relations of the deposits of the eight strategic metals, indicate something of the program of work that will be carried out by the Geological Survey in its attempt to reveal more accurately the nation's reserves. We shall make some effort to examine numerous recorded and reported deposits of these metals that are not yet adequately examined but we shall lay emphasis on careful, detailed studies of those districts for which existing dependable information indicates a definitely hopeful source of one of them.

In carrying out its many kinds of studies during its 60 years of activity, the Geological Survey has generally had to be content to examine and record, in various degrees of detail, the natural exposures of rocks, veins, etc., and the evidence from such artificial openings, as mines, drill holes, etc., made by private groups, and to draw from this evidence conclusions concerning areal extent and persistence in depth. Only rarely, notably in the explorations for potash salts in Texas and New Mexico, has it been possible to carry out a campaign of exploration to prove the existence in depth of a mineral deposit whose presence was inferred from studies on the surface. As you know, this program of exploration, carried out by the Bureau of Mines and
Geological Survey, was highly successful. Obviously, to accomplish the objectives of the present program, close cooperation of geologists of the Survey with the engineers of the Bureau will be necessary, both in planning and in the actual exploratory processes. After much discussion about our cooperative activities, it has been decided that the Survey will do most of the reconnaissance examination work and then carry out detailed district studies that will serve to guide the programs of exploration by the Bureau. Final interpretations of the reserve situation will be based on joint review of the evidence obtained. I feel sure that the program of work that we are planning will clear up many uncertainties concerning our reserves in the strategic minerals.
EXPERIENCE UNDER THE RECIPROCAL TRADE AGREEMENTS

By EDGAR B. BROSSARD
Member, United States Tariff Commission

The trade agreements program, inaugurated by the government June 12, 1934, was a distinct departure from the historical trade and tariff policy of the United States. It is still, after five years, so new and so little understood by many that it is opportune to present the facts about it whenever possible to interested groups of this kind.

There are, of course, wide differences of opinion as to the wisdom of this country's following such a policy at this time, and as to what if any net benefits the United States may gain from the trade agreements. Much has been said both for and against the new policy. These matters of policy, however, are outside of the limits of this discussion which is confined to a brief factual statement of experience under the Reciprocal Trade Agreements.

The Tariff Commission, as you know, is not a policy-determining body, nor is it an agency of any one political administration, but rather it is a bipartisan research or fact-finding body. Consequently, this afternoon we shall discuss trade and tariff facts and omit arguments for and against trade and tariff policies.

First, we shall examine the need of the United States to engage in foreign trade and some of the barriers established by foreign countries that have made trade difficult and have resulted in the adoption of the trade agreements program by the United States. Then we shall describe how the trade agreements have been negotiated and indicate some of the specific changes made in the tariff rates, especially on metals.

Foreign Trade Essential In Times Of Peace And War

The United States is rich in natural resources and is also a great mass-production industrial nation. Consequently we have surpluses of a great variety of commodities which we desire to sell abroad. To sell these surplus products abroad we must buy other products and/or services from abroad. This makes foreign or international trade.

As for the need of our country to engage in foreign trade, there is no justifiable doubt. Foreign trade is both desirable and necessary to necessary to promote the maximum welfare of our people. Any attempt to limit our consumption to those kinds and quantities of materials produced within our own boundaries would, in time of both peace and war, impose needless hardship, and would compel a lowering of our American standard of living. Since the founding of our republic, foreign trade has been a vital factor in the welfare of our nation.

Great as are the resources of the United States there are some goods which we lack but need for the better functioning of our industrial system and some products the importation of additional quantities or special grades of which contributes to our high standard of living. We are fortunate in being able to both complement and supplement our own resources by purchases in the markets of the world.

It is possible, of course, to over-emphasize the value to the United States of foreign trade. At the same time there can be no doubt that exports and imports of many products are of substantial advantage to the national economy as a whole.

In 1938 we exported 270 million dollars' worth of automobiles and parts, 229 million dollars' worth of cotton, 155 million dollars' worth of tobacco, 112 million of crude petroleum, 104 million of gasoline, and 102 million of electrical machinery. We also exported large quantities of metal-working machinery, corn, wheat, agricultural machinery, refined copper, lubricating oil, aircraft, gas oil and fuel oil, iron and steel, boards and planks, cotton
cloth, construction machinery, canned fruit, and wheat flour. In all, we sold over 3 billion dollars’ worth of goods to foreigners in 1938 which, incidentally, represented a value of over 50 per cent in excess of our 2 billion dollars’ worth of purchases from abroad.

Were we to cut ourselves off from our foreign markets, we should be obliged to repattern our whole economic life, for many of our basic industries are geared to supply substantial fractions of their output to foreign buyers. Almost one-half of the South’s raw cotton goes to the mills of Europe and Asia. Foreign outlets take almost one-third of the lubricating oil and one-eighth of the kerosene produced in the United States. One-third of the domestic production of borax goes abroad, and 45 per cent of that of phosphate rock. About one-half of our production of prunes and of apricots goes overseas. Almost one-quarter of our office appliances, one-seventh of our industrial machinery, and more than one-quarter of our aircraft and parts go to foreign countries.

We could spend considerable time reciting similar facts about many other products of American farms, forests, mines, and factories, but there is no need for elaboration. Our splendid natural resources, our inventive genius, our mass production methods, and our efficient workers have all contributed to create and to sustain a large foreign demand for American products.

On the other side of the picture we could ill afford to dispense with our imports. Our chief imports in 1938 were: Coffee, 138 million dollars’ worth; cane sugar, 130 million; crude rubber, 130 million; standard newsprint paper, 101 million; raw silk, 89 million; wood pulp, 73 million; distilled liquors, 49 million; tin bars, blocks, and pigs, 45 million; furs, 43 million; unmanufactured tobacco, 36 million; raw hides and skins, except furs, 30 million; bananas, 29 million; fish, 28 million; burlaps, 28 million; diamonds, 28 million; fertilizers, except nitrate of soda, 26 million; unmanufactured wool, 23 million; cocoa, or cacao beans, 20 million; flaxseed, 20 million; tea, 18 million; industrial chemicals, 17 million; art works, 17 million; and coal-tar products, 16 million.

Unfortunately trade between countries is not as simple as it may appear at first glance. Trade, whether domestic or international, is not carried on in a vacuum. We cannot take refuge in the classic economic proviso “all things being equal.” All things are not equal. Trade is complex. Competitive conditions involve many factors. Many imported products compete directly with like or similar domestic products, while many of the imports supplement rather than compete directly with domestic products. The same is true with our exports, some compete with and some dovetail into production in other countries.

We find also that in many instances our imports have supplied a small proportion of our total consumption because the domestic products have advantages of lower prices, proximity to consumers, are of better quality, or they are protected by the tariff, and so on; and in other instances imports have supplied most of our demands largely because such products either are not produced in the United States or are produced only in small quantities because of natural disadvantages or because of lower prices elsewhere, or superior quality of the foreign products, or for other reasons. All these and many other conditions of competition have greatly complicated the problems of foreign trade, and in addition there have been many other more recent changes making foreign trade more difficult.

Changes In International Commercial Policies

Since The World War

We all know that during the post-war years the movement of goods in international trade has been further complicated by the use of more restrictive measures, such as higher tariffs, fees, quotas, licenses, exchange controls, and even embargoes. Currency depreciation also has been used both as an offensive and a defensive measure.

The new countries created after the war by the Treaty of Versailles sought to protect their national economies by building up their own industries. Countries which prior to the war had been dependent to a greater or less degree on the older industrial nations took steps to protect the industries
which they had developed during the war to supply their own needs. The older industrial nations in their turn sought to protect new industries and to restore the industries adversely affected by the unsettled conditions prevailing during and immediately after the conflict.

A study of tariffs during the period 1925 to 1929 reveals among the 26 European countries 33 general tariff revisions, most of which involved increases in rates of duty, 17 general tariff revisions upward among the 20 Latin American countries, and broad increases in tariff rates and other changes in Australia, New Zealand, Canada, Iran, and China. For a time, as more normal conditions returned, it was believed that the severity of these measures would be lessened. But the depression in 1929-33 stimulated the demand in many countries for even further protection and for a more self-sufficing economy. And even Great Britain having entered on a policy of limited protection in 1915 now adopted a strong protective tariff policy.

**American Commercial Policy And The Trade Agreements Act**

While these changes were taking place in foreign countries certain important developments had also occurred in the United States. After the upturn from the bottom of the depression, on June 12, 1934, this country adopted a policy of bargaining for the reduction of trade barriers by means of reciprocal trade agreements. The Trade Agreements Act empowered the President to reduce duties by not more than 50 per cent of the existing rate in exchange for the lowering or removal of barriers of foreign countries against our exports, and provided for the incorporation of the unconditional most-favored-nation clause in all agreements negotiated under the act. In other words, all concessions granted by the United States to one country are generalized to like products of all foreign countries, except those countries found to discriminate against United States commerce. This latter provision is in accordance with the unconditional most-favored-nation policy first enunciated by Secretary of State Hughes in 1923 and later embodied in the Tariff Act of 1930. At present, the reduced rates are withheld only from Germany.

Now let us examine briefly the procedure followed in negotiating agreements under that Act.

**How Agreements Are Made**

Before any trade agreement is negotiated a great amount of preliminary work must be done by many agencies of the government—the United States Tariff Commission, the Department of State, the Treasury Department, the Department of Agriculture, and the Department of Commerce. Each of these agencies has its prescribed sphere of operation, but their work is co-ordinated by a Committee on Trade Agreements. This body, which is composed of high ranking officials of the various government agencies mentioned, organizes and supervises the work of many subcommittees, directs the preparation of the necessary reports, reviews the recommendations of subcommittees, and formulates the draft of all trade agreements. These draft texts are then submitted, through the Secretary of State, to the President for his approval.

There are about 60 interdepartmental committees which function under the Trade Agreements Committee just described. The various so-called Country Committees are charged with analyzing the trade between the United States and the foreign country in question and with formulating the tentative schedules of concessions to be requested and to be offered. Other committees make reports on specific commodities and still others prepare studies on special problems, such as quotas, bounties, exchange control, trade discriminations, and so on.

Prior to the negotiation of a trade agreement, the United States Tariff Commission prepares detailed studies of each of the products we import from the country with which an agreement is contemplated. These studies show not only the extent and the trend of the imports of those products from the designated country, but also from all other countries. And they show the proportion of domestic requirements supplied by imports, the competitive conditions in the domestic industries affected by such imports, and as far as practicable, the probable effects of altering the tariff on both domestic
producers and consumers. In short, every phase of the problem as it relates to our import trade and to our domestic industry is closely examined. Frequently, many months are devoted to the study of a single commodity and when circumstances, so require, the Tariff Commission even dispatches its experts to foreign countries. When the Tariff Commission has finished its task it has made available to the policy-determining agencies of our government the facts necessary for them to act intelligently.

While the Tariff Commission is performing its work, the other departments of the government are performing theirs. The State Department has the primary responsibility of drafting general provisions and of conducting actual negotiations. The Treasury Department advises in regard to fiscal aspects of proposed concessions and concerning technical questions of customs classification and administration. The Department of Agriculture supplies information pertaining to concessions on agricultural commodities.

The Department of Commerce prepares data corresponding to that prepared by the Tariff Commission, but its work is in reference to United States exports. The Department of Commerce studies each of the products we export to the designated country and indicates what proportion of our various exports goes to that country—and to each of the other foreign countries—and also the proportion of imports into the designated foreign country supplied by the United States. The study also contains detailed information concerning the foreign tariffs and trade restrictions applicable to American goods and the extent to which reductions of the foreign trade restrictions might result in increased sales of our products to that country.

United States Negotiators Have All Essential Facts About Industries And Competition Before Agreements Are Made

Before entering into a trade agreement with any country our government not only assembles all of the pertinent information which its agencies have, but, through public hearings, it further augments these data and—this is particularly important—it gives all interested persons an opportunity to present their views. They may present them publicly or privately, orally or in writing. In fact, a specially constituted body known as the Committee for Reciprocity Information is charged with acting as liaison between the public and the trade agreements organization. This Committee is composed of officials of various government departments, most of whom also serve on the Trade Agreements Committee. The Tariff Commission is represented on this Committee.

From what has been said, it is clear that our Government has not hastily entered into trade agreements, nor has it made concessions on commodities without first getting all available information as to the probable consequences. Probably no other country in the world, in preparation for tariff action, goes to such pains to ascertain the facts and to such lengths to obtain the views of interested parties. Whatever mistakes may have been made were not from lack of information.

Trade Agreements Made With 20 Countries

Since June 12, 1934, the date the trade agreements act became effective, our government has negotiated agreements governing our commerce with 20 countries: Cuba, Belgium, Haiti, Sweden, Brazil, Canada, the Netherlands, Switzerland, Honduras, Colombia, Guatemala, France, Nicaragua, Finland, El Salvador, Costa Rica, Czechoslovakia, Ecuador, the United Kingdom (including British Colonies and Newfoundland), and Turkey. The agreement with Czechoslovakia has ceased to be operative since that country was taken over by Germany, and that with Nicaragua has, by mutual agreement, been greatly modified. The agreements with the other countries, however, are in full force today. And our trade with these countries represents about 60 per cent of our total trade with all of the countries in the world.

There are wide differences of opinion concerning whether, and if so the extent to which, the trade agreements have contributed to the expansion of our foreign trade, and what if any net benefits the United States has obtained from the agreements. These, however, are controversies no one can
answer fully and conclusively at this time, and which we shall not here enter into because we want to use the time to point out some other facts about these agreements.

One-third Of Rates In Tariff Act Of 1930 Reduced By Trade Agreements, Two-thirds Remain Unchanged

When the Trade Agreements Act became law, there were many who feared that it would be employed more or less indiscriminately to reduce the general level of our tariffs by the maximum extent permissible under the law, that is, by 50 per cent. That, however, has not been done. Although many rates have been reduced the full 50 per cent, others were reduced less than the full 50 per cent, and twice as many as were changed, remain unchanged.

The rates of duty on which our government has made concessions in the trade agreements now in force apply to almost 1,200 categories of imports or about one-third of the rates in the act of 1930. That is about the same number of rates as were raised in the tariff revision of 1930. The decreases do not cover all of the items increased in 1930, nor have the reductions been calculated to offset the increases; it is just an interesting coincidence that the number of changes have been about the same. The rates of duty applicable to two-thirds of the total number of tariff items contained in the Tariff Act of 1930 have not been modified at all by the existing trade agreements.

Furthermore, only about two-fifths of the 1,200 trade agreement concessions made in the United States tariffs represent reductions ranging between 40 and 50 per cent, about one-fifth represent reductions ranging between 30 and 39 per cent, one-fourth represent reductions ranging between 20 and 29 per cent, and one-tenth represent reductions between 10 and 19 per cent. The remainder of the concessions—accounting for about one-tenth of the total number—consist very largely of bindings of the rates of duty in effect prior to the negotiation of trade agreements.

It is clear that while many concessions have been made in the trade agreements they have not whittled all our tariffs to the lowest possible levels which the law permits as was at first feared would be done.

Now let us examine the changes made in the rates on certain metals in which you are especially interested.

Reductions Made In Rates Of Duty On Metals Other Than Iron And Steel

In the trade agreements thus far made, there have been about nine or ten reductions in rates of duty on metals other than iron and steel, of which the six following are probably of most importance—manganese ore, ferromanganese, ferrochrome, brass and bronze tubing, lead pigments, and zinc.

Manganese Ore

Manganese ore is used predominantly to make alloys for the steel industry. Domestic production in 1929-38 has averaged about 33,000 tons of which 10,000 tons is battery ore. Similarly imports have averaged about 470,000 tons yearly of which only 4,000 is battery ore. Thus imports usually supply 95 per cent of our total consumption, though only 30 per cent of the battery or chemical grade. The principal foreign shippers to this market are Soviet Russia, the Gold Coast of Africa, Brazil, and India. There are no United States exports of record.

The rate of duty on manganese ore in the Tariff Act of 1930 is 1 cent per pound of manganese content. For the usual ores imported this amounts to about $11 a long ton. The Brazilian trade agreement effective January 1, 1936, cut this duty in half, and the benefit of the cut was extended to all the principal producing countries. The effect of the reduction in duty on the quantity of imports or on prices cannot be definitely traced because the pickup in industry has been such as to dominate other factors. Domestic shipments as well as imports have increased since the cut in duty.
Ferromanganese

Ferromanganese is an alloy used in making steel. Our domestic production in 1929-38 averaged around 216,000 tons and our imports 34,000 tons. Exports are negligible. Thus, about one-eighth of our supply is imported. The principal sources of imports have been Norway, Canada, and the United Kingdom.

The rate of duty under the Tariff Act of 1930 was 1½% cents a pound of manganese content or about $33.60 a long ton for the standard grade containing 80 per cent manganese. The first Canadian trade agreement, effective January 1, 1936, cut this duty about 37 per cent, leaving it $17.92 a ton, but the cut applied only to the usual grade carrying 4 or more per cent carbon, and left the duties unchanged on all lower carbon varieties. Imports carrying over 1 per cent manganese content increased in 1936 to 30,143 long tons but fell in 1937 to 23,284 long tons and in 1938 were 20,902 long tons, which was less than the 1935 imports of 21,370 long tons.

In 1936-38 about three-tenths of the imported tonnage carried such a low carbon content as to eliminate it from the benefit of the duty cut, but the seven-tenths of the imports came in at the lower rate. Data are not available to indicate whether this condition portrays a change in practice or whether the reclassification simply throws more light on previous practice. Norway has continued to be the principal source of imports whereas Canadian imports have declined.

Ferrochrome

Ferrochrome is another alloy used in making special steels, and is produced in both high carbon and low carbon grades. Domestic output is not of public record but may reach 30,000 tons in good years. Imports have been predominantly from Sweden, and have been about 1 per cent of domestic supply. Export data are not available but exports are probably negligible.

The duty rate in the Tariff Act of 1930 on the high carbon alloy is 2½ cents per pound of chromium content, and on the low carbon alloy is 30 per cent ad valorem. These rates were cut to 1¼ cents and to 25 per cent, respectively, by the Swedish trade agreement, effective August 5, 1935. In 1935-36 no imports came from Sweden, in 1936-37 Japan was the principal shipper, but in 1938 Sweden resumed first place. Imports since the duty cuts have not been as large as during the period 1924-29 but have exceeded the average of the depression years. The reduced rates were extended to all producing countries except Germany, and the cut in the rate on the high carbon alloy was confirmed in the second Canadian agreement.

Brass And Bronze Seamless Tubing

Brass and bronze seamless tubing is in large use for steam condenser tubes, particularly in connection with marine boilers, and also for household water pipes. Domestic production ranges from 40,000 to 100,000 tons per year, imports from 200 to 400 tons, and exports from 300 to 3,000 tons. Imports are almost exclusively from England.

The duty rate of 8 cents per pound in the Tariff Act of 1930 was cut to 4 cents in the Trade Agreement with the United Kingdom, January 1, 1939. These goods when imported are also subject to an excise tax of 4 cents per pound on their copper content, and the excise tax on copper has not been affected by any trade agreement.

Imports in 1939, since the reduction in duty, have been at about double the previous quantities entered per month, and are principally bronze tubes. At this rate they constitute from 1 to 3 per cent of our supply, and they generally sell at a premium over domestic prices.

Lead

Lead is used principally in storage batteries, pigments, and cable covering, although around 40 per cent of the annual tonnage consumed goes into a dozen or more minor uses. Our mines produce from 300,000 to 700,000 tons of lead yearly. For many years we have been on a slight import basis, mining about 5 per cent less than our requirements for new lead; but during the last
three years exports have been slightly in excess of imports. At all times most of the exports are with benefit of drawback or similar provisions. Usually about three-fourths of the imports are from Mexico.

The duty on lead in ore is 1½ cents and on pig lead 2½ cents per pound. No trade agreement has affected these rates. Reductions were made in the duties on lead pigments in the agreements with Belgium and the United Kingdom but imports of pigments have been only about 3 per cent of domestic production of pigments, whereas exports of lead pigments have been twice that quantity. Imports of pigments have been largely from the United Kingdom, Germany, and Austria, with Belgium a minor negligible source since 1934.

Zinc

Zinc is used principally for galvanizing sheets and other forms of iron and steel, for making brass, and for zinc sheets and castings. Domestic output in the 1930's has generally ranged from 200,000 to 500,000 tons, the quantity depending on demand. Imports have ranged from 3,000 to 15,000 tons, largely as ore, except in 1937 when 37,000 tons came in. The principal source was Mexico through 1935, but beginning in 1936 appreciable tonnages have come from other sources including Poland, Belgium, Norway, Canada, and the United Kingdom. Exports exceeded imports for many years, the excess dwindling from over 100,000 tons in 1925 to 4,000 in 1930 and to 1,000 in 1934. Beginning in 1935 exports have been less than imports, the excess of imports over exports averaging 6,000 tons per year except in 1937 when it was 33,000 tons.

The 1930 duty rate is 1.5 cents per pound on zinc in ore and 1.75 cents on zinc metal. The second trade agreement with Canada, effective January 1, 1939, reduced each of these rates by 20 per cent, the reduction extending to all principal foreign suppliers except Germany. The domestic zinc industry has lost some of its exports and has complained that the reduction in duty has aggravated the serious condition of the industry by preventing a price recovery to more satisfactory levels. Imports of zinc in the first 5 months of 1939 were greater than in the entire year 1938.

I understand that the industry has recently taken the matter up with the Committee for Reciprocity Information to discuss the possibility of some relief by readjustment of the duty.

Trade Data on Some Other Metals and Coal

There have been no significant reductions in the rates of duty on silver manufacturers and no reductions on silver, tungsten, antimony, quicksilver or mercury, or coal. However, the following facts about our foreign trade in these products are of interest.

Silver

Silver is generally considered a monetary metal for the basis of currency rather than a commodity for trade. Nevertheless, large quantities are used yearly for industrial purposes, largely in silverware and photographic supplies. Domestic output was around 60 million ounces per year through 1929, dropped to around 32 million for the ensuing 6 years, and has risen to about 64 million in the last 3 years. Imports for the same periods were respectively 115 million, 183 million, and 213 million, while exports were 145 million, 55 million, and 4 million. Our supply of new silver has thus risen enormously during the past few years, in fact it is roughly nine times as great as during the roaring twenties. Although supplies are enormously augmented, actual consumption has remained at around 30 million ounces per year, half of which is for silverware. Apart from photographic films which is the next largest use, silver is used in jewelry, optical goods, the dental trade, and for other minor purposes.

There is no duty on silver. Manufactures of silver are dutiable at various rates, and certain of these rates have been reduced by trade agreements with the United Kingdom without any registered complaint from the domestic industry. The tariff rates have been a negligible factor in the movement of silver between the United States and foreign countries, the principal influence having been the various silver purchase acts and other monetary legislation.
Tungsten

Tungsten is indispensable for high speed tools, where it can be only partially substituted by molybdenum and titanium. It also finds important uses in hard faced articles like valve seats and for incandescent lamp filaments.

Owing to heavy stocks of military supplies, domestic ore production ceased shortly after the World War but had recovered to normal by 1925 and for 9 years maintained an average output of just under 500 short tons of contained tungsten. Operations stepped up in 1934 and for the last 5 years have averaged over 1,200 tons.

Imports are far more variable in amount than domestic output; in the 9 years ending 1933 they averaged under 1,100 tons yearly, and in the last 5 years 1,400 tons, of which over 300 were for smelting and re-export. China is regularly the chief source of imports, the shipments from all other countries being small and irregular.

Exports are of foreign material smelted in the United States. They go chiefly to Soviet Russia and to countries of the British Empire.

The duty rate on tungsten ore is 50 cents per pound of contained tungsten with various rates for advanced products. No change has been made in these rates by any trade agreement.

Antimony

Antimony is used principally as an alloying element to alter the physical properties of lead and tin. Domestic production of antimony ore runs from nothing up to a thousand tons per year of antimony content. Primary production of antimony recovered in hard lead from antimonial-lead ore has averaged about 7 times as much as from straight antimony ore.

Imports in ore or in metallic form average about 10,000 tons yearly, the ore coming mostly from Mexico and the metal from China.

Antimony ore is imported free of duty. The antimony contained in lead or other alloys is also duty free. Antimony metal is dutiable at 2 cents per pound. No trade agreements have affected the duty status of these commodities.

The one factor of perhaps greatest importance in the antimony trade is the large scrap recovery of antimonial lead from used automobile battery plates. This material averages nearly 10,000 tons of antimony content yearly and is of fairly uniform quantity, thereby acting as a balance wheel to the other more variable factors of production and imports.

Quicksilver or Mercury

Quicksilver or mercury is used principally in making industrial and pharmaceutical chemicals, in pigments, and in fulminates, with other minor uses accounting for a fourth to a fifth of consumption.

Domestic output is about 16,000 flasks per year, the flasks containing slightly over 76 pounds each. Imports, largely from Spain and Italy, run about 12,000 flasks yearly. There have been no exports of consequence in recent periods except in 1931 when the European mercury cartel forced the price to a high figure. Most of the small exports have been to countries where mercury is used in the amalgamation of gold and silver ores.

The duty on mercury is 25 cents per pound. Recently some sporadic shipments of complex mercury-antimony ore have been imported from Mexico duty free, no duty being especially provided for such material. No trade agreement has affected the rate of duty on mercury or quicksilver.

Coal

Coal, particularly bituminous coal, is used as everyone knows chiefly for generating power. The uses for heating buildings, for making coke and gas, and for metallurgical purposes, although relatively minor, employ many thousands of tons.

Soft coal is produced in the United States on a scale varying up and down around 400 million tons per year. Imports are generally less than a third of one million, and exports run from 8 to 15 million tons. The imports are mainly from Canada, with minor quantities from the United Kingdom and Austra-
Asia. Canada is also the principal destination of our exports which are 30 times as great as our imports.

Coal was provisionally free of duty under the Tariff Act of 1930, conditioned on the duty imposed by a foreign country on coal from the United States. The provision was repealed in 1934 and coal became unconditionally free of duty. However, in the meantime an excise tax was imposed on imported coal of all types by the Revenue Act of 1932 and has been continued ever since, the excise tax depending on the coal trade balance between the United States and the country from which the coal is imported. The collection of this tax was interpreted by the Courts to hinge on “most-favored-nation” treaties, and consequently the only imports on which the tax is now assessed are those from Germany, in this case consisting solely of coke.

The coal status has not been changed in any trade agreement.

Conclusion

In conclusion it might be well for us to remember that in dealing with these economic questions like foreign trade, in which so many factors are involved, it is difficult if not impossible to isolate and measure precisely the effects of a specified change made in a tariff rate. It is more difficult still to forecast what the effects may be in the future.

Experience is the only real test, and with experience it is possible to show only the general results of the combined economic factors. It is rarely, if ever, possible to say that this certain change in the rate and this change alone has produced this specified result and no others on the competition and industries involved. Only in a general way is it possible to evaluate the results of specified tariff changes. That is one of the reasons why, in a republic like ours, the tariff is destined to continue indefinitely to be a public question needing careful consideration of all citizens.
PROGRESS IN MILLING PRACTICE
AND EQUIPMENT

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Introduction

In view of the several mineral dressing review articles of record as of the past few years, one wonders just what, if anything, remains to be said. There has been progress by long and rapid strides and almost every day mineral technology is on the march. In view of the ever increasing difficulty of showing profit at mining, the engineer, for his own survival, has had of necessity to reduce operating costs, recover more, and make better products.

In a general way, the continuously improving technology is the result of operations primarily on four fronts. First, and in my opinion of greatest importance, research and testing in the laboratory; second, ingenuity in setting up flowsheets and devising processes; third, improved equipment; and fourth, availability of better materials and methods of fabrication.

I prefer to emphasize the importance of research rather than any one of the other three fronts above cited. Testing is a routine thing, but when done by a trained, alert, observing mind may, and often does, lead to fundamental discoveries of far reaching importance. Much credit is due the machine designing as well as the plant designing engineer, but, although new machines appear over night, most of them are mechanical variations of an older machine which had the original idea—seldom does a new machine appear embodying new and fresh fundamentals. In machines one, of course, finds good and bad engineering. Good engineering, naturally, leads to improved operating economy and almost inevitably to improved metallurgy. Steel fabrication by electric welding, the employment of the texrope drive, and the use of antifriction bearings are the most important embodiments of the modern machine. The availability to the designing engineer and the metallurgist of better and better materials leads to improved operating economics and in some cases even to the solution of long existing unsolved problems. A few instances may be cited. The use of rubber in equipment required to withstand chemical corrosion and severe mechanical abrasion; the use of stainless steel where the combination of strength, resistance to chemical action and mechanical abrasion are needed. For a concrete example, I might cite the experiment conducted in 1938 at the concentrator of the International Nickel Company of Canada, Inc., Copper Cliff, in which the relative merits of the screen and the classifier, in closed circuit with the ball mill, were tested. In addition to the property of the stainless steel screen to resist wear, due to its immunity to oxidation processes, it resisted "blinding"—a combination of properties not previously available in any other relatively inexpensive material.

The capacity of the operating engineers to concoct ingenious flow sheets and pulp treatment sequences has been outstanding. Results of this type of engineering in the form of increased profits are to be seen in the concentrating plant, in the leaching plant, and in the smelter.

Getting back to research, I wish briefly to offer proof of its importance. Take first the photoelectric cell. This little gadget is used in numerous ways in the steel industry where it controls operations with precision and accuracy beyond human skill, reliability, and endurance. It is embodied in instruments for measuring temperatures, for measuring sedimentation rate, in the cement industry indirectly for measuring particle size and surface, and in cyanidation for detecting the presence of sediment in gold solutions. In the cyanide process, progress has been made around the better knowledge of the basic importance of oxygen. The Crowe process of deoxygenation of
gold-cyanide solution prior to zinc precipitation was a marked forward step. The recent laboratory researches relating the effect of atmospheric pressure upon the rate of gold dissolution open the way for future progress.

In flotation, it was to a large extent the researches of Dr. Langmuir in 1917 that laid the scientific foundation for the technologic development that followed. He gave the key to intelligent explanation of surface reactions. The concept of heteropolar molecules and of molecular orientation at surfaces is the basis of the theory of frothing, wetting, emulsification and of the oiling of mineral surfaces. In the early litigation surrounding development of the process, the experts who gave testimony, and the learned judges who upon this testimony made decisions involving millions of dollars, must now be restless in their graves—or in their arm-chairs if they are still alive. Contrast, for example, the mysteriousness that surrounded the early study of the floating needle and that of sinking of the duck by the use of a dab of one of the modern wetting agents.

Then in crushing and grinding there is the research which led to proof of Rittinger's law of energy distribution; the law of size distribution; the formulae relating ball mill capacity, energy consumption and mill diameter; the research on grindability of minerals and circulating loads.

Innumerable examples of the role of research in the march of mineral technology could be cited.

**Comminution Fundamentals and Research**

In the processing of ores the purpose of comminution is to unlock all or certain of the mineral entities or in wet metallurgy to unlock and expose. Technically and economically it is a surface-making operation. In practice, the problem is to accomplish the above named purposes in a product of minimum surface content.

Comminution for many years went ahead on an empirical basis, eventually slowed down to again go forward under the guidance of science.

In building the technology of crushing and grinding, the microscope has played an almost indispensable role. The skilled use of this instrument has made possible such determinations as (1) the mesh of grinding to effect practical and economic liberation, (2) particle number and surface distribution in a crushed product, and (3) mineralogic composition of ores and ore-dressing products. Great credit is due those who led in the development of the microscopic techniques in the field of mineral-dressing.

Comminution was placed on a more scientific footing when in 1925 Martin and his co-workers in England, and Cross and his associates at Salt Lake, independently and nearly at the same time gave proof to the "law of energy distribution" propounded, but not proved, by Rittinger in 1887. We now know that the energy expended in crushing rock is proportional to the new surface produced. Since surface is proportional to mesh, or reciprocal of diameter, we have been sharply brought to realize that most of the crushing cost goes into production of sub-sieve sizes—in many instances finer than necessary for metallurgical needs. Everything is done now to effect complete mineral liberation with the minimum of over-grinding.

Research in crushing and grinding in the laboratory has been voluminous and brilliant. In 1926, research produced what is generally called the "Law of size distribution." Martin put forth the following law: "The number of particles produced increases with increasing diameter according to the compound interest law." In other words, the number of particles grows with increasing fineness in the same way that money grows when let out at compound interest.

Gaudin stated ("An Investigation of Crushing Phenomena", A.I.M.E. Trans., Vol. 63, 1926)—"If a sized product composed of structurally homogeneous rock grains is crushed, a product results in which the relation between the percentage weight of grains of various sizes and the sizes themselves follows a definite law." When the cumulative screen analysis is plotted upon the log-log diagram, the curve is an approximate straight line. When plotted with arithmetical coordinates the curve is that of a hyperbole.
There have thus been developed scientifically sound methods of studying machine performance. With these tools in hand, extensive and detailed studies of comminution processes have been made.

**Coarse Crushing**

It is well known that coarse crushing costs are relatively low. This is because relatively an insignificant amount of surface is produced. It is true, however, that coarse crushing costs are much greater per unit of new surface produced than in fine-grinding. This is due to high bearing friction as a result of the tremendous unit stresses involved. The use of antifriction bearings in some machines has resulted in large savings in operating costs. Their application here, however, results in higher purchase costs.

In the coarse crushing range, probably the outstanding development of all time was the long-stroke, high-velocity-of-hit, cone crusher. This crusher, requiring controlled feed, by virtue of its principle of action, produces a minimum of undersize. More credit is due the inventor of this machine than is generally accorded him. By these remarks, I do not wish to convey the thought that it is the embodiment of perfection and that its use always is to be recommended. Every good machine and/or process constantly is being threatened in its supremacy. That is true now. Several new machines for which much is being claimed are now in the field undergoing the test of competition. In the case of one of these, typified by the absence of a fixed jaw, in which crushing is affected by direct pressure, astounding claims are made. It would appear to be the crusher man's utopia. It is claimed that steel wear is insignificant, power consumption a minimum, and that it permits reduction of run-of-mine to ball mill feed size in one pass. It is barely possible that here is the embodiment of new principles. The principle of action in this machine is the antithesis of that of the cone.

It is an interesting fact that little laboratory research has accompanied the development of the crusher; at least, not much has been published.

The development has been on the drafting board and in the plant, and, it might be added, at great cost. The "rodents" of the crusher are poor lubrication, dust, poor bearing design and type.

**Rock Crushing With Rock**

There has long been the desire in the milling of ores to avoid and minimize steel consumption. To this end, the rock mill in one form or another has been tried, and again at great cost to the brave-hearted sponsor. This process, not a success to date, should not be given up as having no possibilities. Unfortunately, attempts have been made to do work with this type mill almost exactly that which earlier the ball mill failed to do, namely, comminate in a single stage from mine run to mill feed.

A Seattle manufacturer now advertises a rock mill built in sizes from 6 to 20 feet in diameter and of variable length. It is drum-shaped and provided with four lifting shelves within the drum. The ore is picked up, lifted, and allowed to fall on ore below as the drum revolves.

There is, of course, no objection to single stage rock reduction, and in fine-grinding that can be, and is now being, done. This has been made possible by the availability now of crushers capable of making a quarter inch mill feed.

The rock mill per unit of volume, just as in the case of the pebble mill, which is itself essentially a rock mill, can never compete with the ball mill with its heaving, potent grinding media.

As competitor of the fine reduction crusher, including the rolls crusher, the short, large-diameter mill employing large-diameter cylindrical, steel grinding media, offers promising possibilities. In some recent research in our laboratories, I have been astounded at the capacity of a 4-inch by 18-inch mill, one-third loaded with 2½-inch rods, to reduce quarter inch and coarser feed to minus 48 mesh product.

**Closed Circuit Grinding**

Trends in ball mill grinding have been toward larger discharge ends, higher speeds, smaller ball and pulp loads. Mill speeds above critical, while
shown to increase materially mill capacity, resulted in excessive liner wear. The increased grinding was the result of increased ball-spinning imparted by the liners. This process swiftly abraded steel, and nothing could be done about it. Many liner materials were tried. In practice, speeds are not likely to exceed 83 to 90 per cent of the theoretical critical, and a number of mills now in operation approach this speed.

The experimental proof that mill capacity is proportional to the 2.6 power of the diameter has encouraged enormously the use of larger mills. One large mill produces more surface units per horsepower, day or hour, than two small mills whose combined volumes equal that of the larger mill. Neglecting bearing friction, other factors being equal, mill capacity and power input are proportional and independent of mill size and design. The combination of factors, not including bearing friction, causing a mill to consume the maximum power also proves to be that condition for maximum mill capacity.

Much has been done to maintain in the ball mill sand loads of maximum unfinished sand-surface. To this end, stage grinding, low pulp level, and moderately high circulating loads are maintained.

Single-stage grinding is again increasing in popularity. This is because, as pointed out above, it is now possible to provide the ball mill with finer feed. Rapid pass of pulp through the mill, made possible by use of large discharge ends, with resultant frequent classification and moderately high circulating loads, are other factors. The single stage process also is easier of operation as well as more economical of floor space. Thus, progress goes forward not steadily but "steady by jerks."

The form of the ball mill has not been found to be a significant factor. The power required to operate a ball mill is a safe criterion of the potency of that mill. Of two mills operating on the same feed, the one taking the greater power may safely be presumed to be delivering the greater output of finished product. There is, of course, a best set of conditions for any mill for optimum output. These conditions may or may not be embodied in any operating mill. Much systematic experimentation is required to obtain this critical set of conditions. Once found, however, great economy is to be affected by maintaining constant these conditions. This has been recognized and accessory gadgets now are available for control of the classifier and of the ball mill itself. Ball load, feed load, and water conditions all may now be placed under automatic control. The ball mill is controlled on the basis of the noise it makes employing the "electric ear" and the classifier by the pump density.

**Classification, Water and Sizing**

In modern milling, classification is an integral part of the grinding process. It plays an immensely important role in the whole scheme of mineral dressing. In grinding, it is the direct function of the classifier to remove finished material from the pulp-stream discharging from the ball mill. Because the capacity of the mill to produce finished product is determined largely by the rate of flow of unfinished sand into the mill, there is a demand upon it to handle tremendous sand loads. The operator would like a classifier capable of returning these large sand loads free of finished sizes. No classifier does this, and of consequence the feed to a ball mill always is a composite of two kinds of material, one finished and the other unfinished. The classifier is good or bad, all other factors being equal, in accordance with its ability to remove the finished part. Of course, the classifier overflow also must be relatively free of oversize. Large circulating loads, and the plunging into the classifier of large volumes of pulp, lead to trouble in just this respect. Circulating loads seldom exceed 500 per cent.

In many feeds, it is, of course, theoretically impossible to exclude from the classifier sand all finished sand. Actually this is true in the case of nearly all ores since they are aggregates of (usually) a small percentage of heavy mineral or minerals (usually the valuable ores) and of one or more lighter minerals. The laws of hindered settling and of crowded settling ore at play and hindered and crowded settling size-ratios obtain. Nothing much can
be done about it practically. This situation, however is not always disad­
vantageous. In the case of complex ores requiring fine grinding to effect
mineral liberation, the relatively heavy, locked, middling grains remain in
the mill-classifier circuit longer. They leave the system via the classifier only
when they are broken into small pieces. There are cases, however, when
grinding economy and metallurgical efficiency would be greatly enhanced if
the return sand to the ball mill were subjected to a sizing classification to
remove from the mill-feed finished, free, mineral sand. Much of this eventu­
ally is overground resulting in useless power consumption, reduced mill capa­
city and eventually (in some instances) mineral loss, to say nothing of reduced
capacity in the concentrators, filters, etc., and higher reagent consumption.

In view of the recent test at the concentrator of the International Nickel
Company of Canada, Ltd., screening in closed circuit with the ball mill, using
stainless-steel wire, would appear not to be impractical. The operating cost
of screening in the classifier-mill circuit would need comparison to the costs
and losses due to overgrinding. Other items, particularly dilution problems,
would come up for consideration. The removal of finished mineral-sand
dragged back to the mill by the classifier is being accomplished by concentra­
tion methods discussed below.

Nothing particularly new in classifier machines has been seen. Old
principles of operation are being embodied in new streamlined designs. The
take and screw types have no competitors. The bowl-type classifier in the
fine-grinding circuit has appeared in several modifications of its original
form. There is, however, little new in principle. To the writer's knowledge,
there is little or no research in this field.

**Gravity Concentration, Stratification**

The physical limitations of gravity concentration methods are well known.
Minerals of equal or nearly equal specific gravity obviously can not be
dressed. Neither can a separation be made of mineral feeds of sub-sieve
sizes even though there may be considerable spread in specific gravity. The
small particles have too much surface for their weight to possess practical
settling and stratifying capacity.

The well known and long-used gravity machines, however, have by no
means been squeezed out of the picture by flotation. They continue to serve,
to a limited extent, their original purposes, and during recent years have found
useful new positions in milling flow sheets.

The jig and the table, both old-timers, but dressed in modern designs,
are finding regular and increased use in the mill-classifier circuit. The
jig, using an artificial bed, makes hutch-concentrate only. These machines
take out of the circuit free gold and sulphides, the result being improved
economy and metal recovery. The jig has become very popular and in a
number of plants has replaced blankets, corduroy tables and amalgamation.
Blankets and corduroy are being used at many different places to take out
free gold. It is now perfectly obvious that concentration in the early stages
of modern fine-grinding practice leads to increased profits and mineral con­
servation.

Mineral dressing by use of parting (heavy) liquids, until recently only
valuable in the laboratory, seems to be headed for a place in the commercial
plant. The application of this process is being made possible through cheaper
production of parting liquid such as tetra-bromo-ethane \((C_2H_2Br_4)\) and
through the use of surface-active agents which immunize the solids against the
parting liquid. The method is not applicable to fines. On feed size from
\(\frac{3}{8}\) inch to \(\frac{3}{8}\) inch, the estimated cost is around $0.25 a ton.

Since the development a number of years ago of the Chance process,
heavy suspension is now employed for concentrating zinc ores. Using galena,
a pulp of density up to 3.8 maximum is possible. These very dense pulps, how­
ever, are too viscous for practical purposes, and it is necessary to use diluted,
more fluid pulp. Many technical problems are encountered in this type of
process.

Another process, half gravity and half flotation, usually referred to as
“oil agglomeration with tabling”, is one of the most interesting newer de-
Dressing is affected on the Wilfley table by selective mineral oiling. The oiled mineral particles, in a feed to be thus treated, agglomerate, float on the pulp-bed on the table, and are washed therefrom by the cross-water. This process applies only to relatively coarse sands.

**Thickening And Filtration**

In thickening, there is nothing new in principle. Mechanically, machines have been much improved. A recent development in the “washing tray thickener” has come more widely into use. It may, with a number of advantages, be used in lieu of the Standard C. C. D. System. In cyanidation, it might be said that there are two schools of practice. The counter current decantation method has given way in some districts to repulping and double filtration, using drum and disc filters. This practice also leads to greatly reduced space requirements. Filters now employ shallower pools than previously, have better means for maintaining pulp-suspension, and provide longer drying and washing arcs. Relative to thickening practice, it is noteworthy to call attention to the marked improvement in the diaphragm mud-pump.

**Flotation**

Flotation has made astounding progress. For this, research is largely responsible. Not only can most minerals be floated, but flotation has played roles in other ways than merely to concentrate. In one type of milling, flotation actually performs as a classifier—a type of classification, however, impossible of attainment by use of water or screens. It does this in the gold mill treating an ore in which the gold values are largely intimately locked in sulphide grains. The pulp stream at a relatively coarse grind is subjected to flotation. By this treatment, the pulp is divided into two parts; (1) sulphide carrying the bulk of the gold, and (2) non-sulphide (perhaps mostly quartz and siliceous) mineral carrying little of the values. The sulphide part is separately further ground (roasted if necessary), and cyanided along with the non-sulphide part. Economy is effected by avoiding unnecessary overgrinding of the usually hard, low-grade, non-sulphide part of the ore, and over-all recovery results through fine-grinding of the sulphide part. Of course, if the sulphide concentrate also contains slow-dissolving coarse gold, this may and should be removed by amalgamation or by corduroy before it is subjected to fine-grinding. If flotation is capable of making a satisfactorily economic recovery, the concentrate, of course, is not again admixed with the tailing pulp but is ground and cyanided.

In the case of a gold ore that is, or would be, ideal for cyanidation, if it were not for the presence of a harmful mineral, flotation again may be called upon to take this mineral out of the pulp or to reduce its content in the pulp to a concentration harmless to cyanidation.

To flotation must be credited the idea of concentration in the grinding-classifier circuit. This flow sheet had its first application in Michigan. A single cell sandwiched between the discharge end of the ball mill and the classifier can and does in numerous instances affect great metallurgical savings and operating economies. Free gold is recovered, over-grinding with its attendant costs and losses is avoided, and this device aids the classifier and permits higher over-all recoveries. The success of the flotation machine in this position has led to the application of the table and the jig to this same job.

Most gold ores are amenable to cyanidation, and most yield better gold recovery by the dissolution process than by flotation. Flotation can serve in the treatment of gold ores best, in most instances, as an aid to a better and more economical recovery rather than as the principal recovery process.

There is now in process of being perfected a combination dissolution-flotation process for recovering gold from its ores. It is the Chapman process. It employs lime, cyanide, activated charcoal, and flotation. The gold goes into solution presumably in accordance with the often stated equations for this reaction. The gold, however, is immediately absorbed by the activated charcoal. The charcoal with its gold content in turn, along with sulphides, is removed by flotation. Some interesting advantages are claimed for this process over standard cyanidation practice.
The fact that in most cases gold can be floated readily is not news. Recovery from placer sands, however, has been indifferent and for the most part unsuccessful. The lack of success may be ascribed to several factors; in some cases, bad engineering, in others to the absence of enough gold to make the operation pay. During the last year, a systematic study was made of some 18 placer samples taken at scattered points nearly over the entire length of the Snake River. When a fraction of pound of cyanide per ton was used, high recovery was had on all samples. All samples contained silt and mud, and, in the absence of cyanide, responded poorly to flotation. The cyanide did one or both of two things. It dispersed the slimes and presumably it chemically attacked and thus cleaned the surface of the gold. Which one or whether both of these factors were important is not known. The study is being continued.

Silver minerals float readily, and silver ores in which the values are associated in and as sulphides yield exceptionally high recoveries. Outstanding examples of silver-ore dressing by straight flotation are in the plants of the Sunshine Mining Company and of the Polaris Mining Company, both in the Coeur d'Alene, Idaho, silver belt district. The silver-carrying mineral is tetrahedrite. Recoveries up to 98 per cent are being made.

Weathering and products of weathering strongly affect the flotability of silver ores. Waste dumps and reject dumps of previous silver milling operations seldom respond to satisfactory recovery by flotation, using standard reagents, with or without sulfidization. Further microscopic and mineralogic studies along with use of some of the newer reagents may offer the solution to this problem. The slimy, colloidal part of these ores is a possible source of the trouble.

One of the most interesting relatively recent applications of the flotation process is that of the dressing of sylvenite ore. The ore as mined contains approximately 40 per cent KCl (sylvite), 58.5 per cent NaCl (halite), and about 1.5 per cent insoluble clay.

The potassium and sodium chloride crystals are distinct and separate. In some cases, the individual crystals are as much as several inches in dimensions. Generally, however, in order to unlock the respective salts, it is necessary to crush down to ordinary flotation size. The minerals of the ore are, of course, quite soluble in water, and the novel feature of the flotation process in this fact is that it is carried out in a saturated solution of the ore itself. The reagents used are cocoanut oil soap with a metallic cation of the lead-bismuth type. The sodium salt rather than the potash is floated for the reason that the clay is carried up by mechanical entrainment, making it possible to produce a high-grade muriate of potash. Grinding is done in pebble mills lined with silex in order to avoid precipitation of the lead cation on fresh iron surfaces. There are many other interesting features of the process as used at this plant. Time, however, does not permit further detail.

Credit for this development is largely due A. J. Weinig of the experiment station of the Colorado School of Mines. This application of the flotation process is especially of interest not only because of its industrial importance, but also because it is one of the few forward steps in the application of the process based on sound scientific principles.

In the Northwest, another forward step in the ever extending development of the flotation process is in the making. A crude quarry product, unable to meet specifications in competition with imported material, is being ground and subjected to two stages of flotation. In one stage, a froth silica-reject is made, and in a second stage a tailing lime-reject is made. The froth concentrate from the second flotation machine is the dressed product.

There is scarcely a mineral whose surface can not be organically coated to repel water, and in turn be floated. Some mineral combinations still defy selective flotation. This is due to similarity of surface chemical proper-

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3 See Holmes article in Mining Congress Journal.
4 Potash Company of America, Carlsbad, New Mexico. Personal communication.
ties. For example, both beryl and quartz are easily floated. Selective flotation of one in preference to the other has not been successful.

Flotation is being aided materially by classification. Often a mineral feed, containing a small percentage of obnoxious, valueless constituent, can be improved for flotation by removal or partial removal of this constituent. For this job, there is need for a classifier capable of adjustment over a wider range of hydraulic conditions than is possible in present machines.

The scope of reagents for this job and that in flotation dressing is constantly being broadened. For sulphides, the xanthates and aerofloats still are supreme. For oxidized metallic ores and other non-siliceous non-sulphide mineral, the long-chained fatty acids (oleic acid) are most generally used. A combination of xanthate and soap has proved effective on the metallic copper-bearing tailings in the Houghton, Michigan, district.

Dissolved and/or emulsified in water by use of suitable wetting agents, some of the relatively insoluble long-chained fatty acids, solid at normal temperatures, and the insoluble hydrocarbon oils are being advantageous used as collectors. Emulsified collectors are particularly advantageous for flotation of minerals of near-colloidal size.

Relatively recently there has sprung up a new type collector particularly applicable to flotation of such substances as quartz, feldspars, ilmanite, chromite, and other minerals whose suspensoids are negative in water. Examples of this type reagent are the heavily loaded quaternary ammonium salts and cetly pyridinium bromide. These substances give a positively charged surface-active ion in aqueous solutions. The hydrocarbon mineral-oiling end of the molecule is in the positive ion. These substances now are generally referred to as cationic agents. Xanthates and the fatty acids have the hydrocarbon chain in the anion and are termed "anionic oilers."

Other problems to contend with are to oil, and thereby float minerals which are normally floatable, but, due to surface contamination, do not respond, and to inhibit and prevent flotation of minerals normally floatable. The nature of the surface contamination is not always definitely known. The contamination substance is either a surface tarnish as a result of surface weathering, a precipitate (colloidal hydroxide), or sediment.

Oxidization films and precipitate coatings may be removed only through use of a reagent having solvent power for the film compound. If a high concentration of reagent is required, removal of the excess reagent may be required before satisfactory flotation is possible. Adhering colloidal sediment may be removed by mechanical attrition and washing, or by use of wetting agents and/or dispersants.

Mineral depression is now effected by use of a number of classes of reagents. Those long used are cyanide, lime, potassium, dichromate, etc. A newer reagent is hexametaphosphate. This reagent in its effect on mineral flotation appears to possess dual properties. Kick, Eggleston, and Lowry found that when used with unsaturated soaps or fatty acids it functioned to activate the flotation of massive hematite, but had little effect or acted as a depressor with the saturated collectors. Rose and MacDonald used this reagent in controlled concentrations as a selective depressor. The potency seems to be in its surface-active properties at solid-aqueous solution interfaces and its ability to sequester ions by forming soluble complexes with numerous multivalent cations. This reagent is a strong deflocculator of clay, and is generally a depressant. Its remarkable properties in the water-conditioning field are well known. It has a remarkable property not only of preventing calcium carbonate scale, but of slowly removing that already present.

Other new depressants finding increasing application are the colloidal substances such as certain of the glues, resins, etc., and the non-colloidal organic compounds such as malic, gallic, and tannic acid and starch.

Although pine oil and creslyic acid still are the best known frothers, a new group of reagents known in the textile industry as “wetting” agents

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2 Min. and Met. 18, 285-286, 1937.
are receiving much attention and many applications. There are literally hundreds of these available, and numerous new ones are being developed yearly. The surface-active property of these reagents is due to the dual character of the molecule or of the large hydrocarbon ion when they ionize. They are composed of a water-repelling (hydrophobic) group such as alkyl, aryl, or alkylaryl group, etc., and a water soluble or water solubilizing (hydrophilic) group such as $\text{SO}_4\text{H}, \text{SO}_2\text{H}, \text{PO}_4\text{H}_3, \text{COOH}, \text{OH}$, etc.

Substances of this class are more soluble than the fatty acids, and it is essentially in this respect that they differ from the fatty acids.

These reagents are characterized in varying degrees by high wetting power in very low concentrations; stability in acid solutions where soap can not be used; solubility in organic solids, especially in non-polar solvents; and resistance to hard water. As frothers, many of them, unlike pine oil, are wholly unaffected by pH variations, thus permitting freedom to float at the pH giving maximum flotation selectivity.

Some of these reagents are surface-active at the mineral water surface, and have mineral collective properties as well as frothing. Non-mineral-collecting wetting agents are serving as carrying and dispersing media of water-insoluble hydrocarbons, thus making the latter available as collectors.

In dilute solution, ionization of these agents is nearly complete. The ionization products are a large heteropolar ion either negative or positive (usually the latter) and a small ion, positive (Na$^+$) or negative (Cl$^-$ or $\text{SO}_4^-$). The large hydrocarbon bodies of these reagents when the cations are active, as already pointed out, serve as collectors of negatively charged minerals.

It was with one of these wetting agents, aerosol OT Dry
\[
\begin{align*}
\text{C}_8\text{H}_{17} &-\text{OOC} &- &\text{CH}_3 \\
\text{C}_8\text{H}_{17} &-\text{OOC} &- &\text{C} &- &\text{SO}_3\text{Na}
\end{align*}
\]

that engineers of the American Cyanamid Company caused great embarrassment for a duck. A duck placed in a 10 per cent solution of this reagent was, one might say, literally water-logged.

The wide application of the pH (hydrogen-ion) method of control of flotation pulps and of cyanide solutions should not go unmentioned. This technologic tool is a development of the research laboratory. The H and OH ionic concentrations of a pulp are factors having profound bearing on the surface reaction involved in flotation.

The exact nature of the surface reactions that are involved at mineral-water surfaces in the numerous physical phenomenon involved in flotation still is unsettled.

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REPORT OF DIRECTOR IDAHO BUREAU OF MINES AND GEOLOGY

SCHOOL OF MINES
UNIVERSITY OF IDAHO

and

STATE BUREAU OF MINES AND GEOLOGY
MOSCOW, IDAHO

March 27, 1939.

To
The Board of Control
Idaho Bureau of Mines and Geology

Gentlemen:

Copies of the director’s biennial report are being mailed to the members of the Board of Control of the Idaho Bureau of Mines and Geology, the personnel of which is as follows:

Honorable C. A. Bottolfsen, Governor of the State of Idaho
Mr. Arthur Campbell, Inspector of Mines
Mr. Irvin C. Rockwell, President, Idaho Mining Association
Mr. Alfred L. Anderson, Acting Head, Department of Geology, School of Mines, U. of I.

Your copy is herewith attached.

The act creating the Idaho State Bureau of Mines and Geology provides that a meeting of the Board of Control shall be held the first Monday in April of each year. This provision has not been rigidly adhered to. In view of the very great reduction in the appropriation for the present biennium, some money can be saved by avoiding the travel expense that would be involved in holding this meeting at Boise. I should like to respectfully request that there be no meeting of the Board of Control this year and that each member of the Board read the report carefully, and, if he sees fit, indicate his approval of it by either affixing his signature to the report and returning it to me or by letter.

Yours very truly,
A. W. Fahrenwald
Secretary, Board of Control

SCHOOL OF MINES
UNIVERSITY OF IDAHO

and

STATE BUREAU OF MINES AND GEOLOGY
MOSCOW, IDAHO

March 27, 1939.

To
The Board of Control
Idaho Bureau of Mines and Geology

Gentlemen:

There is submitted herewith report of the activities and work of the bureau for the biennium 1937-38, proposed budget for the present biennium, and list of projects recommended for approval for the present biennium.

As is, of course, understood by members of the Board, the bureau receives its appropriation under two headings—(1) U. S. Geological Survey Cooperation, and (2) State Mineral Resources Investigation. The projects and types of studies and investigations undertaken by the bureau are also roughly classified in these two divisions. The projects and studies set up under U. S. Geological Survey Cooperation are primarily geologic; those under State Mineral Resources Investigation are largely metallurgic in kind, but may
be of a general "mineral-resources" type. Various general services, not classified above, also are rendered by the bureau.

The subject matter of this report is presented in sequence under headings as follows:

U. S. GEOLOGICAL SURVEY COOPERATION

I. Projects studied and completed in the 1937-38 biennium.

1. Boise Basin survey, Boise County. (Geologist in charge—Dr. Alfred L. Anderson, assisted by Warren Wagner.) Project initiated in 1932. The first typewritten manuscript was completed in 1936. Owing to several factors, including time consumed for critical reading and revisions, shortage of funds, etc., the report did not then reach the publishers. In the summer of 1938, Dr. Anderson revisited the district to make new observations in the mines now at greater depth. As a result of these later observations, it was deemed advisable to rewrite the entire report. This new revised report is now being typed and
it is hoped that it will be possible to announce its publication in the near future.

2. Murray-Pritchard district, Shoshone County. (Geologist in charge—Dr. P. J. Shenon, assisted by G. D. Emigh.) Project initiated in 1938. Report published in October, 1938, as Pamphlet 47—"Geology and ore deposits near Murray, Idaho".

3. Placer-ground studies in central Idaho. (Formerly given as high-bench placer-ground studies in Burgdorf, Warren, Florence, and Slate Creek districts.) (Geologists in charge—Dr. John C. Reed and later Dr. S. R. Capps, assisted by D. W. McGlashan, Vernon E. Scheid, V. F. Hammer and, Royal Sorenson, and Ralph J. Roberts). This project was initiated in the spring of 1934. It has been underway continuously since that time. Reports dealing with this work already published are as follows:

   Pamphlet No. 40—"Gold-bearing gravels of the Nezperce National Forest, Idaho County, Idaho".
   Pamphlet No. 45—"Geology and ore deposits of the Warren mining district, Idaho County, Idaho".

Reports in process of publication are as follows:

   Pamphlet No. 46—"Geology and ore deposits of the Florence mining district".
   Pamphlet No. 48—"The Dixie placer district, Idaho—with notes on the lode mines".

This project is recommended later for continuation. A great deal of data of practical scientific value are being accumulated.

4. Atlanta district, Elmore County. (Geologist in charge—Dr. Alfred L. Anderson, assisted by Vernon E. Scheid.) Project initiated in June, 1936, and completed the same summer. Report covering the project will soon be published as Pamphlet No. 49—"Geology and mineralization of the Atlanta district, Elmore County, Idaho".


6. Silver Belt, Shoshone County. (Geologist in charge—Dr. P. J. Shenon, assisted by Roger McConnell.) The field studies in this district were terminated the fall of 1938. At this time, a geologic report with map is in preparation. There is also being hurriedly prepared a geologic map to be accompanied by a preliminary report, the publication of which is expected to be issued within the next few months. Continuation of studies in this district is contingent upon availability of funds now known to be not available.

II. Projects in course and unfinished at close of 1937-38 biennium.

1. Rocky Bar project, Elmore County. (Geologist in charge—Dr. Alfred L. Anderson, assisted by Warren Wagner.) The geologic field work has been completed and the preparation of a map to show the distribution of the veins and lodes is all that remains to complete the project. Time required, about six weeks.

2. Geologic study on the Snake River in the Seven Devils country, Adams County. (Geologist in charge—Dr. Ralph S. Cannon.) Mr. Cannon spent the entire 1938 field season on this project. Due to the extreme ruggedness of this country, and the wide expanse of the mineralization, progress has been and will continue to be slow. The district, however, warrants the survey now in progress and the cost involved.

3. Placer-ground studies in central Idaho.

   See Project I-3, page 2, of this report. The project originally was under the direction of Dr. John C. Reed of the U. S. Geological Survey. The work, however, was taken up last spring (1938) by Dr. S. R. Capps of the U. S. Geological Survey, who is ably carrying on. Dr. Capps already has made important geologic discoveries and deductions.
III. Proposed new projects for further study.

1. Detailed study of the lead-zinc deposits of the Coeur d'Alene district. This is a large project and would require several years by a competent party in residence in the district.

2. Detailed study of the Clark Fork district, to complete and to bring up to date the reconnaissance study of that made by Dr. Anderson in 1926.

3. Study of the molybdenum, tungsten, cinnabar, manganese, nickel, and cobalt deposits of the state. These are classified by the War Department and the U. S. Bureau of Mines as strategic minerals. A preliminary type survey is well justified.

4. Completion of work covering the Muldoon district, Blaine County.

5. Study of the lead ore deposits in the Leadore-Gilmore area, Lemhi County.

6. Gold deposits of the Shoup district, Lemhi County.

7. Study of the prospects in Elmore and Camas counties in the mountains north of Fairfield.

8. Areal and structural geology of various areas in the state to be selected on basis of importance of the districts.

IV. Geologic projects recommended for approval of the Board.

For continuation the current field season:
Projects II-1; II-2; II-3.

For tentative approval for future study, subject, however to revision:
Projects III-1; III-2; III-3; III-4; III-5; III-6; III-7; 111-8.


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<td>$3,100.00</td>
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The above figures can not be budgeted at this time since the field parties are made up by the Director of the U. S. Geological Survey. The wholly inadequate sum appropriated is expended for salaries, transportation, supplies, and for publication of reports in pamphlet form.

MINERAL RESOURCES INVESTIGATION

I. Mineral resources surveys.

1. Beryl deposits near Troy in Latah County.
   There was initiated last spring (1938) a mineral survey and study of the beryl deposits near Troy. Existence of this deposit has long been known. The work was under the direction of Mr. Vernon E. Scheid, Assistant Professor of Geology, School of Mines. The project in the field probably is only 50 per cent completed. Although this work should be carried on to completion, no funds are in sight for the job.

2. Latah County clays.
   Like Project 1 above, this survey was initiated last spring and was carried on simultaneously with the above project. The study, of course, also should be carried out to completion. However, in view of the greatly reduced appropriation over that of the past biennium, and that which was counted upon, the work can not be carried on.

II. Metallurgical research and investigations.
   Investigations under this heading generally may be classed as follows:
   A. Flotation research and studies of various ores, including gold-silver, sulphides, non-sulphides, and nonmetallic mineral ores. Examples of
MINING INDUSTRY OF IDAHO

mineral problems studied are—beryl samples from Troy; phosphate rock from near Montpelier; Polaris silver ore and rock formations claimed to assay high in gold; silver and platinum by special trick methods.

B. Flotation and cyanidation research of strictly fundamental nature. Specific studies which may be mentioned are (1) sedimentation, dispersion, hydrogen ion concentration and mineral flotability, (2) cyanidation under high oxygen partial pressures, (3) precipitation of gold and (4) silver from cyanide solutions by atomic hydrogen.

C. Crushing and grinding studies. In these studies, which have been of a very varied nature, the objective has been to learn through a study of basic fundamentals how to reduce crushing and grinding costs and to provide a crushed product better to give improved metallurgical results. Details can not be gone into here, but it may be said that results of our work have set national trends and our objectives have been achieved to a large degree.

D. Classification research and studies. Like in the fields of flotation and grinding, our studies of classification have created trends universal in character and have resulted in prevention of mineral waste and increased operating profits. At the present, revolutionary new developments in this line are in the experimental stage.

All of the subjects above, including A, B, C. and D, are of a continuing type. As a formality, approval of this policy and approval of "Mineral Resources I and II" is respectfully requested of the Board.

III. Mineral identification.

As in the past, numerous samples are weekly received for mineral identification and for tentative opinions as to probable methods of metallurgical treatment. This is a well appreciated and useful service. We are occasionally also called upon for aid in checking gold, silver, and other precious metal content of ores reported by certain so-called chemists and/or metallurgists to contain high values. Expenditure of good capital is thereby avoided.

IV. Ore testing.

The bureau in the past has not accepted ore samples for testing for determination of the treatment process. We have, however, for many years studied complex and refractory ores. The study of such ores included many refined laboratory technique designed to determine the factors rendering the ore refractory and then as to how these factors may be surmounted.

There have been many requests from many Idaho sources for a strictly ore-testing service. The testing work suggested would be of a routine type including free milling, cyanidation, and flotation tests. Inasmuch as the U. S. Bureau of Mines and those of several bordering state bureaus are doing this kind of thing, the director of this bureau inquired by letter of some twenty prominent mining people of the state of the desirability of the bureau offering this type of service. A copy of the letter is hereto appended. The reply was not at all unanimous. In the light of these communications and in view of the greatly reduced appropriation, action in the matter is not requested.

V. Appropriation and budget, State Mineral Resources Investigation.

The appropriation in this division is as follows:

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It might be added at this point that the present 1939-40 appropriation ($8,000.00) represents a reduction of $3,169.98 over the appropriation ($11,169.98) for the 1937-38 biennium. This necessitates termination of all projects already under way and the cancelling of several others which had been set up for the biennium.

The appropriation to salaries of $5,750.00, listed above, is budgeted as follows:

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<td>(Inez T. Roulston)</td>
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<td>(B. L. Bryant)</td>
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The above budget shows how calamitous the situation really is. All projects, including mineral identification service, must of necessity be concluded. As director of the bureau, the situation is most embarrassing. It is particularly so in view of the fact, as the records will show, that the Idaho Bureau of Mines and Geology has set the pace, and has been far more productive than any similar institution in any of the northwestern states, even with constantly less funds. The states of Utah, Oregon, Washington, and Montana all have provided their mining departments with substantial appropriations—many times the amount provided us.

VI. Publications.

Pamphlet No. 45—"Geology and ore deposits of the Warren mining district, Idaho County, Idaho", by John C. Reed.

Pamphlet No. 47—"Geology and ore deposits near Murray, Idaho", by Philip J. Shenon.

Publications in the process of publication—

Pamphlet No. 46—"Geology and ore deposits of the Florence mining district, Idaho County", by John C. Reed.

Pamphlet No. 48—"The Dixie placer district, Idaho—with notes on the lode mines", by S. R. Capps and Ralph J. Roberts.

Pamphlet No. 49—"Geology and mineralization of the Atlanta district, Elmore County", by Alfred L. Anderson.

Complete list of publications to date is attached hereto.

VII. Projects requested for approval.

To recapitulate, projects requested for approval of the Board are—

U. S. G. S. II-1; II-2; II-3, pages 2 and 3 of this report.

For tentative approval—

U. S. G. S. III-1; III-2; III-3; III-4; III-5; III-6; III-7; III-8, page 3 of this report.

For approval—

S. M. R. I. II-A; II-B; II-C; II-D.

Approval of I-1 and I-2 is a mere formality since there are no funds.

Respectfully submitted,

A. W. Fahrenwald,
Secretary, Board of Control.
ACTIVITIES IN THE
IDAHO BUREAU OF MINES AND GEOLOGY

By A. W. FAHRENWALD, Director

Projects completed and publications issued since the first of January, 1939, are as follows:

Pamphlet No. 46—“Geology and ore deposits of the Florence mining district, Idaho County, Idaho”, by John C. Reed. (Prepared in cooperation with the U. S. Geological Survey.) 50c.

Pamphlet No. 47—“Geology and ore deposits near Murray, Idaho”, by P. J. Shenon. (Prepared in cooperation with the U. S. Geological Survey.) 50c.

Pamphlet No. 48—“The Dixie placer district”, by S. J. Capps, with “Notes on the lode mines”, by Ralph J. Roberts. (Prepared in cooperation with the U. S. Geological Survey.) 50c.

Pamphlet No. 49—“Geology and ore deposits of the Atlanta district, Elmore County, Idaho”, by Alfred L. Anderson. (Prepared in cooperation with the U. S. Geological Survey.) 50c.


Pamphlet No. 51—“A metallurgical study of Idaho placer sand”, by A. W. Fahrenwald, Joseph Newton, W. W. Staley, and Robert E. Shaffer. 25c.

Field work completed for which manuscripts are in process of preparation and which will be published possibly within the next six months are as follows:

“Geology and metalliferous deposits of Kootenai County, Idaho”, by Alfred L. Anderson.


“Geology and ore deposits of the Rocky Bar district, Elmore County, Idaho,” by Alfred L. Anderson.

“Geology and ore deposits of the Volcano district, Elmore County, Idaho”, by Alfred L. Anderson.

“Geology and tungsten deposits on Patterson Creek, Lemhi County, Idaho”, by Alfred L. Anderson.

“Geology and quicksilver deposits near Weiser, Idaho”, by Alfred L. Anderson.


Publications in Technical Magazines

(Not for distribution from the office of the Idaho Bureau of Mines and Geology)


Proposed Projects

U. S. G. S. Cooperation:

During the past two field seasons, Dr. Ralph S. Cannon of the U. S. Geological Survey has been studying the Seven Devils district on the Snake River in Adams County. It is planned to have this work continued
to a logical conclusion. Owing to the tremendous ruggedness of this country, the work is hard and the progress slow. When completed, it will constitute a long-needed document on the copper mineralization of the district.

State mineral resources investigation:

In this division a variety of studies, surveys, and researches are conducted under the direction of the director of the State Bureau of Mines and Geology. The work in kind and quantity is limited only by the money available. The service roughly is of three kinds—(a) research and testing of ores, both metallic and nonmetallic, to improve economics, prevent mineral waste, and to devise methods of processing minerals of possible future commercial and economic importance; (b) service to the industry in the form of (1) mineral inspection and identification, (2) consultation with prospectors and engineers concerning their mining and metallurgical problems, (3) reply to correspondence to numerous inquiries on all phases and angles of mining and metallurgy, technical and geographical, (c) mineral surveys and reports.

PUBLICATIONS OF THE IDAHO BUREAU OF MINES AND GEOLOGY

Moscow, Idaho

*BULLETIN NO. 1—"The copper deposits of the Seven Devils and adjacent districts," by D. C. Livingston and F. B. Laney. 1920.


*BULLETIN NO. 5—"Geology and ore deposits of Alturias quadrangle, Blaine County, Idaho," by Samuel M. Ballard. 1922.

*BULLETIN NO. 6—"Geology and water resources of Goose Creek Basin, Cassia County, Idaho," by Arthur M. Piper. 1923. (Prepared in cooperation with the U. S. Geological Survey.)

*BULLETIN NO. 7—"Geology and gold resources of north central Idaho," by Francis A. Thomson and Samuel M. Ballard. 1924.


*BULLETIN NO. 11—"Geology and metalliferous resources of the region about Silver City, Idaho," by Arthur M. Piper and Francis B. Laney. Price 50 cents. 1926.


*PAMPHLET NO. 1—“Interfacial tension measurements and some applications to flotation,” by Robert B. Elder. 1921. (Prepared in cooperation with the U.S. Bureau of Mines.)

*PAMPHLET NO. 2—“Size of mineral particles in relation to flotation concentration,” by A. W. Fahrenwald. 1921. (Prepared in cooperation with the U.S. Bureau of Mines.)

*PAMPHLET NO. 3—“Testing ores for flotation,” by A. W. Fahrenwald. 1921. (Prepared in cooperation with the U.S. Bureau of Mines.)

*PAMPHLET NO. 4—“Differential flotation,” by A. W. Fahrenwald. 1921. (Prepared in cooperation with the U.S. Bureau of Mines.)

*PAMPHLET NO. 5—“A preliminary reconnaissance of the gas and oil possibilities of southwestern and south-central Idaho,” by John P. Buwalda. 1923. (Prepared in cooperation with the U.S. Geological Survey.)


*PAMPHLET NO. 7—“Notes on the geology of eastern Bear Lake County, Idaho, with references to oil possibilities,” by Virgil R. D. Kirkham. 1923.

*PAMPHLET NO. 8—“Ground water supply at Moscow, Idaho,” by F. B. Laney, V. R. D. Kirkham, and A. M. Piper. 1923.

*PAMPHLET NO. 9—“Ground water in Pahsimeroi Valley, Idaho,” by Oscar E. Meinzer. 1924.


*PAMPHLET NO. 11—“Geology and water resources of the Bruneau River Basin, Owyhee County, Idaho,” by Arthur M. Piper. (Prepared in cooperation with the U.S. Geological Survey.)

PAMPHLET NO. 12—“Possibilities of petroleum in Power and Oneida Counties, Idaho,” by Arthur M. Piper. 1924.


*PAMPHLET NO. 14—“Mica deposits of Latah County, Idaho,” by Alfred L. Anderson. 1923.


PAMPHLET NO. 16—“Ground water for municipal supply at Idaho Falls, Idaho,” by Arthur M. Piper and Virgil R. D. Kirkham. 1924.

*PAMPHLET NO. 17—“Ground water for municipal supply at St. Maries, Idaho,” by Virgil R. D. Kirkham. 1926.

*PAMPHLET NO. 18—“Some Miocene and Pleistocene drainage changes in northern Idaho,” by Alfred L. Anderson. 1927.


*PAMPHLET NO. 20—“A disseminated lead prospect in northern Boise County, Idaho,” by Clyde P. Ross. 1926. (Prepared in cooperation with the U.S. Geological Survey.)

*PAMPHLET NO. 21—“The Vienna district, Blaine County, Idaho,” by Clyde P. Ross. 1927. (Prepared in cooperation with the U.S. Geological Survey.)

*PAMPHLET NO. 22—“The geology and ore deposits of the South Mountain mining district, Owyhee County, Idaho,” by Robert E. Sorenson. 1927.

PAMPHLET NO. 23—“Ground water for municipal supply at Potlatch, Idaho,” by Virgil R. D. Kirkham. 1927.

PAMPHLET No. 24—“Underground water resources in the vicinity of Orofino and Lapwai, Idaho,” by Virgil R. D. Kirkham. 1927.

*PAMPHLET NO. 26—“Geology and ore deposits of the Rocky Bar quadrangle,” by S. M. Ballard. 1928.

*PAMPHLET NO. 27—“Geology and ore deposits of the Birch Creek district, Idaho,” by P. J. Shenon. 1928.


*PAMPHLET NO. 31—“Geology and silver ore deposits of the Pend Oreille district, Idaho,” by Edward Sampson. 1928. (Prepared in cooperation with the U.S. Geological Survey.)

*PAMPHLET NO. 32—“Geology and ore deposits of the Lava Creek district, Idaho,” by Alfred L. Anderson. 1929.

*PAMPHLET NO. 33—“Geology and ore deposits of the Seafoam, Alder Creek, Little Smoky, and Willow Creek mining districts, Custer and Camas Counties, Idaho,” by Clyde P. Ross. 1930. (Prepared in cooperation with the U.S. Geological Survey.)

*PAMPHLET NO. 34—“The geology and mineral resources of the region about Orofino, Idaho,” by Alfred L. Anderson. 1930.


*PAMPHLET NO. 38—Biennial report on the activities of the Bureau, by John W. Finch.

*PAMPHLET NO. 39—“The Dome mining district, Butte County, Idaho,” by Clyde P. Ross. 1933. (Prepared in cooperation with the U.S. Geological Survey.)


*PAMPHLET NO. 43—“A preliminary report on the geology and ore deposits of the eastern part of the Yellow Pine district, Idaho,” by L. W. Currier. 1935. (Prepared in cooperation with the U.S. Geological Survey.)


PAMPHLET NO. 45—“Geology and ore deposits of the Warren mining district, Idaho County, Idaho,” by John C. Reed. 1938. (Prepared in cooperation with the U.S. Geological Survey.) Price 50c.

PAMPHLET NO. 46—“Geology and ore deposits in the Florence mining district, Idaho County, Idaho,” by John C. Reed. (In course of preparation.)

PAMPHLET NO. 47—“Geology and ore deposits near Murray, Idaho,” by Philip J. Shenon. Price 50c.
LEGEND

- County Seats

Custer-Etc. Names of counties

- County Boundary Lines

Recent Lake Bed Sediments Tertiary

Tertiary Lenses Largely Soil Covered

Cretaceous Coal Bearing Series

Triassic Jurassic And Carboniferous Carboniferous Series

Quartzite Slates And Graywackes.

Granite Gneiss And Schist.
PAMPHLET NO. 48—"The Dixie Placer District, Idaho," by S. R. Capps with notes on the lode mines by Ralph J. Roberts. 1939. (Prepared in cooperation with the U. S. Geological Survey.)

PAMPHLET NO. 49—"Geology and ore deposits of the Atlanta district, Elmore County, Idaho," by Alfred L. Anderson. 1939. (Prepared in cooperation with the U. S. Geological Survey.)


*NOTE: All publications marked * (out of print) may be consulted in public libraries and libraries of instructional institutions.

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ISSUED BY THE U. S. GEOLOGICAL SURVEY

In cooperation with the Idaho Bureau
of Mines and Geology


BULLETIN NO. 854—"Geology and ore deposits of the Casto quadrangle, Idaho," by C. P. Ross. 1934. (Obtainable from the Superintendent of Documents, Washington, D. C., for 60 cents.)

BULLETIN NO. 877—"Geology and ore deposits of the Bayhorse region, Custer County, Idaho," by Clyde P. Ross. 1937. (Obtainable from Supt. of Documents, Washington, D. C., for $1.00.)


ISSUED BY THE U. S. BUREAU OF MINES

In cooperation with the Idaho Bureau of Mines and Geology

*BULLETIN NO. 205—“Flotation tests of Idaho ores,” by Clarence A. Wright, James G. Parmelee and James T. Norton. 1921.

TECHNICAL PAPER NO. 403—“Hydraulic classification, theory, mechanical development and application in ore dressing,” by A. W. Fahrenwald. 1927.

(Obtainable from Superintendent of Documents, Washington, D. C. Price 15 cents.)

REPORT OF INVESTIGATION, SERIAL NO. 2933—“Effect of sieve motion on screening efficiency,” by A. W. Fahrenwald and S. W. Stockdale. 1929.

REPORT OF INVESTIGATION, SERIAL NO. 2949—“The relation of table feed preparation to table efficiency,” by A. W. Fahrenwald and W. F. Meckel. 1929.


PUBLICATIONS IN TECHNICAL MAGAZINES


"Effects of reagents on aqueous suspensions of pulverized materials and relation of this effect to flotation concentration," by A. W. Fahrenwald. American Chemical Society, 1932.


"Flotation of gold from river sand and black sand," by A. W. Fahrenwald. The Mining Journal, Phoenix, Arizona, April 30, 1933.


The writer of this report wishes to record here the passing of Dr. F. B. Laney and a few inadequate words of appreciation of his life.

Dr. Laney was for eighteen years the head of the Department of Geology in the School of Mines, University of Idaho. After an illness of but a few hours, he died on April 25, 1938, from a heart attack which he was stricken while working in his garden.

Dr. Laney was a highly learned geologist, a status achieved through a combination of natural intellect, intense interest and enthusiasm for knowledge of earth science, intensive training, and wide experience. He had a most profound knowledge of natural science, and was an enthusiastic conversationalist not only in his own chosen field, but on varied subjects. He gave freely of his time and knowledge and never was he too busy to act as counselor and advisor to old and young. His handwritten reports were works of accuracy, thoroughness, and literary precision. Hundreds of such reports are in our files, available as models to the younger and less experienced scientists.

His passing is a loss beyond appraisal, particularly to those of us whose good fortune it was to live and work with him as colleagues for nearly twenty years. His life was full, his contribution large, and his passing untimely and at too young an age. Idaho has lost a fine and valuable citizen.

—A. W. FAHRENWALD.
OBITUARY

JAY A. CZIZEK
1864-1938

With profound sorrow, we note the death of one of Idaho's most beloved citizens, Jay A. Czizek, born October 8, 1864. Died July 7, 1938, of a heart attack at Burgdorf, Idaho, at the age of 74 years. He was the fourth man in Idaho history to serve as State Mine Inspector. This position he held with honor for one term, 1899-1900.

Jay A. Czizek pioneered quartz mining in the Marshall Lake and Warren districts of Idaho County. Among properties in which he was actively interested was the Holte mine, now known as the Golden Anchor.

The death of Jay A. Czizek removed from the mining fraternity one of its highly respected members and one who contributed greatly to the development of Idaho's natural resources.

He is survived by his widow, Elizabeth Ann Czizek, at Burgdorf, and son, J. A. Czizek, Jr., structural engineer, Oakland, California.

OBITUARY

WALDEMAR LINDGREN
1860-1939

Waldemar Lindgren, geologist and teacher, died at his home in Brighton, Massachusetts, on November 3, 1939. At the age of twenty-three he completed a course of study at the Freiberg Bergakademie, then the world's leading school of mining and geology. In 1883 he came to the United States. For thirty-one years Waldemar Lindgren was associated with the United States Geological Survey and later was head of the Department of Geology at the Massachusetts Institute of Technology. At the age of seventy-three he retired from active service as Professor Emeritus, though continuing at writing and research. His life was a busy one in the field of science and honors came as an impressive testimony to his achievements. Hardly a day goes by that we do not have occasion to refer to some of Waldemar Lindgren's writings on the geology of the state of Idaho. His contributions will be referred to for years to come and his loss keenly felt by all that knew him either personally or through the writings of a master in his chosen line of endeavor.

OBITUARY

OSCAR HERSHEY

Oscar Hershey, nationally known geologist and for more than twenty-five years the chief geologist for the Bunker Hill & Sullivan, died December 11, 1939, at Wilmington, Delaware, from a heart attack.

He had been taken to a hospital in that city a few days before when he suffered an attack from which he failed to rally. He was about sixty-five years of age and had spent the greater part of his life in the west, his home of late years being at Oakland, California. He made frequent trips to the Coeur d'Alene district and was also consulting geologist for a number of other properties in Idaho, Nevada and California.

He was a member of the Institute of Mining and Metallurgical Engineers and numerous other geological societies. His written reports on the geological structures and formations, together with his "Origin of Ore Deposits in the Coeur d'Alenes" are considered the highest authority on these subjects. He leaves his wife at Oakland and one son, Allen, residing in the east.
After more than thirty years of dealing with men as a boss and a superin­
tendent I am led to offer some suggestions with the hope that they may be
helpful in these days when relations are sometimes difficult between employer
and employee. They are meant primarily for the “boss”, by which term I mean
any one who has been intrusted with the supervision of the working hours of
a number of men, whether he be a “straw boss” with his dozen men or a plant
superintendent with a much larger number.1

Note that I do not speak of “handling men” as if men were so many inert
sacks of freight to be disposed of or wild animals to be tamed. Possibly the
thought behind the expression has been responsible for much of the overbear­
ing attitude that some bosses have displayed toward their employees under
them. Men should not be “handled” but dealt with—and dealt with just as
considerately as any business associate would be. This change in mental atti­
tude is most essential to the establishment of better relations at a time when
friction and misunderstanding are all too frequent.

Admittedly, the difficulty of applying these suggestions successfully in­
creases in direct proportion to the size of the organization. Nevertheless, the
aim should be the same. Even in large plants, much can be accomplished.

To the average man, the company for which he works is represented by
the boss or foreman with whom he comes most in contact. It is important that
these men be intelligent (not necessarily “educated”), progressive, and, above
all, tactful.

* E. S. Tillinghast, Calumet, Minn.—An Iron County superintendent, sug­
gests certain rules for keeping employee relationships harmonious.

The selection of foremen should be considered one of the most important
duties of management, one to be given as careful attention as would be given
the purchase of an expensive machine. Foremen are mirrors that reflect to
their men the company's attitude on matters affecting them.

Perhaps first in the list of “don'ts” for a boss is this: Don't patronize a
man or allow any trace of condescension to appear in your treatment of him.
Litmus paper is no more sensitive to acids than is the normal man to any such
feeling on the part of his boss. If he entertains it, it is soon evident in his
manner—even in his voice. One foreman of our acquaintance could hardly say
“good morning” without revealing his self-satisfied sense of superiority. Con­
sequently, to avoid displaying such a state of mind, one must avoid harboring
it at all.

Treat the man who wears a dirty blue shirt just as you do the
one who wears a clean white one. The human nature underneath is just the
same and in almost every man you will find some trait, some knowledge or
some accomplishment, which, in that respect, makes him superior to yourself.
Only a small man need fear that he is lowering his dignity (another much­
abused thought) by letting the men under him know that he admits this.

When you give orders (or, better, instructions) about a certain job, take
time to explain briefly but clearly just what it is all about. A man’s interest
will be greatly increased if he knows why he is doing the thing he is directed
to do, if he can visualize the completed work and its purpose.

Don't lose your temper. It does not pay and you are quite sure, when
angry, to say something that will be regretted later. The good feeling created
by years of patient and understanding effort may be destroyed in a moment of
explosive anger. Sugar is still better than vinegar for catching flies.

1 June, 1939—Engineering and Mining Journal.
Don't let your treatment of your men vary with your digestion. Be yourself, but be the same day after day—when things are going well and when they are not. Don't take your ill will out on the man who happens to be under you.

Don't have favorites. Be fair, just, helpful, and sympathetic to all your men but partial to none except as such partiality is a reward for merit and accomplishment. Then it ceases to be partiality. This is a difficult attitude to attain, but worth cultivating.

If you find it necessary to discharge a man, don't call him in and say with a snarl and, perhaps, an oath: "You're fired." Explain to him why he does not fit into your organization and see if you can help him to obtain more suitable employment elsewhere. But first be certain that he does not fit in and that your reasons for letting him go are justifiable and sound. Perhaps he was simply misplaced and would be entirely satisfactory at some other job in your plant. This has happened to men in all walks of life. So be sure you are not being unfair to the man before you force him to seek new employment with only a "discharged" slip to show for his last connection.

If a man applies for work which you cannot give him, tell him so kindly and, if possible, suggest some other place where he may be able to find employment. He is offering to you all that he has to offer—his services. A curt refusal or a sign on the door "No help wanted" sends him away with a needless and easily avoidable resentment—one step nearer to being what is commonly called a "Red".

No boss can grant every request, but at least he can give every one thoughtful consideration, even when he is certain that it cannot be granted. When you must refuse, do it tactfully and make your reasons plain. If they are sound, you will find most men willing to see your point of view and appreciative of your confidence. A refusal given kindly may leave a man more friendly toward you than the granting of a request conceded grudgingly. If, as sometimes happens, you are constrained to make a concession contrary to your desires and judgment, do it gracefully. Further, if you are convinced that some such yielding of position is imminent, do it before you are forced to, while you are better able to mitigate the harshness of its application. In this connection, try to anticipate improvements in working conditions before they are requested or demanded. If reasonable, they should be apparent to you first. An improvement initiated by you causes more appreciation than one for which the men have had to ask.

Don't be niggardly with words of encouragement and praise when they are deserved. Nothing does more to build up a man's morale than to know that his efforts are appreciated. On the other hand, nothing does more to undermine and destroy his self-respect and his interest than to be unfairly censured.

If you find it necessary to criticize a man, wait until you are no longer "mad", and do it privately. We have seen this almost axiomatic rule of human psychology disregarded by men in very high positions.

Before you reprimand a man you should go over in your mind how you can make the reproof as tactful and "stingless" as possible, just as statesmen prepare diplomatic notes. After all, you are not trying to relieve yourself of a grouch but to make a better man of your employee. The old method of beginning such an interview with a series of "blankety blanks" is outmoded and pernicious. A well-selected organization should require little bossing and less reprimanding. The best boss is the one who gets the work done on schedule with the least bossing.

Encourage your men to come to you with complaints and suggestions. You will find, frequently, that the man who is actually doing the work has thought of something worth adopting that has not occurred to you.

Don't use the first-person-singular pronoun too commonly. "We" is more inclusive than "I", and usually more accurate.

Do your best to have your men understand that, at least as far as is within your power, their job is secure, that the existing pleasant relations are not going to be disturbed by you. No fear is more haunting, more destructive
to “pep”, morale, and ambition, than that of being out of a job with no job in sight.

Don't feel above saying “Thank you” for small services rendered by a man working for or with you, even though that service is part of his regular work.

On one occasion I happened to be in a group of men who rode for a short time in the cab of a railroad locomotive over a section of the company's track. As we got down from the cab at the end of our trip, the only member of the group (composed of foremen and men of higher positions) who said “Thank you” to the locomotive engineer was the chairman of the board, the company's highest official. I am inclined to think that it was more than mere coincidence that a man who displayed such thoughtfulness had risen to this position though still, relatively, a young man—younger than some of the others in our group. This little act exemplifies the fact that a man goes up, not on or over his fellows, but with their help. As an electric motor can do nothing until connected to a power line, so a boss can accomplish little until he has made an effective contact with his men.

Know your men by name, including their nicknames if possible, even though it requires some work and trouble to do so. A man's name is what distinguishes him from his fellows, and it is natural for him to appreciate being so distinguished by you.

As you go through your plant, mill, or job take time to bid each man whom you meet a cheerful “Good-day” and contact as many of them as you can. A brief word is time well spent. Eventually you will come to know something of the plans, ambitions, and troubles of the individual men and be able to be of service to them. Personal antagonisms are dissipated as men become better acquainted. In other words, feel and display a friendly interest in the men under you, not a paternalistic one.

When one of your men is ill or injured, try to visit him in his home. Once we had among our employees a man who was reputed to be a “very red” communist. Perhaps he was. But, on visiting him when he was ill at home, we received a most hospitable reception.

One day we picked up on the road a man whom one of our foremen had given a short layoff for losing time from work because of drunkenness. After some desultory conversation John said: “Please, Mr. Super., don't lay me off for good. You know everybody got something. You got something yourself!” We could not deny the allegation—and he came back to work.

That Matter of Loyalty

As to the loyalty of men for the company which issues their pay checks, we believe this largely resolves itself into a sense of loyalty to the bosses with whom they work. Loyalty is given for loyalty received—and for little else. If we expect such a spirit from our men, we must first evidence it to them. Loyalty and cooperation cannot be forced—they must be won.

Some managers make a hobby of one thing, some of another, depending on their training. It may be costs, equipment, efficiency, or what not; but none can afford to neglect or minimize his company's greatest asset and its greatest responsibility: its men.

Don't be afraid to say “I don't know,” but do not be obliged to say it too often. The boss should make it his business to know his job a little better than any one else.

Avoid ostentation, on the job and at home. Oftentimes, too great a disparity between accountrements or living conditions of bosses and men leads to dissatisfaction and discontent.

Support your foremen. If you find one unworthy of such support, change him.

Don't employ spies to invade meetings of any of your employees—union or non-union. The information you obtain will probably be distorted, unreliable, and misleading. This is a case where “a little knowledge is a dangerous thing.”
In a dispute between two of your employees or between a man and a foreman, be sure to get both sides before making a decision. Usually there are two sides, and you must learn to look at every controversial matter from the man's point of view as well as your own. To the extent to which you learn to do this you will avoid those errors in judgment which often result in the assumption of an untenable position. Learn to decide matters quickly, but don't go off "half-cocked."

A superintendent was once asked by a friend what he would do if going through his plant, he heard one of his men say to another: "There comes that _______." He replied: "I'd first sit down and think it over to decide if, perhaps, he might be right." Possibly, from that man's point of view, the superintendent had done something that justified such an unfavorable opinion. To realize what a difference the point of view makes, go to a moving picture show and sit far over on the side.

Don't bluff. If, for instance, you feel that you must threaten some sort of punishment to a man who habitually breaks a safety rule, make good on your threat if required. Otherwise it is better not to have made it.

Don't attempt to dictate the politics of your men, no matter how sure you may be that what you urge is for their own good. They will resent such interference with what they rightfully regard as their own prerogative—just as you would. If one of your men asks for your opinion, give it to him together with your reasons for holding it; but do not carry on an argument to the point of animosity.

Your organization is a chain whose strength can be increased only by patiently welding strength into the individual links, one by one.

To both employer and employee, this earnest admonition: As alternate waves of prosperity and depression give first one and then the other a temporary bargaining advantage, neither should let himself get into the frame of mind which says, "Now we have them where we want them." Such an attitude can lead only to trouble, for of such materials are strife and discord fabricated.

Perhaps the whole subject may be summed up by calling it an every-day application of the Golden Rule. Our experience has been that few men are unresponsive to such treatment.

One last don't. Don't say all this is only impractical idealism. We believe it is sound common sense and that along some such road lies the hope of industrial peace.

WHAT MAKES A GOOD EMPLOYEE

In listing the characteristics that go to make up a good foreman or a good worker in the ranks, it is something of a surprise to discover that most of those attributes are purely personal qualities rather than the result of education and training. They are characteristics that can be and should be cultivated by every one, no matter what his calling or station, and this should be an encouraging thought to the ambitious worker who feels the lack of education but is anxious to get ahead. This in no way belittles the desirability of education and training. Of course they are very important. But it does mean that acquiring an education is but a part of the preparation for life and its work and, perhaps, not so large a part as we are accustomed to believe. No amount of "book learning" can take the place of these very human qualities which every one may cultivate and the lack of which may be more of a handicap than lack of education.1

A second surprise, though it should cause none, is to observe the similarity between the list that applies particularly to a worker and that for a foreman. But every employee is a possible foreman, and those qualities which constitute a good foreman will also help the worker to convert himself into foreman material. Foremen were promoted from the ranks because they were the best workers and had learned—consciously or unconsciously—to acquire most of the qualifications named.

1 September, 1939—Engineering and Mining Journal.
Other workers will be promoted for the same reason, for, in America, today's workers are tomorrow's foremen, superintendents, and managers. Almost every company, large or small, contains conspicuous examples of this.

It is impossible to list these characteristics in the order of their importance. Many of them are of equal consequence, and the need for certain qualities varies with the individual. Some are most in need of one thing, others of another and very different one. With this in mind we begin the list with willingness to learn.

No one ever attains to such perfection that he can no longer learn, both from his foreman and from his fellow workers. And no one is so dull or so ignorant that he cannot teach his brightest associate something. If he shows no positive virtue which should be imitated, he teaches negatively by illustrating what to avoid. Every man must maintain an open mind, ready and eager to learn from any one with whom he comes in contact. Neither pride nor diffidence should prevent him from making this a fixed habit. Too, he should be just as willing to help others as he expects them to be to help him.

If a man is honestly willing and anxious to learn, he will utilize every opportunity that offers to obtain information that has any relation to his occupation or interest. It may be possible to attend night school or some of the trade demonstrations that are frequently presented by salesmen and engineers for the companies they represent. If none of these methods is open to him, there is always a public library that contains helpful books and magazines, and he can do much to help himself—if he is sufficiently interested.

Cooperation must come early in a man's self-building if he wishes to succeed. The world's work is not done by a few "stars" but by the combined efforts of many men working together. Even though he does not fully understand or approve the methods employed, or does not like the man who gives him orders, he should contribute his best to the job's success. A man who does not cooperate is a drag, and a less efficient worker, plus cooperation, will be more effective and more useful than a more able one without this asset.

Alertness is but another step in the same direction. A man should keep himself alert and "on his toes" all the time: thinking of a better way to do the task allotted to him—one that is more safe or one that requires less time, less manual labor, or less material. If he feels confident that he has a worth-while suggestion to make, it should be presented to his foreman—not when the foreman is busy and hurried, but when he is relaxed and at ease and when it can be done appropriately, thinking of himself as a salesman with an idea to sell.

Because so many men are content merely to "get by," a man is required to do but little to make himself stand out from the rest: a little more interest in the job, a little more thought for the safety of himself and others, a little more quickness in anticipating orders and in following those given, will soon bring him to the attention of those above him.

Carefulness and dependability: These two attributes are so closely associated as to be almost inseparable and are most essential elements in the make-up of a man who aspires to become a foreman or who wants to be a better and more useful employee. Almost every gang of men contains some who, because they have gained a deserved reputation for being careful and dependable, are considered indispensable to the organization—a reputation well worth a considerable amount of trouble to acquire. They are traits which any one may build into himself if he wishes to do so.

The man who is careful will not do anything that may cause unnecessary danger or inconvenience to himself or to others. He will remember and observe all safety precautions and tactfully warn others who may be inclined to disregard them. Such a man, it is morally certain, will be found on his job during the hours when he is supposed to be there and doing his work with the same conscientious thoroughness whether the boss is near or not. For a careful man is almost always a dependable man.
Enthusiasm: A spirit of enthusiasm may not be an easy thing to bring to one's task day after day, even though that task is monotonously similar, but enthusiasm must be self-generated, in the mind and heart. No job is so uniformly tedious that something new and interesting does not develop in it daily, and if a man learns to look for things that arouse interest, they may be found in the simplest kinds of work. To permit himself to slump into a spirit of listless disinterestedness is to assist the advance of age and decline. To keep enthusiastic is to keep young. Enthusiasm will send a man to his day's work each morning saying to himself, "This is my job, and I'm going to do it today to the very best of my ability." It will send him home at night, weary it may be, but content.

Temperateness applies not merely to drinking (though intemperance in that respect is most conspicuous), but to eating, amusements, and most other activities. No matter how good a man may be, if he does not possess good health his usefulness to his employer is destroyed every day that illness keeps him away from his job. To be temperate in all things is one of the best ways to insure good health. Every community contains examples of good men ruined by excessive drinking, but there may be just as many who are victims of overindulgence in other ways, not so easily discerned, yet just as dangerous to health. "Be temperate in all things" is still good advice.

Energy is one of the products of good health that should result from temperateness. An energetic employee need not try to do all the work of the gang to which he belongs, but he will keep busy. If, for a time, his own task does not require his attention, he will (because he is interested in the job) try to help some other man at his. In this way he is not only helping the job as a whole but he is helping himself much more by learning something about a different part of the business, making it easier to fit him into some other place when curtailment, expansion, or advancement makes that necessary or desirable. To realize the value of energy, one need only recall those men of his acquaintance who definitely do not possess it.

Courtesy: It is not necessary to carry under his arm a book on table and parlor etiquette for a man to be courteous. Courteousness is just another way of saying kindliness or thoughtfulness. If one has in his heart a kindly feeling for his fellows, it is just as certain to be shown in his manner as is the sun to shine through the clouds. To remain kindly and thoughtful when others may seem stupid, careless, or disagreeable may not be easy but it is bound to make the gang in which a man must spend a third of his time a more pleasant environment in which to work. It should be applied to fellow workers as well as to bosses and it will pay good dividends.

Smile: A smile is the outward evidence of a kindly spirit within, and no one thing helps more to make life pleasant. The man who does not smile is failing to contribute to the world's all-too-meager supply of sunshine and he is overlooking a most effective means of bringing himself to favorable attention. To smile when one feels blue requires an effort, but to do so acts as an antidote to his own blues and as a preventive to discouragement in others. A friendly smile given to another helps to make that person's day more enjoyable and, working inwardly as well as outwardly, it helps to make him who smiles more happy. To be an optimist, to smile, aids health, advancement, and happiness.

Pay and Profits Have the Same Source

Working for his employer's interest: Many a man fails to realize that his employer's interest and his own are, necessarily, the same. His pay MUST come from his employer's profits. There is no other source. No profits (sooner or later), no pay, no job. He and his employer are in the same boat, trying to cross the rough sea of competition to the harbor of profit. If they are not pulling together in the same direction, they cannot go forward. The man who fails to further his employer's interest at every opportunity, is—to just that extent—making his own job less secure.

Perhaps employers are partly at fault for the failure of many men to appreciate this, but it is a truth that operates constantly and, no matter where the fault lies, the result is the same.
A man may show his interest in many ways: making the best use of his own time; not taking other men away from their work by time-wasting gossip during work hours; by avoiding waste in tools and materials; being careful of the equipment which it is his job to operate, thus minimizing breakdowns and delays; and in countless other ways. And all this should apply whether his employer is an individual or a large corporation.

To put it briefly, he should think of the job as if it were entirely his own, with its success depending upon him alone.

The most gratifying thing is that the more thoroughly a man acquires interest and enthusiasm for his job the more completely has he succeeded in extracting a sense of drudgery and resigned indifference from his daily routine.

Neatness: A man should keep himself and the tools he uses as neat and clean as circumstances permit. This does not mean to be afraid of honest grease and dirt when his job requires him to get into them or to shun any part of that job because it is dirty. But the man who is naturally neat will look, even when he is dirty, as if he tolerated dirt rather than courted it. His tools will be kept in the place designated for them, sent for repairs when needed, and used for the purpose for which they were designed. Neatness does not require many or expensive clothes and it is not a difficult habit to acquire. To be neat is to be orderly—and it pays.

Safety has long since passed out of the realm of things to be talked about, then forgotten. There are few men today who are not completely sold on the idea of safety, but there is a great difference in the way it is practiced. To be effective, it must constantly be kept in mind—never overlooked for a minute. There are hundreds of ways for a man to be injured, but there is only one way for him to avoid accidents, and that is by being always on guard to avoid them, making himself his own safety inspector. Safety devices may be—and should be—installed wherever they can help, but, in the last analysis, it is up to the individual man to practice safety all the time, never relaxing his vigilance for his own welfare and that of others. No one else can assume this responsibility for him.

Rights against obligations: As an employee adds increasing years to his length of service with an employer, he naturally—and properly—considers that the years are gaining for him certain rights. These rights include a preference over other and younger men when a reduction in force is necessary or when promotions are to be made, consideration as to the choice of a job, and, in many companies today, vacations with pay. In addition he expects, and is usually shown, preferment in other ways.

All this is perfectly proper and as it should be, but he should remember that every right carries with it a corresponding obligation. Because he is an older and more experienced workman and, as such, is conceded these rights, he should feel it his duty to render a progressively increasing service. If he possesses the attributes of a good employee he will become a better and more productive one as time goes on and thus justify his claim to the recognition and appreciation he expects. If he permits himself to coast along on his length of service record without endeavoring to improve because of his additional experience, he will find younger and more enthusiastic men bettering his record and competing with him for the advantage he should be preserving.

This list of qualifications does not pretend to be exhaustive and there are many others that could be added and that will be considered by the thoughtful employee. The important thing to remember is that the cultivation of these and other worth-while qualities by a man, though bound to be of real benefit to his employer, will be many times more valuable to the man himself, on the job and elsewhere.

WHAT MAKES A GOOD FOREMAN?

Characteristics considered desirable in an employee are, to an even greater degree, essential in a foreman. As a man is but a boy grown up, so a
One of the most important attributes and one of the most difficult to maintain consistently is fairness. We are all human and swayed by the various influences of life that shape and, frequently, bias us. We may unintentionally—even unconsciously—digress from that strictly impartial consideration of a situation that perfect fairness demands. But the very difficulty and infrequency of its complete attainment makes it the more essential that men in supervisory positions avoid any appearance of unfairness or partiality. Men are extremely sensitive to injustice, real or imagined, and a foreman must always be on guard to see that his actions do not give this impression. A foreman who is known to be intolerant of religious, political, or social views that differ from his own will be unable to convince his men that he is unprejudiced in other matters. The boss who has built up a deserved reputation for consistent fairness has gone a long way toward winning the confidence and respect of his men, and no boss can afford to neglect its careful and constant cultivation.

High up in the list of "must" qualifications comes tact. An old negro, asked to define the difference between politeness and tact, replied: "if Ah goes into a bathroom and finds a lady in the tub, Ah says 'Excuse me, Sir.' The 'excuse me' am politeness but the 'Sir' am tact." Tact will smooth out many a difficult situation and avoid many a disagreement by anticipating and diverting it before it develops.

Open mindedness is most essential in a well-balanced foreman. It is located somewhere between indecision on one hand and bullheadedness on the other. It makes a man willing to consider the views of others, whether workers or other foremen, before assuming that his own plan is best. A mind that closes itself to suggestions will shut out many worth-while ideas and impede its own development.

A foreman should always be ready to give credit where credit is due. If one of his men makes a suggestion which proves to be worth while, he should be careful to mention that fact to his own superiors. If he permits it to be understood, either by statement or inference, that the idea was his own, he will soon find that he has denied himself the advantage of suggestions from his men. If he is not big enough to do this, he is not of foreman caliber. Also, he should be scrupulously careful to assume all responsibility for his own mistakes and not permit another to be censored for his own errors.

Dependability is a characteristic that is always conspicuous in the make-up of a good foreman. When his superior officer can say, "I know that job will be well done because Bill is looking after it" he has "arrived" on that score.

Adaptability, both as to men and to work, is likewise most important. Conditions under which work is done and the manner of doing it change so rapidly that, unlike golf, a foreman must not allow his mind to become grooved. He must be able to conform to the changes and improvements that follow one another in quick succession. This qualification makes him capable of adjusting his language and actions to fit the capacity of those whom he is addressing. He will not be guilty of talking over the heads of some men or of acting as if he had underestimated the intelligence of others.

Honesty and frankness are indispensable in a good foreman. If it is necessary to question or discount a foreman's report of an incident, even where he may himself have been negligent or remiss, then much of his usefulness is destroyed. Not only does his superior soon discover this fault and cease to place confidence in him, but his own men will quickly sense it. Dishonesty will vitiate and nullify a host of good qualifications.

Of course every foreman must know his job thoroughly. He cannot expect to direct his men in any operation with which he himself is not perfectly familiar. He should endeavor, also, to learn something about the details.

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November, 1939—Engineering and Mining Journal.
of the next job to which he may be promoted. He does not know when chance or design may offer him an opportunity to take that next step. The better prepared he is for it, the more quickly will he be able to produce the results expected of him and to fit in at the new assignment.

A good foreman will encourage his men to think and to give him the benefit of their thinking. Only so can he obtain from them the full measure of co-operation and assistance of which they are capable. This will not only further his own immediate interest but will also enable him to determine intelligently which of his men are worthy of advancement at some future time when he may require men able to support and promote his own ideas.

He will not permit success to give him a "swelled head" or cause him to snub those friends and co-workers who have been less fortunate. An attitude of this kind marks him as being too small for the promotion he has received and may result in his own undoing.

He will avoid assuming privileges or prerogatives that do not properly belong to his job. The indiscriminate assumption of unauthorized prerequisites is just as reprehensible as any other form of pilfering, and it is promptly noted by other employees. It is a sure means of lessening the esteem in which he is held by his men as well as by his employer. The slight financial advantage he thinks he is obtaining at no expense to himself is probably paid for at a very high price in loss of self-respect and in impaired opportunity for advancement.

He will treat all of his men with equal consideration, reserving for after-work hours any display of friendship for one man over another. A failure to observe this precaution is unfair to the object of his friendship, as any advantage which that man may later receive will be attributed to favoritism instead of to merit, even though it may be entirely deserved.

A good foreman will keep his work planned well in advance. To avoid delay, confusion, duplication of effort, wasted time, this is absolutely necessary. Planning must precede performance. Just as a teacher must be at least a lesson beyond his class, so a foreman must have his work planned ahead to keep it going regularly, smoothly, and systematically. If he tells a number of his men to be at some particular place at a certain time to do a certain job, he should be sure that all the tools, equipment, or other material that will be required have been anticipated. Thus, when the men arrive, the work may be started without delay. Careful planning will insure that enough, but not more than enough, men are supplied for each job, effecting proper distribution of the men at his disposal.

Attention to Costs is Part of the Foreman's Job

A good foreman must be cost-minded. He must constantly remember that the product of mill, plant, or mine in which he is employed must bear all the expense of production and leave a profit. It must be his aim to reduce those costs and to improve the product both as to quality and quantity. The foreman who is observing will find many means of promoting this objective, and he should deem no improvement or economy too small to be considered. Any degree of waste, inefficiency, or carelessness which he disregards is reflected in the cost or the quality of his product. It makes competition, always severe, that much more difficult; endangers the security of his own job, and places unnecessary obstacles in his own road to advancement. Selfishness as well as loyalty should impel him to watch his costs.

His plant is like a runner in a race with professional athletes, and he should constantly endeavor to lighten the load his athlete must carry. His failure to remove every straw of handicap, however light, may cause the loss of a race that watchful and intelligent collaboration might have won. When the foreman realizes that he is the runner and the race is his, he will tackle his job with a spirit of enthusiasm that will be difficult to defeat.

NOTE—Reprints of this article as well as of the articles by Mr. Tillinghast in the June and September issues respectively, may be had in multiples of 100 at a nominal price, from the Engineering and Mining Journal.
MEN EMPLOYED AND WAGES

The present price of gold with the government's program to purchase newly mined silver, and the increased demand and price advances for the base metals, had a stimulating effect on mining activities in Idaho during 1939. This and the suspension of the moratorium on annual assessment work as to all unpatented mining claims in the United States, including Alaska, resulted in more employment, better wages, new machinery and equipment, larger orders for supplies, greater consumption of foodstuff and increased tonnage on incoming and outgoing freight. New construction and development work was noted at many properties throughout the state. Preparations are being made to increase and even double the production at some of these mining operations, due perhaps to world conditions and a favorable metal market.

Employment has been fairly steady during the past year. There was an ample supply of labor, and the turnover was comparatively small, so that operating companies were assured a constant working force of experienced men, without the necessity of breaking up the personnel with new and inexperienced crews.

It is practically impossible to obtain complete and accurate statistics of the number of men employed in the mines. Many men are employed by prospectors and small companies which do not maintain continuous work and do not file a report with the Inspector of Mines. The reports sent in vary greatly as to the number of working days, and this is especially true with the data received from seasonable operations. However, a conservative estimate covering all mining in Idaho for the year 1939 would total approximately 6,800 to 7,000 with about 50,000 people directly and indirectly connected with and dependent upon the mining industry.

Wages in the state are not uniform. Placer and hydraulic miners are classed as surface workers and receive less remuneration than the employees of the deep seated lead-silver-zinc mines of the Coeur d'Alene district. The several gold mines and other operators in the mining districts of Idaho have their own individual scale that will fit their particular problem and condition. These facts taken into consideration we are pleased to note that the scale of wages that prevail in this state are equal to, and in many instances better than were paid in other mining sections of the nation.

The following list is the wage scale maintained by mines in the Coeur d'Alene district from January 1, 1939 until September 15, 1939 when another 50-cent bonus was added to the prevailing scale.

<table>
<thead>
<tr>
<th>Miners</th>
<th>$5.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump and Compressormen</td>
<td>$6.00</td>
</tr>
<tr>
<td>Shovelers</td>
<td>$5.25</td>
</tr>
<tr>
<td>Surface laborers</td>
<td>$5.00</td>
</tr>
<tr>
<td>Timbermen</td>
<td>$6.25</td>
</tr>
<tr>
<td>Ore sorters</td>
<td>$5.00</td>
</tr>
<tr>
<td>Timber helper</td>
<td>$5.50</td>
</tr>
<tr>
<td>Cagers</td>
<td>$6.00</td>
</tr>
<tr>
<td>Machinists</td>
<td>$6.50</td>
</tr>
<tr>
<td>Pipe and Trackmen</td>
<td>$6.00</td>
</tr>
<tr>
<td>Machinist helper</td>
<td>$6.00</td>
</tr>
<tr>
<td>Shift bosses</td>
<td>$7.25</td>
</tr>
<tr>
<td>Carmen, Trammers</td>
<td>$5.25</td>
</tr>
<tr>
<td>Blacksmiths</td>
<td>$6.50</td>
</tr>
<tr>
<td>Motormen</td>
<td>$6.00</td>
</tr>
<tr>
<td>Blacksmith helper</td>
<td>$5.50</td>
</tr>
<tr>
<td>Motorman helper</td>
<td>$5.50</td>
</tr>
<tr>
<td>Electricians</td>
<td>$6.50</td>
</tr>
<tr>
<td>Main hoistman</td>
<td>$7.00</td>
</tr>
<tr>
<td>Flotation operator</td>
<td>$6.00</td>
</tr>
<tr>
<td>Small hoistmen</td>
<td>$6.50</td>
</tr>
<tr>
<td>Mill repairmen</td>
<td>$6.00</td>
</tr>
<tr>
<td>Nippers</td>
<td>$5.50</td>
</tr>
<tr>
<td>Mill repairman helper</td>
<td>$5.50</td>
</tr>
<tr>
<td>Shaftmen</td>
<td>$6.75</td>
</tr>
<tr>
<td>Carpenters and Painters</td>
<td>$6.50</td>
</tr>
</tbody>
</table>

Other employees including master mechanics, superintendents, foremen, engineers and office help are generally on monthly salary.

The Sunshine Mining Company, considered the largest producer of silver in the United States, pay 50 cents a day above the Coeur d'Alene scale.

Notices were posted at the Sunshine mine advising employees that the company will make a cash payment of 5 per cent of each employee's wages for 1939 in full settlement for any claims which employees have or may have
against the company for "any acts or occurrences" prior to December 15, 1939. The notice states that the 5 per cent offer is in place of the cash bonus paid at this time in former years and the distribution will total about $50,000 if accepted by all employees. Last year's Christmas bonus was at the rate of 4 per cent on wages earned and totaled $40,551. The reason given for changing the form of the Christmas bonus gift is because of questions and uncertainties brought up by certain federal laws affecting employees and employers and inability of the company to determine the extent of rights and liabilities created by such laws.

In an effort to bring the whole labor relations matter to a head the Sunshine company has started suit in the United States district court at Coeur d'Alene asking for relief under the fair labor standards act and a court decision relative to the company's standing as a concern doing interstate business.

The company also asks to be relieved of the 5-day week labor arrangement now in effect, contending that it is a detriment both to the miner and mine management and asks that the 6-day week plan be allowed for the benefit of all concerned.

The cost of board and room at company boarding houses, hotels, and at private homes average from $1.25 to $1.50 per day. Many companies have built and are maintaining houses which are rented to their married employees, and some of the largest companies assist their employees in financing the construction of homes.

Some small operators and promoters have continued to take advantage of laxity in the laws governing the protection of labor and materialmen in Idaho and failed to make provision for proper reimbursement for services rendered. This condition must be remedied and probably the appointment of a labor commissioner as provided by the Constitution of the State of Idaho would be the answer to this situation.
First Aid Class, Bunker Hill and Sullivan Mining and Concentrating Co., 1939.
ACTIVITIES OF THE COEUR D’ALENE MINING
DISTRICT CENTRAL MINE RESCUE
STATION DURING 1939

By JAMES WILSON
Director in Charge

The use of oxygen breathing apparatus in fighting fire in the Coeur d'Alene Mining District dates from 1912, when three sets each of Draeger apparatus were purchased by the Bunker Hill & Sullivan and Hecla Mining Companies. A short course of training in the use of this apparatus was given during the year by a representative of the U. S. Bureau of Mines, this training being put to a practical use on October 7, 1912, when a fire broke out in the Bunker Hill mine. Three sets of apparatus were sent to Kellogg by the Hecla Mining Company and the fire was put out about midnight on October 9th, prior to the arrival of a car of the U. S. Bureau of Mines which had been sent to Kellogg from Oklahoma.

The apparatus now in use, number of trained men, supply of repair parts and miscellaneous fire fighting equipment, as well as the organization behind it, have shown a wonderful improvement since that time. A new Central Mine Rescue Station, with workshop, storage facilities and garage has been established in Wallace, centrally located relative to the mines of the district. During the past year a new mobile unit replaced the railroad car which had served as a central station since 1923. This unit consists of a new one and a half ton, 157” wheelbase Chevrolet truck with dual rear wheels, on which is mounted an especially designed aluminum body with built in fixtures. Sufficient equipment, breathing apparatus and supplies are carried for a crew for twenty-four hours. Material carried at all times includes:

11 Two-hour Paul oxygen breathing apparatus
6 One-hour Mine Safety Appliance Co., oxygen apparatus
3 Two-hour all service Burrell gas masks
16 One-half hour self rescuers
100 Cans Cardoxide
10 Ten-and-a-half cubic foot oxygen tanks
2 Two hundred cubic foot oxygen tanks
1 Hand oxygen pump

Repair parts for the apparatus

Miscellaneous equipment includes electric hand lamps, gas detectors of various types, blankets, life lines, stretchers, and first aid supplies, as well as whirling nozzles and various other items of fire fighting supplies. With this mobile unit contact at any mine of the district can be made in an hour or less, work can begin at once before the fire has gained headway, with a probable large property saving as well as a possible saving of lives, either of which would certainly justify the investment in truck and equipment.

Training in the use of oxygen breathing apparatus has been carried on throughout the year. Previously trained men are given four four-hour periods of additional training each year, while new men trained are given four initial training periods of four hours each, with additional training at quarterly intervals thereafter. Each year first aid instruction is given at the various mines or at other suitable locations and are attended by large numbers of the mine workmen as well as others. During this time a representative of the U. S. Bureau of Mines works in co-operation with the director of the Central Mine Rescue Station and issues a government First Aid Certificate to all completing the course of five two-hour classes. At this time new men trained during the year in the use of oxygen breathing apparatus are checked and are issued Bureau of Mines, Mine Rescue Certificates. Men taking this
training have previously passed a physical examination as to their fitness for such service. After the completion of each period of training a list of the trained men at each mine is compiled which shows the total training each has received. Several copies are sent to the officials of the mine and a copy retained for the Central Station, which thus has a complete check of all trained men in the entire district.

On hand in the district at the present time there are: seventy-three, two-hour standard oxygen apparatus; six, one-hour oxygen apparatus; eleven, two-hour all service Burrell gas masks; one hundred three, half-hour self rescuers, together with a large supply of repair parts and fire fighting equipment of various kinds. Added this year, among other items, was four hundred feet of 1½" hose with the necessary adapters to fit any coupling which might be encountered. This equipment is kept at the various mines, both in the regular training room and underground, on the mobile unit, and at the Central Station. All supplies and apparatus are checked at frequent intervals and kept ready for service at a moment's notice. Equipment at each mine is sufficient for any normal use and in case of an emergency additional supplies could be obtained from the mobile unit, the Central Station, or neighboring mines, as all equipment is standard throughout the district.
The safety and health of the men employed in the mines, mills, reduction works and other refineries of the mining industry in Idaho, is of paramount importance to this department. In line of duty, the Inspector of Mines visited in person each mining county of the state. During these examinations many suggestions and recommendations were made to men and their employers with a sincere hope that working conditions could be improved, the safety and health of employees safeguarded, and the avoidable accidents cut to a minimum. The Inspector was greatly assisted in this program by the cooperation of various agencies and individuals. Any success we may have attained in reducing the number of accidents is due to the cooperative efforts of all of us. Each and every man is entitled to credit for his share in this effort. There is much to be done along safety lines so let us renew our enthusiasm to perfect a mutual understanding and good feeling that is so necessary in safety work. Only then may we arrive at our goal of perfection in making a more safe and happy living for all of us.

Most of the larger companies have, for many years, maintained their own safety organizations. These organizations, in cooperation with the U. S. Bureau of Mines and the Central Mine Rescue Station, give first-aid training with instruction in mine rescue to the men and watch the workings for dangerous conditions, which are remedied as soon as possible. However, there is much to be done and many improvements made before our program can possibly meet with success. The Inspector suggests that each individual be a safety-first-man and assist in bringing about better working conditions as they pertain to health and safety. Safety suggestions and constructive criticism are always welcomed and essential in the furtherance and success of most any program to keep it from becoming stagnated.

It is impossible for any one man to carry out a successful safety campaign all over the state and at the same time give the proper attention to other duties of the office. To carry on this work in an intensive manner, the personnel of the department should be enlarged so that closer supervision and continual check could be made, instead of a brief visit once a year, which is all that is possible under present arrangements. This is provided for by Section 46-108, Idaho Code Annotated, but an appropriation has never been made adequate for this purpose.

The minor accidents, listed in the accompanying table, “Classification of Accidents”, are taken from the records of the Industrial Accident Board and have been arranged to comply as nearly as possible with the classification made by the U. S. Bureau of Mines. Accidents that did not cause a loss of time of more than seven days are not included because no compensation is paid, yet, we believe the record is as complete as it is possible to obtain. Although the U. S. Bureau of Mines and agencies of state government are listing these minor injuries of less than seven days in their reports, they have all been omitted in the accompanying table.

The loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis or other condition permanently incapacitating a workman from doing any work in a gainful occupation, is classified as “Permanent Total Disability.” The loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or other injury known in surgery to be a permanent partial disability, is classified as “Permanent Partial Disability”.

Out of a total of 736 accidents reported during the year, 13 were fatal. The number of fatal accidents occurring in connection with underground mining was 8 as compared with 13 during a like period in the year 1938. In the total for the year 1939 are included one milling accident, caused by machinery. Fatal accidents on the surface total 5. In two of these cases death did not occur until a considerable length of time had elapsed with death resulting from further complications of the injuries.
A comparison of the total number of accidents during the year 1939 with those during a like period in the year 1938 show an increase in compensable accidents of 95. However, underground accidents decreased while surface accidents increased. This increase was due, perhaps, to a larger number of men employed in the mining industry.

In 1939 there were 13 fatal accidents compared with 15 that were fatal during the preceding year of 1938, a total of 22 fatal accidents were recorded for the year 1937 and a total of 30 fatal accidents were recorded for the year 1936. Although the compensable accidents increased during the past year, it is encouraging to note that we are making some progress in reducing the number of fatal accidents and that many of the compensable accidents recorded were of a minor nature.

**DESCRIPTION OF FATAL ACCIDENTS**

January 9, 1939; Polaris Mining Company; Wallace, Shoshone County, Idaho. James H. Bagley, married, shaft miner, age 34.

The sinking crew in the bottom of the Polaris shaft was preparing to blast a round of holes. It was necessary to remove the sinker pump before blasting. This was done by hoisting the pump up from the bottom through the center compartment with a tugger hoist, located about 70 feet from the sump. It seems that riding the pump to the place where it was lashed to the shaft timber before a blast was common practice, with the workmen disregarding the fact that the cage and bucket in the next compartment was available for use while performing this routine task. Bagley was riding the sinker pump from the bottom when the cable broke allowing the pump and Bagley to fall to the sump, a distance of about 50 feet. The deceased died in the Providence Hospital, Wallace, Idaho, January 10, 1939, from injuries which consisted of a compound fracture, dislocation of the bones of the right lower leg and foot, fracture and dislocation of head of left femur, lacerations of the face and scalp, with multiple fracture of the skull. This accident could have been very easily avoided. James H. Bagley was an experienced miner, and before working at the Polaris was a shift foreman in the employ of the Federal Mining and Smelting Company at its Morning mine, located at Mullan. The deceased is survived by his widow and four children.

**STATEMENTS**

Statement of: Ruben E. Brown, shaft miner operating tugger hoist.

Re: Fatal accident of James H. Bagley, January 9, 1939—1115 P. M.

The round had been drilled out and the pusher, Frank Hutton, was loading and preparing the holes for blasting.

I had climbed up the shaft app. 70 feet to the platform on which the tugger hoist is placed that is used in raising the sinker pump the 50 or 60 feet necessary to make it safe for blasting.

There is a small hole in the floor of the platform through which it is possible to watch the pump on its progress upward. Bagley signaled with his light for me to hoist. As the cable reeled in I could see Bagley was coming up with the pump.

When the pump was within about a set of its landing place the cable snapped without warning and the pump and Bagley fell to the bottom of the shaft.

RUBEN E. BROWN.

H. R. WELLMAN,
Witness.

Statement of: Wallace Pledger, shaft miner.

Re: Fatal accident of James H. Bagley, January 9, 1939—1115 P. M.

The round had been drilled out and the pusher, Frank Hutton, was loading and preparing the holes for blasting.

Bagley, Brown and myself climbed into the bucket on the bottom of the shaft, Bagley left the bucket at the second set where the sinker pump is
anchored. I got off at the bulkhead where the air and water hose is stored. Brown went up to the platform where the tugger hoist is located.

The cable for pulling up the sinker pump is run through a snatch block on the sinker pump and the end is securely fastened to timbers on top of the tugger hoist platform. The time required for the hoisting operation is about five minutes because of the slow cable speed due to this snatch block arrangement.

Bagley signalled Brown to begin hoisting. I could see him “steady” the hoist as it was pulled away from its anchor and then Bagley climbed onto it to ride up the shaft. When the pump was within a short distance of its landing place the cable broke without any previous warning and Bagley and the pump fell to the bottom of the shaft.

H. R. WELLMAN,
Witness.

Statement of: Frank W. Hutton, pusher.
Re: Fatal accident of James H. Bagley, January 9, 1939—11/15 P. M.
We had drilled out our round in the bottom of the shaft and I was stringing the wires for the delay exploders while Ruben Brown, Wallace Pledger and James Bagley were taking care of the air, water hose and sinker pump.
I had just finished the preparations for one end of the shaft and started to the other when the sinker pump and Bagley fell, landing just in front of me.
Brown always operates the hoist and either Bagley or Ricard help him.
The tugger hoist used in pulling the sinker pump from the bottom is located about 70 feet from the bottom of the shaft and the sinker pump is anchored about 50 or 60 feet from the bottom of the shaft.
According to Pledger, Bagley was riding the pump and had just arrived near the point where the pump is anchored when the cable broke, allowing the pump and Bagley to fall to the bottom of the shaft, a distance of about 50 feet.

FRANK W. HUTTON,
Witness.

Melvin J. Phillips was employed by M. W. Zook, a leasor at the Latest Out Mine to haul ore from the mine to Purcell Siding where the ore was loaded into railroad cars. While enroute to the loading dock it was necessary to cross a creek that was in a frozen condition. The wheels of the truck splashed water on the ratchet of the windlass on the dump truck, forming ice. In dumping the truck the dog slipped a few notches causing the crank to fly back and hit Phillips on his head crushing his skull. The injured man was killed instantly. As no report was sent to this department concerning this accident, information was taken from the files of the Industrial Accident Board.

March 9, 1939; Polaris Mining Company; Wallace, Shoshone County, Idaho. Clayton H. Ricard, raise miner, married, age 28.
Presumably overcome by powder smoke in the mine raise where blasting had taken place during the night, Clayton H. Ricard, 28, Polaris mine employee, plunged 100 feet to instant death in a timber slide off the mine’s 1900-foot level early today.
His neck was broken and his skull was fractured. The accident occurred a few minutes after Ricard and Jim Clem, his work partner, had started for the day. They went into the raise, but found it was “gassy” from blasting. They prepared to leave after turning on water to wet down the muck.
Ricard started from the raise ahead of his partner and apparently fainted, plunging headlong into the timber slide. He formerly lived in Sandpoint, and
came to the Coeur d'Alene district about five years ago. He was hired by the Polaris in November, 1937. Surviving are his widow, Mrs. Bess Ricard, a stepdaughter, Betty, and a brother, Henry Ricard.

The accident was indirectly caused by the negligence of the night shift who in their hurry to leave the working place failed to turn on the air to clear the raise of smoke and gas. This accident could have been avoided. A good workman is a careful workman who will guard the safety of himself and his fellow employees. It is always good policy to apply the Golden Rule,— "Do unto others as you would have them to do unto you."

STATEMENTS


Re: Accident which resulted in the death of Clayton H. Ricard on 3/9/39.

I went to 2300 level on the last cage for the beginning of the days shift, I was on 2300 level a very short time and came immediately to 1900 level. I walked from the 1900 station to the 31 raise.

When I arrived at 31 raise Ricard and Clem were up in the raise somewhere and I supposed that they were up on the bulkhead preparing for their days work. I rapped three (3) times on the air pipe to signal that I was coming up, there was no reply and I rapped again; getting no reply, I started up the raise manway. Fine muck began falling and I jumped back under the chute and was no more than safely under the chute when Ricard struck the level, landing on his head.

His partner (Clem) came down in about 3 or 4 minutes, he appeared to be gassed and Nolan Probst and I bathed his head in water.

We turned on the air pressure and allowed no one to go up the raise for about two (2) hours, there was some gas in the raise at that time, but it was not bad.

H. R. WELLMAN, Witness.

U. C. HUFF.

H. R. WELLMAN, Witness.

STENCH WARNING SYSTEM

Note injector and valve arrangement. Cabinet in center contains stench material known as "Ethyl Mercapton" which gives a strong odor resembling garlic.
Statement of: James Clem.

Re: Accident which resulted in the death of Clayton H. Ricard on 3/9/39.

Ricard and I rode from the 1900 station to the 31 raise in a dump car attached to the battery motor. Upon arrival at the foot of the raise we made the usual preparations for climbing up to the "back". We heard a hissing noise such as is made by escaping air and decided that the air had been turned on in the raise and was probably leaking from somewhere in the airline.

We began the climb up to the back of the raise and when we reached a point about 60 feet up, we stopped and rested and discussed the presence of gas in the raise. I wanted to go back to the level and turn the air pressure into the raise until the gas was blown out, but Ricard thought we should go on. We then resumed the climb up the raise, reaching the bulkhead, I climbed up over and on top of the bulkhead and Ricard climbed onto some lagging over the manway, he handed me the water hose thru the manhole and climbed thru the manhole and up onto the muck pile. We began wetting down the muck pile, meanwhile discussing the gas and finally decided to go back down the raise, turn on the air and blow the gas out of the raise, waiting on the level until the gas had been cleared out. After this decision was made, Ricard climbed back down onto the lagging over the manway and from there onto the ladder. Ricard waited for me and I climbed down onto the lagging over the manway, stopping to put on my shirt, and talking to Ricard, asking him if he was all right, to which he replied that he was. After getting into my shirt I glanced down preparatory to climbing onto the ladder, I could see no light, and almost in the same instant I heard a shout from some one at the bottom of the raise. I realized that Ricard must have "passed out" from the gas and fallen down the raise.

H. R. WELLMAN, Witness.

April 11, 1939; Federal Mining and Smelting Company; Morning Mine, Mullan, Shoshone County, Idaho. John Talvi, married, shoveler, age 66.

John Talvi was helping Joe Coffey land a load of 9 foot lagging on the 5th floor of the old shaft block stope in No. 5 tunnel workings of the Morning Mine. Unobserved and without making a sound he suddenly disappeared. The deceased may have stumbled or lost his balance while releasing the chain from the load of lagging which caused him to fall into the timber slide. It is possible that Talvi may have had a dizzy spell or a heart attack. The man's body was found 30 feet below in the timber slide. Death resulted from fractured skull and neck (compound).

AFFIDAVIT

I, Arthur Britton, was the shift boss in charge of the work being done at the time John Talvi fell into the timber slide in No. 5 tunnel and was instantly killed, April 11, 1939, at about 12:45 P. M.

I had ordered Joe Coffey to go down from the sixth floor to the fifth floor and help John Talvi land a load of 9-foot lagging. I remained on the sixth floor and after a few minutes went down and noticed Coffey working alone. I asked him where John was and he said he did not know. There was an air hose blowing and if he said anything else I did not hear it. Then I went down to the second floor where E. F. Whiteside was tying on the timbers and I asked Whiteside if he had seen John Talvi go by there and he said he had not. It was then that I suspected something was wrong and I went down to first floor and asked the hoistman E. K. Whiteside if he had seen Talvi. When he said "No", I then proceeded to the slide on the first floor where I found the body. Talvi was lying on his shoulders with both feet up along the slide. I did not notice any lagging or other material over or under him, but there could have been something under him covered by his body.
I ordered the man taken out immediately and the ambulance ordered. Dr. F. W. Rolfs was called and pronounced Talvi dead.

GUY FISHER,
Witness.

Sworn to an subscribed before me this 19th day of April, 1939.

B. N. OUIMETTE,
Notary Public

AFFIDAVIT

I, E. F. Whiteside, was working on the third floor at the time John Talvi fell down the slide and was killed.

I was tying lagging on the chain for Talvi and Coffey to land. I had sent one load up the slide and while they were landing it I was tying another load on the chain. The 9-foot lagging I was getting ready were sticking out in the slide about 2½ feet.

I stepped back to get another lagging and in doing so stepped on the far end of those in the slide. Just as I stepped on them they flew up and knocked me against the cap overhead. I did not see what hit them.

The shifter came down about 4 minutes later and asked if I had seen Talvi. I said, “No”, and he went on down. I sat down and rested for a minute until Coffey sent the chain down, when I tied another load of lagging on.

Kenneth hollered up and said John had fallen. I went down to the first floor and helped put him on the stretcher. I then went up and took the lagging off the chain so they could use it to lower the stretcher.

I did not hear a sound out of Talvi at any time.

GUY FISHER,
Witness.

Sworn to and subscribed before me this 18th day of April, 1939.

B. N. OUIMETTE,
Notary Public

AFFIDAVIT

I, Edwin K. Whiteside, was operating the timber-hoist that was being used to hoist lagging at the time Mr. John Talvi fell into the timberslide and was killed at the fifth floor of the old No. 5 Shaft Block.

I had been given signal to hoist a load of lagging from third floor to fifth floor and had completed the operation. In a few minutes something came down the slide which I thought at the time was a lagging that had been dropped from above. I heard my father, E. F. Whiteside, who was on the third floor, yell, “What are you doing up there?”

In the neighborhood of 5 minutes Mr. Britton came down to where I was and asked me if I had seen John. I replied, “No” he hasn’t come down here. He must be landing timber.” Mr. Britton said, “No, Coffey is helping him and he said he just came down.” “Then”, I said, “That must have been him that fell.”

We then both climbed up and found Talvi in the slide lying on his head and shoulders. Mr. Britton went to get the stretcher in No. 5 hoist room. I then helped put him on the stretcher. We felt his pulse and there was none, neither was he breathing.

GUY FISHER,
Witness.

Sworn to and subscribed before me this 18th day of April, 1939.

B. N. OUIMETTE,
Notary Public.
AFFIDAVIT

I, Joe Coffey, was working on the sixth floor of the old shaft block, No. 5 Tunnel, when Mr. Britton, the shift boss, asked me to go down to the fifth floor and help John Talvi land a load of 9-foot lagging which was being hoisted to that floor.

Talvi had placed lagging about the sides of the opening in the timber-slide, and when the lagging was hoisted it dislodged several pieces of the lagging. It apparently settled back into place and we thought it safe.

I turned around and had started to pull out a lagging from the load. When I last saw Talvi he was standing on lagging, leaning over in the act of unhooking the chain. I had my back turned and was about 4 or 5 feet away from the slide. I did not see Talvi fall into the slide, nor did I hear him make any sound, although I did hear the lagging fall.

Just then Mr. Britton came down and I told him I thought John had gone down the timber-slide. Mr. Britton did not appear to understand me, so I said it a couple of times. Then Mr. Britton went on down and I stood above, and when I saw Mr. Britton's light flash onto Talvi I went up to the floor above to tell Spinney and Alanko that John had fallen into the timber-slide. I went on down and helped put Talvi onto car.

JOE COFFEY.

GUY FISHER,
L. I. MARKEL.
Witnesses.

Sworn to and subscribed before me this 13th day of April, 1939.

B. N. OUMETTE,
Notary Public.

June 3, 1939; Idaho Almaden Mines Company; Cinnabar Mine, Weiser, Washington County, Idaho. L. A. Sutherland, single, surface miner, age 65.

While lifting a concrete slab, during construction work, Sutherland sprained his back muscles and injured his spine. From the sprain of the sacral iliac muscles and joint. The injured bone developed a Psoas abscess, later sepsisemia, which resulted in death on December 7, 1939. The deceased was operated on by Dr. W. R. Hicks, August 31, 1939, for a large Dorso-lumbar abscess which drained over a period of time but Sutherland was unable to recover from the injury. This information was taken from the files of the Industrial Accident Board.

July 7, 1939; Prospect, Blaine County, Idaho. Clifford Nome Yarnell, married, prospector, age 33.

From reports of the accident received in this department Yarnell and his associates were prospecting the lava beds about 25 miles north of Minidoka, Minidoka County, just across the Blaine County line. At first a churn drill hole was put down and values were found in the core drillings about 410 feet below the surface. The next step was to enlarge the churn drill hole to be used as an adit for the lowering of men and material and for hoisting muck. The idea was to build a station at the 410 foot horizon and mine under the lava beds from this point. The equipment was of the windlass type which is a very crude but simple way of hoisting for short distances. The cable was old and extremely unsafe, and connected to the bucket by knots instead of clamps. The deceased was being hoisted to the surface when the cable broke. Death was caused from a fractured pelvis and leg fractures received in the fall of approximately 400 feet. This accident was the result of extreme carelessness on the part of the prospectors, with no thought as to the fundamental rules of safe mining practice or the common law of self preservation. This is so obvious that the Inspector of Mines will refrain from further comment other than to say this accident most certainly could have been avoided.
August 4, 1939; Tendoy Copper Queen Syndicate; Baker, Lemhi County, Idaho. Demoin Frederick Schaffner, married, mill man, age 22.

Upon investigation of this accident by the Inspector of Mines it is hard to determine how the deceased could get his head in position to cause this regrettable accident. The machinery at the Tendoy Copper Queen Syndicate Mill is well guarded to avoid accidents. One making an investigation would come to the conclusion that every precaution had been taken for the safety of the men employed. However, on August 4, 1939, at about 3:45 A.M. on graveyard shift, Demoin Schaffner in some inconceivable manner got his head caught between a four-inch belt and a pulley on a thickener pump revolving at a speed of approximately 60 R.P.M. Death was caused by fractures of the skull, cervical vertebrae, and broken upper and lower jaws. We do not know how the man got himself in this extraordinary position but it is safe to classify this accident as avoidable.

State Insurance Fund,
Boise, Idaho.

Gentlemen:

I wired you today that Demoin Schaffner, mill hand, was injured in the mill and later died at the Salmon General Hospital.

The accident occurred about 3:45 a.m. on graveyard shift. His foreman, Niel Ankrum, had stepped out to the toilet and when he returned, found the mill full of smoke, which it was promptly learned by due to a belt on the thickener pump slipping on its drive pulley. He ran up to the cell floor where the thickener pump is located and found Demoin Schaffner with his head lodged between the belt and the pulley. How he got in such a position will never be known and it is difficult to surmise how he could have gotten there. Mr. Ankrum says that his hands were free and his head, lodged between the belt and the pulley, had stopped the pump and the belt was partly burned thru where it had been held against the drive pulley. He released him and called me. I found him lying on the floor (releasing him was a remarkable bit of work) where Mr. Ankrum had laid him and several teeth lying about that had been knocked or squeezed out. We immediately put him on a stretcher and took him to Dr. Mulder's office in Salmon, who after a brief examination sent us to the General Hospital.

He was under the physician's care about an hour after the accident and died about 7 a.m.

Demoin Schaffner has been with us about two years, was a model employee, has a wife and a baby about 6 weeks old.

Mr. Saboe was in Salmon and I went over the accident with him. He did not come up to the mine.

Please advise if there is any other information desired or blanks I should fill out.

Cordially,

Copy, Arthur Campbell,
State Mine Inspector.

Tendoy, Idaho,
August 4, 1939.

September 14, 1939; Sunshine Mining Company; Sunshine Mine, Kellogg, Shoshone County, Idaho.

At 10:15 P.M. while the night shift was at work, an explosion occurred in the powder magazine on the 3100 level of the Sunshine Mine, located near Kellogg, Idaho. The deceased was in the magazine at the time of the explosion and was killed instantly. The cause of the explosion is unknown. No evidence remained after the explosion to aid in the investigation. Following the "Description of Fatal Accidents" we have included an article on Explosives, including Transportation, Storage, and some "Don'ts" which we sincerely hope will not only be read with care but put into actual practice so that another accident of a similar nature to the Morrison case may be avoided.
Front view of the Paul Breathing Apparatus, which is standard equipment used in the Coeur d'Alene district in mine rescue work.

STATEMENTS

Statement of: Laurence H. Benton, foreman.

Re: The accident which resulted in the death of Chester L. Morrison on September 14, 1939.

“At about 10:20 on night shift, I heard the telephone ring—I was in the change room. Sam Wright, electrician answered it. He ran up to tell me that there had been a blast on 2700 level. I ran down steps, into tunnel and got on the cage. Tiny Pugh who was in the tunnel got into the cage with me. We went to 2700 down the Jewell Shaft. Both of us ran the approximate 1500’ over to the winze shaft. By the time I got there, I. H. Wood had brought Sam Widmer and Manuel Fagan up from the 3100 level. I met Gene Wimer there, and he, Woods and myself grabbed each of us one of the 30-minute respirators which had already been brought down from the 1900 level. We went to the 3100, got off cage, and went back to powder magazine, but could see absolutely nothing because of the very dense smoke. We knew our respirators would not last much longer so I told the boys we would have to hurry back out. We went back to the 2700 level, and donned the helmet crew with Mine Rescue Helmets which I had sent for before I had gone to 3100. I sent five trained men of the mine rescue team to 2900 level because we had four men on 2900 whom we thought might be endangered by the heavy smoke. They found the four men and they were all right, and Gene Wimer sent them up the 17 Raise on 2900 to 2700 level. The five helmet men then returned to 2700. By the time they returned, three of the four men on 3100 had reached the 2700 level by climbing up the raises. Wimer put on a new helmet and took two new helmet men back to 3100 to magazine but could not find the other man.

They came back to the 2700. The smoke had cleared considerable by this time. A. L. Graham, myself, Red Veach and Berl Zurkle went down to the 3100. We found a piece of flesh, but upon the advice of Mr. Graham we left it lay pending the arrival of the coroner. We did not try to straighten up any of the wreckage the rest of the shift, and I gave orders that none but
### Classification of Accidents

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<th>MINE</th>
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<th>Seriously Injured</th>
<th>Slightly Injured</th>
<th>Fatal</th>
<th>Seriously Injured</th>
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<td></td>
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<td>14 days</td>
<td>7 to 14 days</td>
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<td>14 days</td>
<td>7 to 14 days</td>
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#### Underground
1. Fall of rock or ore from roof or wall
2. Rock or ore while loading at working face or chute
3. Timber
4. Explosives
5. Haulage, cars or motors
6. Persons falling down chute, winze, raise or stope
7. Drilling (by machine or hand drills)
8. Hand tools
9. Machinery (other than motors or drills)
10. Flying or falling objects
11. Fall of persons
12. Lifting
13. Nails and splinters
14. Electricity
15. Other causes

### Total
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#### Milling Accidents
1. Haulage (cars and locomotives)
2. Railway cars or motors
3. Crushers, rolls or stamps
4. Tables, jigs, etc.
5. Other machinery
6. Falls of persons
7. Falls in ore bins
8. Falling objects, (rocks, timbers)
9. Scalding (steam, water or acid)
10. Lifting
11. Hand tools, axes, bars etc.
12. Nails, splinters, etc.
13. Electricity
14. Other causes
15. Drowning

### Total
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<td>Breaking of cables</td>
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### SURFACE ACCIDENTS

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### SMELTER ACCIDENTS

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<td>Burns from matte, slag or molten metal</td>
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### AUXILIARY WORKS

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the cager or the pumpman could go down to 3100 level. When the four of us returned to the 2700 level we met R. F. Mahoney and Mr. Graham and myself returned again to 3100 to show him what we had found.”

L. H. BENTON

Statement of: Gene Wimer, shift boss.
Re: Accident which resulted in the death of Chester L. Morrison on 9/14/39.

“About 10:30 in the evening, I came down the 17 Raise from the 2500 to the 2700 levels and I met Ed. Warren who told me about the explosion on the 3100 level. I immediately went out to the winze and saw the smoke. L. H. Benton was there, and I inquired of him about helmets, and he said that they were on their way down. While we were waiting for them, Mr. Benton, I. H. Wood and myself took 30-minute respirators and went to 3100 level, and about 100 feet east of the “Y” before we were forced to return to the 2700. It was difficult to see, and we felt around for anyone who might have fallen, but we could find no one. Upon our return to the 2700, we found the helmets had arrived, so I took a crew of four men, namely; Berl Zirkle, I. H. Wood, R. J. Stanford and Wade Pugh, and went to the 2900 and to the easterly end of the E. Drift and encountered dense smoke until we came to 17 Raise. We turned off the fan on 2900 to keep the smoke from going into the east end. I instructed N. B. Blanford to hoist three men up the 17 Raise to 2700, and for him to turn the air in a westerly direction, and to wait until I came back for him. Then I checked gauges on the helmets and found them low in pressure, so we went back to the 2700. We found that three of the four men on 3100 had climbed out, so after assuring myself that they were all right, I sent them on out of the mine. I sent two men back on 2700 level to the 17 Raise to assist the three men from 2900 out of the skip and to be sure that they were all right. I took three fresh men, Si Cornett, Norval Jones and Earl Wood, and we went back down to the 3100 level, and went as far East as the 7 Raise. From there we returned to the former site of the powder magazine, where we found some of the battered remains of Chester L. Morrison. We then returned to the 2700, and as the smoke had cleared considerably, we removed our helmets. The three men from the 2900 had arrived on the 2700 level, and I sent them on out and I went back to the East Drift on 2900 and brought Norvin Blanford out to 2700 and sent him on out of the mine. A. L. Graham, L. H. Benton, R. F. Mahoney and myself went to the 3100 to the scene of the explosion and made a circuit of the 3100 level, then up to the 2900 and inspected it, then returned to the 2700. Then I went up out of the mine and home.”

E. K. WIMER.

Statement of: I. H. Wood.
Re: Accident which resulted in the death of Chester L. Morrison on 9/14/39.

“I first saw C. L. Morrison when he ate lunch with us, and he got up and took his primers and tied them in a knot with string and left. That must have been, I should judge about 10 o'clock when he left. About 15 minutes later, the big air doors near where I was working flew back and hit wall. I did not have my hat and I ran back to the station to get it and I said to Kenneth “That is not an air blast.” I began to see smoke on 2700 station so I got in cage and went down. There was more smoke on 2900. When we got to 3100 level, I could not see a thing. I called, and Manuel Fagan answered and grabbed my hand. I felt around for Sam Widmer and finally felt his slicker. They said: “We do not know who is down here or what has happened. I helped them into cage and brought them up to 2700— I sent my partner to 2500 to find Gene Wimer, and had Kenneth Kulm call top for stretchers. Gene Wimer and L. H. Benton came down to 2700 and the three of us donned smoke respirators and went down to 3100 and back to curve on 3100, but the respirators were getting too hot so L. H. Benton signalled for us to come back up to 2700. Then we put on helmet and went back to 2900 and went in and shut off the fan to halt the smoke—then back to 2700, and resumed regular work.”

I. H. WOOD.
Statement of: Jack D. Harris.
Re: Accident which resulted in the death of Chester L. Morrison on 9/14/39.

“I was on motor, and on trip out to station, I noticed C. L. Morrison standing near the powder magazine on the side toward the shaft. I do not think his lamp was lit. We went out to the station and dumped and returned to face. In about ten or fifteen minutes after our return to the face the blast went off and our lights went out. We started out of the drift and got within about 50 feet of the “Y” where we met the smoke. We went back into the drift, and someone knocked on the pipe as a signal but we got no response. We then decided to attempt to go thru the smoke in the South Drift to the station, but smoke, wire and boulders made it impassable. We then went back to 7 Raise and up 7 Raise to 2900—then up 5 Raise to 2700. We met L. H. Benton and Gene Wimer on 2700 station and upon Gene Wimer’s instructions we went up to the surface.”

JACK D. HARRIS.

Statement of: John Koskinen.
Re: Accident which resulted in the death of Chester L. Morrison on 9/14/39.

“C. L. Morrison and I finished lunch about 9:20 P. M. and picked up primers and wire at 2700 station and waited about ten minutes for cage to take us to 3100. When we got off on 3100 we went directly to the Powder Magazine. There were about four or five boxes of powder in the magazine and I took one box down the drift 10 or 15 ft. and I split powder while my partner, (C. L. Morrison) was making primers. I finished splitting and had powder stacked in box and then I went on into drift to help mucking machine man and his partner finish mucking out round. In a very few minutes there was a terrific explosion. We were jarred and our lights extinguished, but we did not lose our footing. We lit our lights and started down drift and soon encountered smoke. We were driven back into the drift by the smoke but finally decided to make an attempt to get thru—and we went thru to the “Y” and from there past the raise in an attempt to reach the station, but we had to retreat and go up No. 7 Raise 3100 to 2900—from there up No. 5 Raise to 2700—from there to winze station. We talked to Gene Wimer, and found the rest of crew on 2700, and at Gene Wimer’s instructions, we came up to the surface.”

JOHN KOSKINEN.


TELEGRAM

COEUR D ALENE IDAHO 1939 SEP 17 AM 9
ARTHUR CAMPBELL—

STATE INSP OF MINES BOISE IDAHO CARE GTC RUSH

OVERWINDING HOIST ACCIDENT MAIN SHAFT EARLY SUNDAY MORNING TWO MEN KILLED ONE SERIOUSLY INJURED PLEASE COME AT ONCE AND HOLD INQUIRY SUGGEST YOU USE A PLANE—STANLY A. EASTON.

At 1:30 a. m., Sunday morning, September 17th, Andrew G. Anderson, timberman, and two assistants, Dewey White and Bruno Ebel, were lowering framed timbers from the main shaft station of the Bunker Hill Mine on the No. 9 Adit tunnel level to the 2100-foot level, a vertical distance of 2400 feet.
Assisting in handling and unloading these timbers at No. 9 station were John Komin and Thomas Saari. This main incline shaft of the Bunker Hill mine is 50° incline, two hoisting compartments and a manway. Framed mine timbers are hauled in from the surface plant, stored temporarily at the station and lowered as required.

As shown by the self-recording device at the electric hoist a load of timbers went down at 1:15 a.m. and subsequent examination showed that these timbers were trucked from the station on the 2100-foot level to the point where they were to be used in the timbering of the three compartment May raise, and the three men, Anderson, White and Ebel, had returned to the 2100 station, mounted the timber carrying truck attached to the skip and gave proper signals to be hoisted to the No. 9 station for another load of timbers. The hoisting engineer, Harold Acton, who has been in the employ of the Bunker Hill and Sullivan Mining Company for many years and on this special hoist as hoistman and oiler for upwards of ten years stated that he received the signal properly but did not stop the skip, to which the timber truck-trailer was attached, at the collar of the shaft but hoisted it past the station up into the skip dump where the ore and waste is discharged while hoisting. The action of the skip in going into the skip pocket threw the truck or trailer against the concrete hanging wall, wrecking it and tearing it loose from the skip so that it dropped or slid down on the rails the entire distance to the bottom of the incline.

Bruno Ebel fell or was hurled by the impact into No. 9 station where he was found near the edge of the shaft and removed to the hospital. The other two men, Anderson and White, were probably killed by the direct impact or shortly after by the erratic course of the derailed truck in sliding down the rails and the incline; their badly mutilated bodies were found on the truck at the bottom of the shaft.

Andrew G. Anderson is survived by his widow and four children ranging from seven to fourteen years of age. Dewey White's dependents are his father and mother who live at Moyie Springs, Idaho. Bruno Ebel, while suffering from fractures of both legs, shoulder blade and three ribs, is reported getting along well at the hospital and will probably recover although he will be in the hospital for several months. Hoist engineer Harold Acton has been in a bad nervous and mental condition. He was given sedatives and put to bed at the hospital. Acton made a statement at noon of September 19th, 1939, saying he assumed full responsibility for the accident claiming it was entirely due to failure on his part, saying that possibly "he went to sleep on his feet".

The safety device used in hoisting men automatically prevents the passing of the skip past the collar of the shaft. In this instance the loading of these long raise timbers made it necessary to hoist the equipment past the collar of the shaft a short distance so that such safety device was inoperative at the time.

This is the first fatality which has occurred to any underground employee of Bunker Hill and Sullivan Mining and Concentrating Company since July 17, 1936, a period of exactly three years and two months during which time closely 3,051,921 man hours were put in underground and 1,118,830 tons of ore mined.

An investigation was made of this accident by the Inspector of Mines but owing to the condition of Bruno Ebel and Harold Acton no formal hearing or inquisition was held in connection with the accident. If public opinion should demand that a public hearing be held in the face of the statement by Harold Acton on September 19th, when he assumed all responsibility it can be arranged. This department does not feel that there was any criminal negligence present and in fairness to all concerned the Inspector of Mines does not intend to take the initiative in the matter until Bruno Ebel is sufficiently recovered from his injuries and Harold Acton has returned from a short trip which his employers have urged him to take in order to recover from the shock of the accident and recover his mental equilibrium. However, this accident could have been avoided, and in the meantime any suggestions
along safety lines that would help us to avoid a recurrence of an accident of this kind will be welcomed by this department and the Inspector of Mines assumes that safety suggestions on the prevention of accidents would also be welcomed by the safety department of any mining company engaged in mining within the state of Idaho.


Henry I. Leslie and his partner Audrey T. Dunham were employed by the Huron Mines Inc., to drive a contract raise from the 540 level of the Lincoln Mine. The men worked in the raise September 16th, 1939 and as the night shift did not show up for work on that date they followed themselves on the morning of September 17th. Dunham climbed up the raise to blast some boulders that were lodged on the grizzly a distance of about 170 feet from the sill. When the smoke had cleared to some extent from the blast, Leslie got on a small skip or boat used to hoist timber, steel, and other material used in the raise with the idea of riding up to the grizzly rather than having to climb the ladders. Dunham was operating the air tugger hoist at the bottom of the raise on the sill floor or drift. The skip was about 10 feet above the level when a rock fell down the timber slide knocking Henry Leslie off the skip. The deceased fell to the drift level immediately in front of Dunham. Death was caused from a basal fracture of the skull. The accident happened about 10 A.M. Leslie never regained consciousness and was pronounced dead by Dr. Carver of Emmett upon the doctor's arrival at 11 A.M. The deceased is survived by his widow and one child, five years of age. This accident could have been avoided. The man had absolutely no protection from falling obstacles and the contraption on which he attempted to ride was never intended or placed there for the transportation of men. In the last analysis it does not pay to take unnecessary chances.

September 18, 1939; Senter Star Mine, Elk City, Idaho County, Idaho. Claude Easley, single, laborer, age 59.

While hauling lumber for construction of a mill Easley slipped and fell against a tractor. From a slightly bruised right leg, embolism developed and resulted in the man's death on September 19, 1939. The infection which set in is known as Phlebitis of the right leg. No report was sent to this department concerning this accident making it impossible for any investigation. This information was taken from the files of the Industrial Accident Board.

September 19, 1939; Bradley Mining Company; Yellow Pine Mine, Stibnite, Valley County, Idaho. Lee Lcusious Hill, carpenter, married, age 57.

During the forenoon of September 19, 1939, Lee L. Hill, a carpenter on construction work, was working on a scaffold near the gable of a new mill building. As near as we can tell the deceased became dizzy and fell to the ground. Death was caused about an hour after the accident by a fracture on the right side and to the back of the skull. Dr. Roscoe C. Ward came in from McCall by airplane but Hill was dead when the doctor arrived at Yellow Pine.
TWELVE FUNDAMENTAL RULES FOR SAFETY

Compliments of Mine Safety Appliances Company,
Braddock, Thomas & Meade Streets, Pittsburgh, Pa.

All of these 12 rules have been developed to point the way to an improvement in mining safety. They are intended to answer the question: "How Can I Make My Mine Safe?"

Emphasis throughout has been laid upon the management as the key factor in any safety program. Unless the president and other top executives are thoroughly sold on safe operation as an essential policy of the company, little can come of a safety program.

Once sold on the idea of safety, management must set its own house in order first, before appealing to the worker for his cooperation. This involves the education and training of foremen, the provision of safety equipment and safe operating methods, and the maintenance of the mine property in a safe condition at all times.

Then can the worker be approached for his cooperation. This involves his education in safe ways of working as well as the use of an emotional appeal for his self-preservation.

Our mines can be made safe if management takes the initiative and firmly sets out to do a good job.

1. Begin at the Top
The president and the top executive officers of the company must be personally sold on safety and have the determination to initiate a sound program that will produce results.

2. Work Down Through The Management
This involves selling safety to the operating officials, especially the general managers and superintendents.

3. Foreman Responsibility
Safety must be considered as important a part of the foreman's job as costs and production.

4. Provide Safe Mine Design and Layout
This involves a consideration of safety in the laying out of mining methods and selection of detailed operating plans.

5. Use Safe Equipment
The use of permissible mining equipment and the maintenance of the permissible standards through inspection after the machines have been installed and in use, are important safety practices.

6. Provide Safety Equipment
The use of permissible equipment is also stressed here, including permissible mining machines, permissible locomotives and electric cap lamps.

7. Sell Safety To The Miner
This can best be done by first convincing him that the management is really interested in safety for his protection.

8. Maintain Interest In Safety
Foreman meetings, safety contests, bulletin boards, and related activities stimulate interest.

9. Cooperate With State And Federal Agencies
The value of cooperation with the Federal Bureau of Mines, state mine inspectors, and insurance inspectors is brought out.
10. **Find The Cause of Accidents**
   A definite investigation should be made of every accident, responsibility established, and means taken to prevent recurrence.

11. **Discipline**
   Occasionally it is necessary to set up a procedure for discipline, which should apply not only to the miners but also to foremen, when they are responsible for accidents.

12. **Keep Accurate Records**
   An accurate and detailed record of accidents, where they occur and their causes, is a great aid in any safety program.

**NOTE**—This department recommends the use of electric cap lamps when there is no danger of encountering poisonous gas. The Inspector of Mines suggests that extreme caution should be exercised in the use of electric cap lamps or closed lamps of any kind when opening up abandoned mines, rehabilitating old workings and in dead ends which have not been subject to proper ventilation for a period of time. This precaution would eliminate the immediate danger of an avoidable accident and assure the workmen a comfortable margin of safety. With a closed lamp there is not sufficient warning if a dangerous condition should exist from the presence of black damp or other poisonous gas unless open flame lights or some other precaution is taken to eliminate any immediate danger.
Characteristics

In the selection of any explosive for any blasting operation many factors must be taken into consideration to choose wisely an explosive adapted to the conditions under which it is to be used. It is essential first to know the condition under which the blasting is to be done. The presence of water, good or bad ventilation if underground, and the nature of the material to be blasted, together with knowledge of the degree of fragmentation desired of the blasted material, whether large lumps as in coal or small pieces for crushed stone, furnishes the problem and asks the question. "What is the explosive best suited to overcome the known obstacles in the way of successful performance and to produce the desired results in the most economical manner?"

The principal characteristics of commercial explosives are touched upon below.

Velocity

This is spoken of under various names: rate of detonation, speed, quickness, etc. The velocity of any explosive denotes its capacity for producing a shattering or smashing effect. An explosive is said to have a burning speed or velocity of a certain number of feet per second. The higher the velocity the greater shattering effect. There is a wide range in the speed of explosives. Black Blasting Powder is rated at 1,538 feet per second. A granular dynamite with 5% nitroglycerine content, has a speed of 3,300 feet per second, while the higher strengths possess higher velocities until we reach a speed of 26,200 feet per second in 100% Blasting Gelatin.

Strength

By this term is meant the power or force developed by an explosive. To know the strength of an explosive is to know its propulsive effect or its potential capacity for doing useful work.

The straight Nitroglycerine Dynamites, alone are rated on the basis of the actual percentage of weight of nitroglycerine content per 100 pounds of dynamite, for example: 40% Nitroglycerine Dynamite contains 40 pounds of nitroglycerine per 100 pounds of dynamite. The strength of Nitroglycerine Dynamite serves as a basis of comparison for grading the strength of all other types of dynamite. Nitroglycerine Dynamite may properly be spoken of as 40% or 60% whichever the case may be, but other types of dynamite are said to be 40% STRENGTH or 60% STRENGTH. Certain types of dynamite do not contain as much nitroglycerine as Nitroglycerine Dynamite, but they are made on a formula calculated to release as much energy as an equivalent grade of Nitroglycerine Dynamite, weight for weight.

Relative Strength of Black Blasting Powder to Dynamite

The question is often asked as to what the relative strength of Blasting Powder is to Dynamite. No mechanical test is known by which a comparison can be made owing to the very different characteristics of Blasting Powder and Dynamite.

In practice it is found that 20% or 30% strength dynamite will replace Blasting Powder pound for pound, while it is suggested that one pound of 40% strength will replace one and one-half pounds of Blasting Powder.

Bulk Strength

When reference is made to the bulk strength, it is to make comparison of the VOLUME strength, i.e., stick for stick of the same size.

A cubic foot of space will only hold a cubic foot of dynamite, consequently a more bulky explosive cannot be loaded weight for weight in a given size hole, hence the measure of its strength of course is the volume strength.

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Density

Some dynamos are more bulky than others and have a larger cartridge count to the case. Naturally, one pound of a bulky explosive will fill more of a given hole than will a pound or equal weight of a dense explosive. A dense explosive is desirable in tight rock, whereas the bulky types may be used to advantage where the force is distributed over a large area.

40% strength Gelatin, 1 ¼"x8" sticks, will average 88 sticks to the 50-pound case against about 105 sticks for Ammonia or Nitroglycerine Dynamites. Accordingly, if blasting is being done requiring a high degree of strength or propulsive effect and good shattering, Gelatin would be the choice. The same would apply in softer material as between 40% Ammonia of 105 cartridge count and a bulky explosive of 155 count to the 50 pounds.

Fumes

The efficiency of any explosive depends directly upon the volume of gas evolved, but it is aimed to keep the volume of the more objectionable gases or fumes down to a minimum. Some types of dynamite evolve more objectionable fumes than others. For open work, the character of the fumes is seldom important, but for underground work, an explosive that gives off noxious fumes never should be used. In underground work attention should be given to improving the ventilation.

Unless complete detonation of the explosive used is secured an excess of fumes will result. Dynamite will burn and in doing so will evolve the greatest amount of dangerous fumes. Incomplete detonation also creates excessive fumes. The more complete the detonation, the better the fumes. Complete detonation is made more certain by using strong detonators that have not become damaged by improper care or storage; by close confinement of the explosive in the bore hole, thereby eliminating air spaces; by tamping firmly with enough material and never lacing fuse through dynamite because a side spit from the fuse may cause the dynamite to burn instead of to detonate. Cheap fuse such as cotton, for example, should be avoided. Cheap fuse will, in itself, create more smoke than good fuse, as may be easily demonstrated in the open by burning simultaneously two kinds of fuse. Old dynamite will often fail to detonate, sometimes burning up and making a great deal of smoke.

Length and Duration of Flame

All explosives, when fired, give a flash which varies in length, duration and temperature. The flame from Black Blasting Powder is longest in length and duration; dynamites make shorter but hotter flames; and permissible dynamos give the least of any as to length, height, duration and temperature. Even a permissible explosive, if overloaded and improperly confined, may ignite gas or dust in air. Permissible explosives when not frozen and completely detonated and loaded in amounts not to exceed one and one-half pounds and as otherwise prescribed by the Bureau of Mines are formulated to give a minimum of flame, thereby minimizing the likelihood of gas or dust explosions in coal mines.

Plasticity

Plasticity is a property especially characteristic of Gelatin. Like putty, it can be moulded into any shape, and being cohesive, will not crumble like dynamite and run out of upholes, called uppers, but will fit snugly in the hole when pressed into place.

Water Resistance

Any dynamite will be ruined by an excess of moisture. If improperly stored, dynamite and especially the Ammonias or permissible types, will absorb moisture from the atmosphere if the climate is damp. It is for this reason that great care is used to seal the cartridges with paraffine to protect the dynamite from moisture. If the wrappers are removed and the explosive loaded in wet holes, it is rendered less effective and in the case of Ammonia or Permissible Dynamites, may become totally ineffective in a short time. In wet work, the wrappers should never be removed, nor should the cartridges be slit. Explosives loaded in wet holes should be fired as soon as possible.
Gelatins are the most water resistant. Nitroglycerine grades are next, especially the higher grades. Black Powder is the least water resistant. Removing the wrappers also decreases the strength for the wrapper is an unmixed ingredient and its removal upsets the chemical balance of the powder.

Sensitiveness

Sensitiveness to detonation is the susceptibility of any explosive to explosion by influence, and its ability to propagate from one cartridge to another the detonating wave. Some explosives are more sensitive, hence more easily detonated than others.

TRANSPORTATION AND STORAGE

Transportation

1. A truck containing explosives should never be left without first stopping the motor and securely setting the brakes. When transporting explosives over the highways, it is advisable to avoid unnecessary stops. Stops for meals should be made at some roadside restaurant and the truck should be left well away from traffic and parked vehicles. A truck containing explosives should never be taken into a garage or repair shop.

2. When transporting explosives, the truck should come to a full stop before crossing any railroad track and should not attempt to cross the track until it is known that the way is clear and that a train or engine is not approaching.

3. Unauthorized persons should never be permitted to ride on trucks transporting explosives.

4. The gasoline tank of a motor truck should not be filled while explosives are on the truck except in emergency and then only when the engine of truck is stopped.

5. The batteries and wiring on motor vehicles for transporting explosives should be located so that they will not come in contact with the packages of explosives and all wiring should be completely insulated and securely fastened so as to prevent short circuiting and fire.

6. The truck should be equipped with not less than two fire extinguishers of a make approved by the National Board of Underwriters located at convenient points, filled and ready for immediate use. To reduce fire hazard and risk of explosion, the truck engine, the pan, the chassis and the bottom of the body should be kept free from surplus oil and grease.

7. Where state laws or local ordinances prescribe special markings for vehicles transporting explosives, same should be complied with. Where no such regulations exist, such vehicles should either be placarded on each side and the rear with the word “EXPLOSIVES” in letters not less than 3 inches high or display a red flag 24 inches square marked with the word “DANGER” in white letters not less than 6 inches high.

8. A truck used for transporting explosives should be inspected daily in order to determine that—

- Fire extinguishers are filled and both extinguishers and equipment are in good working order.
- Electric wiring is completely insulated.
- Chassis, engine, pan and bottom of body are clean and free from surplus oil and grease.
- Gasoline tank and feed line have no leaks
- Brakes and steering apparatus are in good order, and that
- Truck is in proper condition in all other respects for handling explosives.

9. Explosives should never be left unless they are placed in a magazine and the magazine is locked, or are delivered to some one authorized to receive them. In unloading, packages of explosives should never be piled immediately back of the exhaust as a spark may start a fire and cause an explosion.

Storage

Magazines for the storage of high explosives should be bullet and fire resistant, weather-proof, dry and well ventilated. They may be of brick or
sand filled construction or of the portable iron type; however, if a portable iron magazine is used, the building should be made bullet resistant by lining with either brick, sand or a weak cement mortar. The magazine should be ceilings and painted with aluminum paint to reduce the temperature in the building.

If there are state or local laws specifying the location of magazines, they should be complied with. In the absence of any laws, it is recommended that all magazines be located in compliance with the American Table of Distances which specifies the distances that magazines containing various quantities of explosives should be located from inhabited buildings, highways and railroads.

The storage of explosives has a much deeper relation to safety in their use than is commonly realized. Improper storage of explosives, detonators, fuse and squibs leads directly to misfires and to the incomplete detonation which leaves unexploded dynamite in the bore hole or thrown out among the blasted material, and to the burning of charges in the bore holes. Even a small leak in a magazine roof may allow a few cartridges of explosives to become wet and the use of these cartridges may result in either misfire or incomplete detonation. A dilapidated magazine, or a magazine with floors close to wet ground, or any condition of storage which would expose ammonium nitrate explosives, and these include all of the extra dynamites and most of the permissibles—or blasting caps, or safety fuse, or squibs to moisture is almost sure to result in one or both of the aforesaid troubles.

Inadequate ventilation of magazines may also lead to misfires or incomplete detonation, for unless air circulates freely through a magazine the atmosphere may become hot and humid, and long exposure to such atmosphere has much the same ultimate effect upon ammonia explosives, blasting caps and fuse as has dampness. With the nitroglycerine explosives it tends to cause a separation of the nitroglycerine from the other ingredients, or a leakiness, that makes the explosives much more sensitive and hence dangerous to handle.

If a steel magazine is used without protection of some kind from the direct rays of the sun, there is danger that the steel will absorb so much heat as to cause ammonia explosives inside to become hard and insensitive. Especially is this likely to happen in a climate of hot days and cold nights where the explosives are subjected to repeated alterations of high and low temperatures. Numerous instances are on record of misfires and partial detonations due to just this cause. A steel magazine for the storage of ammonia explosives in a region of hot sunshine should be protected by a wooden roof supported on posts so as to leave free circulation of air between it and the magazine, or by a coat of aluminum paint.

**DON'TS**

1. Don't leave explosives in a wet or damp place. They should be kept where it is clean, cool, dry and well ventilated.

2. Don't leave explosives in a field or any place where live stock can get at them. Cattle like the taste of salts in explosives, but these or other ingredients will probably make them sick or kill them.

3. Don't store explosives so that the cartridges stand on end.

4. Don't open cases of explosives in a magazine.

5. Don't throw packages of explosives violently down or slide them along floors or over each other or handle them roughly in any manner.

6. Don't smoke while using or handling any explosives.

7. Don't handle explosives near open lights, other fire or flame, or sparks.

8. Don't use any tool other than wooden wedges and wooden, fibre or rubber mallets for opening cases containing high explosives.

9. Don't use frozen high explosives.

10. Don't cut or break frozen cartridges or high explosives.

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² Institute of Makers of Explosives, 1985 Revision.
11. Don't force a cartridge of high explosives, especially a primer, into a bore hole.

12. Don't tamp with iron or steel bars or tools. Use only a wooden stick with no exposed metal parts.

13. Don't prime both ends of a cartridge of explosive when making primers of half cartridges with a blasting cap or electric blasting cap, before cutting it in two. Cut the cartridge in half and prime each piece separately.

14. Don't shoot into explosives with any firearm.

15. Don't connect up or load bore holes for electric firing during the approach or progress of a thunderstorm, and if charges are already loaded and connected, all persons should be kept at a safe distance from them while the storm is in progress. If necessary to leave over night, ends of the wires should be twisted together, coiled and covered with dirt.

16. Don't fire a blast before all persons are at a safe distance or under sufficient cover, and all explosives are in a safe place.

17. Don't allow occupied automobiles near the danger area of the blast.

18. Don't keep blasting caps or electric blasting caps in the same box, container or magazine with other explosives.

19. Don't leave packages of explosives or blasting caps uncovered.

20. Don't leave high explosives, blasting caps or electric blasting caps exposed to the direct rays of the sun.

21. Don't store or carry blasting caps or electric blasting caps with any other kind of high explosives.

22. Don't have electric wires or cables, which may be carrying current, near blasting caps, or electric blasting caps, explosives or charged bore holes at any time except for the purpose of firing the blast.

23. Don't use any blasting caps—or electric blasting caps, weaker than No. 6.

24. Don't attempt to use electric blasting caps with plain wire and normal insulation in very wet work. For this purpose use water-proof electric blasting caps having enameled wires.

25. Don't attempt to remove or investigate the contents of a blasting cap or electric blasting cap.

26. Don't carry blasting caps or electric blasting caps in pockets of clothing.

27. Don't try to withdraw the wires from an electric blasting cap.
Idaho contains an area of 83,888 square miles. The state is divided into 44 counties, 36 of which can be classed as having minerals of commercial importance. In most of these counties there are producing mines.

In the past practically all mining has been confined to the five principal metals: Lead, silver, gold, zinc, and copper, which are widely distributed throughout the state. In addition to these a great variety of uncommon metals and minerals occur in sufficient extent to be of commercial importance.

This great diversity of mineral wealth establishes Idaho as one of the principal mining states of the Union. It also makes mining the second most important industry in the State.

The importance of Idaho's mineral wealth is well shown by statistical facts based on the production and exploitation of the five principal metals, lead, silver, gold, zinc, and copper.

Total metal production since 1860, more than $1,300,000,000.
Average annual production for past 30 years, more than $26,000,000.
Average annual mine payroll, more than $9,000,000.

See pages 6-7 for publisher's address, meaning of reference marks, and abbreviations.


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ANTIMONY

Deposits of antimony, principally the sulphide (stibnite) are found in Shoshone County, Valley, Boise, Blaine, Idaho, Owyhee, and Custer counties. Those in the Coeur d’Alene district of Shoshone County have been extensively developed; a number of mills for the concentration of the ore have been constructed; and in the past a large tonnage has been produced and marketed. The deposits in Blaine, Valley, and Owyhee counties contain a high-grade ore, most of which can be shipped without preliminary treatment. During the war, when antimony commanded a high price, a large tonnage was produced and shipped from the mines in Valley County.

Antimony occurs as an accessory mineral in many lead-zinc ore bodies, also in stibnite-bearing veins in which it is the dominating metallic mineral. All of the antimony ores carry more or less silver, and many of them, particularly those of Blaine County, are more valuable for this mineral than for the antimony.

In all the above-mentioned counties there are many deposits containing a large available tonnage of commercial ore, which can be readily marketed when freight and market conditions will permit it to be produced at a profit. Antimony and quicksilver deposits in the Yellow Pine district, by F. C. Schrader and C. F. Ross: U. S. Geol. Survey Bull. 780, pt. 1, 1925.*
The Livingston mine, Custer County, Idaho, by J. B. Stewart: Mining and Metallurgy, vol. 7, No. 233, pp. 223-224, May, 1926.§

ARSENIC

Deposits of arsenic, principally the sulphide (arsenopyrite), occur in Blaine, Gem, and Boise counties. These deposits, although not fully developed, show a large available tonnage containing sufficient arsenic to be valuable for this metal, which can be readily marketed when the demand for it will permit profitable production. Arsenic occurs also as arsenopyrite in Ada, Elmore and Kootenai counties, but the deposits in these counties have not been sufficiently developed to ascertain the possible tonnage.


ASBESTOS

Commercial asbestos occurs in two forms: The chrysotile variety, which is adapted to spinning; and the amphibole variety, which is not adapted to spinning but is used extensively in shingles, insulation materials, paper stock, cements and paints.

Amphibole asbestos occurs extensively in Idaho County, near Kamiah. There is a large demonstrated tonnage, but the demand is small, on account of market and freight rates. Deposits containing chrysotile have been reported in Fremont, Teton and Idaho counties.


BARYTES

Barytes (barium sulphate) is used in the rubber, paper, linoleum, ink, and paint manufacturing industries. Its principal use is in the manufacture of lithopone, a white pigment consisting of about 70 per cent barium sulphate and 30 per cent zinc sulphide.

Some of the largest deposits of high-grade barytes found west of the Mississippi River occur in the Deer Creek and Muldoon sections of Blaine County.


BENTONITE

Bentonite, a plastic clay, is valuable for its high absorbent qualities; it has a capacity of absorbing three times its weight or about seven times its volume of water. It is used in beauty clays; for refining oil; as a filler in paper and soaps; as an adulterant in drugs and candies; and as a packing for horses' hoofs.

Bentonite occurs in commercial quantities in Clark and Custer counties, and it has been reported to be found in Cassia, Owyhee, and Oneida counties. A geologic reconnaissance of Clark and Jefferson and parts of Butte, Custer, Fremont, Lemhi, and Madison counties, Idaho, by Virgil R. D. Kirkham: Pamphlet No. 19, Idaho Bureau of Mines and Geology, 1927.*

BERYLLIUM AND BERYL

Beryllium, or glucinum, is often listed as a rare element, though it probably is more abundant in the earth's crust than many of the minor metals that are ordinarily considered rather common. * * * Beryllium is very light and exceptionally hard and strong, and many believe that it is destined to share with magnesium and aluminum in the fast-growing demands for light metals to be used in the construction of air craft. It is very light, having about the same specific gravity as magnesium, and is almost as hard as quartz.

The mineral beryl, which seldom contains more than about 5 per cent of the element, is the only recognized ore of beryllium. It is a common accessory in pegmatite veins and is also found in clay slate and mica schist, but heretofore only the gem varieties, including emerald and aquamarine, have been actively sought.


BISMUTH

Bismuth, occurring as a sulphide, has been found in Blaine County unassociated with other metals, as well as in association with many of the lead ores. It also occurs in the gold ores of the Gold Hill, Belshazzar, and Buckskin mines, Boise County, in association with lead, probably galenobismuthite or similar lead-bismuth minerals.

BUILDING STONE

Sandstone exceptionally adapted to building purposes is found in Ada, Bear Lake, and Cassia counties. One of the principal enterprises in Ada County is that of the Boise Stone Co. in quarrying and converting sandstone to building purposes.


CLAY

The different kinds of clay have so many uses that it is probably impossible to list them all, but the following rough classification will serve to point out the great variety of products that contain clay: Structural products: Common brick, tile, etc. Refractories: Fire clay brick and special refractories. Pottery: Tableware, kitchenware, sanitary ware, etc.

Clay suitable for structural purposes is found in almost every county in the state, the better grades occurring in Benewah, Cassia, Kootenai, Latah, Lewis, Idaho, Power, and Washington Counties.

Clay suitable for refractories and pottery is found in Latah County. The refractory clay is high-grade. One deposit is being exploited, and the manufactured articles are in great demand throughout the Pacific Northwest states.

DEER — A FAMILIAR SIGHT TO THE IDAHO MINER


COAL

Bituminous coal of commercial importance occurs in Teton, Bonneville, Fremont and Clark counties. No attempt has been made to exploit any of the deposits commercially except those in Horseshoe Basin, Teton County.

In Owyhee and Boise counties several beds of low-grade lignite occur. The largest and best developed of these is that on Reynolds Creek, Owyhee County, which has shipped considerable fuel for local domestic use in years past.


The Horseshoe Creek district of the Teton Basin coal field, by E. G. Woodruff: U. S. Geol. Survey Bull. 541, pp. 379-388, 1912. (Teton County.)*


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COBALT

Cobalt is found in Lemhi County. During the World War, when this metal commanded a high price, the deposits were actively developed; a small mill was constructed, and concentrate with a high cobalt content was produced. This metal is reported to have been found also in Kootenai and Latah counties.


Geology and ore deposits of Lemhi County, by J. B. Umpleby: U. S. Geol. Survey Bull. 528, 1913.*


COPPER

Idaho is an important producer of copper and holds a high position among the ranking states of the Union. The many copper mines which are now under development and the numerous discovered but undeveloped veins indicate that the production of this metal will be greatly increased; the State will then be elevated to a rank higher than it now holds.

Gold and silver are found associated with practically all the copper ores, and in some counties, notably in Custer and Bonner, the silver content is more valuable than the copper.

Custer, Lemhi, and Shoshone are the most important copper-producing counties: Adams and Washington counties may eventually become large producers. Bonner, Idaho, Blaine, Butte, Clearwater, Latah and Lewis counties also contain copper mines of importance.


DIATOMACEOUS EARTH

Diatomaceous earth is more commonly known as infusorial earth, and is sometimes referred to by its German name of kieselguhr. It is composed of the siliceous remains of minute aquatic plants known as diatoms.

The principal uses of diatomaceous earth are: Sawed brick for refractory and insulation purposes; filter material at sugar factories; lightweight filler in concrete; in polishing powders; absorbent in dynamite, and in thermal insulator compounds.

Extensive beds of this mineral, in which it can be measured by the acre, are found in Owyhee, Elmore, Camas, Payette, Washington, and Idaho counties. A small tonnage has been obtained from Elmore County for use in Idaho sugar factories.


FELDSPAR

Common feldspars are crystalline compounds of silica, alumina, and one or more of the bases: potash, soda, and lime. There are two principal classes of feldspar—the one including the potash and potash-soda varieties; the other including the soda, soda-lime, and lime varieties. Pure potash feldspars are orthoclase and microline. The principal use of feldspar is in the manufacture of pottery, chinaware, porcelain, enamel ware, and enamel brick and tile.

Deposits of high-grade feldspar, occurring as orthoclase, are found in Latah and Adams counties.

GARNET

Garnet is a common accessory mineral in a large variety of rocks, occurring abundantly in contact metamorphic zones and in metamorphosed crystalline limestone. Deposits of garnet possessing the necessary qualifications for ornamental or industrial use and so situated with regard to transportation and markets that they can be exploited commercially are relatively small and occur in only a few areas throughout the United States.

The principal uses of garnet are: As settings in jewelry; jewel bearings in watches; and as an abrasive. Abrasive garnet is utilized either in the form of a manufactured paper similar to sandpaper, or as loose grain or powder for grinding and polishing.

Extensive deposits of garnet adapted to abrasive purposes occur in Adams, Lemhi, Custer, and Cassia counties.

GOLD

Gold is found in most counties of the State and is one of the most widely distributed metals. Prior to the World War, Idaho was an important producer of this metal, but during the war period many of the mines of which the principal product was gold were closed down and have not been reopened, so at the present time the State ranks about seventh in the United States in gold production.

Gold occurs associated with almost all the lead, zinc, copper, and silver ores, and very commonly in a free-milling condition. A large amount of gold is obtained from placer deposits; at one time Idaho was among the principal placer-mining states in the Union. The greater part of the placer ground which could be hydraulicked has been exhausted, but many acres suitable for dredging still remain and the gold lode-deposits offer greater opportunities than those of almost any other State.

The most important counties in which gold occurs are Boise, Idaho, Lemhi, Owyhee, Elmore, Shoshone, Custer, Blaine, Camas, Clearwater, Gem, and Valley.


An Idaho silver-gold camp (Florida Mountain district), by F. G. Corning; Eng. and Min. Jour., vol. 60, p. 244, Sept. 14, 1895.§
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GRAPHITE

Graphite is a soft, black, greasy form of carbon, sometimes referred to in trade as “plumbago” and “black lead.” It occurs in nature in two forms, crystalline and amorphous, each having its own peculiar uses.

The physical properties of graphite—infusibility, chemical inertness, high conductivity, extreme softness, and low specific gravity—fit it for a large number of uses. The manufacture of crucibles and other refractory products; lubricants; “lead” pencils; paints; stove polish; foundry facings; and various types of electrical appliances.

Graphite of commercial importance is found in Blaine County, but, owing to the fact that at the ordinary price of graphite it is possible to mine only the most favorably situated deposits, the known deposits in Idaho have never received much attention.

GYPSUM

Gypsum is a natural hydrated sulphate of lime. It is a soft, white chalk-like material, found widely distributed in single crystals and in thick beds. The natural product is generally very pure.

The principal uses of gypsum are as structural material—wall plaster, gypsum boards, blocks and tile—and is an ingredient of Portland cement and plaster of Paris.

Extensive deposits of high-grade gypsum are found in Lemhi, Bear Lake, and Washington counties. These deposits have never been developed, as the low price of the crude product limits production to those States located near the centers of population.

LEAD

Lead is the most important metal found in Idaho, and this State ranks second in the United States in the production of lead, Missouri ranking first, and Utah third. Idaho produces over one-fourth of the total amount of lead mined in the United States. Lead is widely distributed throughout the State, and occurs as galena (lead sulphide) and as the oxide and carbonate; silver is always associated with it, and occasionally zinc, gold and copper.

The largest lead mine in the United States is in Idaho—the Bunker Hill & Sullivan M. & C. Co., at Kellogg. This is one of the few companies in the world that mine, mill, smelt, refine, manufacture, and market lead and lead products.

The principal lead mines in the State are those in Shoshone County, which produces 85 per cent of the State total. Blaine, Boundary, Bonner,
Custer, Lemhi, Boise, Butte, Valley, and Camas counties are the other important lead-producing counties.

A bibliography of mining, milling and metallurgical methods will be found under the county in which the plant or mine is located.


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Some Coeur d'Alene geology, by J. E. Berg: Mining and Metallurgy, vol. 8, July, 1927.§

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Geology and ore deposits of the Clark Fork district, by A. L. Anderson: Idaho Bureau of Mines and Geology Bull. 12, 1930.**


LIMESTONE

Limestone is mined in Bannock, Butte, Boise, Clearwater, Teton, and Bonner counties; Blaine and Bear Lake counties also contain deposits of importance. The limestone mined in Bonner County is shipped to Spokane, Washington, where it is manufactured into Portland cement; the limestone mined in Butte and Teton counties is shipped to the sugar factories of Idaho and Utah, where it is used in the refining of sugar; the limestone mined in Bannock County is manufactured into cement, the plant being located adjacent to the quarry; the limestone mined in Boise and Clearwater counties is sold to the agricultural and poultry industries and burnt to form plaster lime. A cement plant is located at Orofino in Clearwater County.

There are unlimited deposits which are suitable to the foregoing industries.

MANGANESE

Manganese occurs in Bannock, Lemhi, Owyhee, Shoshone, Butte, and Washington counties. Some of the deposits are high in manganese content and others in manganese-iron. A substantial tonnage has been produced and marketed from the mines of Bannock County, and the deposits of Lemhi County constitute a large potential resource.


MARBLE

Marble is dense crystalline calcium carbonate, formed from limestone by the pressure of overlying sediments and the action of underground water. The value depends on the color, which may be white, gray, red, black, or veined, and on the grain of the structure. Its principal use is for building and monumental purposes.

Marble suitable to commercial purposes occurs in Nez Perce, Butte, and Cassia counties. The deposits in Nez Perce and Butte counties have been slightly exploited.

MICA

The principal physical properties which give value to mica are: Its cleavage, transparency, resistance to decomposition, and nonconduction of electricity and heat. The important uses of mica are: Short mica, in the electrical industries and as glazing for stoves, screens, goggles, and lantern projection; ground mica, in fancy paints, wallpaper, tiles, concrete, rubber goods, roofing materials, lubricants, and insulating compounds.

Deposits of commercial importance occur in Latah, Adams, and Idaho counties, although they have never been prospected or developed in proportion to the possibilities which they offer.


Ground water for municipal supply at Potlatch, Idaho, by V. R. D. Kirkham: Idaho Bureau of Mines and Geology Pamphlet 23, 1927.**

The development of Idaho's nonmetallic mineral resources, by E. L. Tullis: Pit and Quarry, vol. 23, pp. 22-27, Mar. 23, 1932.**

MINERAL WATERS

Mineral springs of various types occur at a great many places throughout the State, the principal types being calcareous chalybeate, sulphurated, and saline. The temperatures of the different types vary from "cold" to "hot" with some of the latter exceeding the boiling point. Hot springs are more numerous, and at many of them sanatoriums and bathing resorts have been erected.
The chalybeate springs of Caribou County are particularly efficacious from a therapeutic standpoint, although they have never been exploited.

**MOLYBDENUM**

Molybdenum, occurring as the sulphide disseminated in intrusive rocks and as a molybdate of lead in fissure veins in limestone, is found in Elmore, Boundary, Custer, Idaho, and Lemhi counties.


**MONAZITE**

The mineral monazite consists chiefly of the phosphate of cerium and variable amount of thorium, the value depending primarily upon the thorium content. It is a resinous golden-yellow mineral occurring as a placer in practically all of the gold placer mines of the State; the quantity varies, and in some of the deposits it is not sufficient to be of commercial importance. The placer deposits of Ada, Idaho, Lemhi, and Owyhee counties contain an appreciable amount of this mineral, and those of Boise and Clearwater counties contain sufficient to be of commercial importance.

The principal use of thorium is in the manufacture of incandescent mantles for gas lighting. Practically all of the monazite used in the United States is imported from Brazil and India.


**NICKEL**

Nickel is found in Lemhi County. During the late war considerable development work was done on the veins in which it occurs. These deposits are described by Frank L. Hess under "Cobalt" in U. S. Geological Survey Mineral Resources of the United States, pt. I, 1917.

**NITRATES**

The occurrence of nitrate in Bannock, Bingham, Bonneville, Camas, Caribou, Clark, Custer, Elmore, Fremont, and Owyhee counties has been reported. Nitrate deposits in southern Idaho and eastern Oregon by G. R. Mansfield: U. S. Geol. Survey Bull. 620, pp. 19-44, 1915.*


**OIL AND GAS**

The same formations which are oil-producing in Wyoming are present in structures highly favorable to the accumulation of oil and gas in Caribou, Bonneville, Teton, Bear Lake, and Bingham counties. A small amount of drilling has been done in Caribou and Teton counties, but the wells were never completed to a sufficient depth to determine the possibilities of the occurrence of oil.

Gas has been developed in Payette and Washington counties.


UNDERGROUND HAULAGE


Oil and gas possibilities of eastern Oregon, by J. P. Buwalda: Oregon Bureau of Mines and Geology, vol. 3, No. 2, 1921. (Southwestern Idaho.)*


Oil shale of the Rocky Mountain region, by D. E. Winchester: U. S. Geol. Survey Bull. 729, 1923.†


Possibilities of Petroleum in Power and Oneida counties, Idaho, by A. M. Piper: Idaho Bureau of Mines and Geology Pamphlet 12, 1924.**

Geology and oil possibilities of Bingham, Bonneville and Caribou counties, Idaho, by V. R. D. Kirkham: Idaho Bureau of Mines and Geology Bull. 8, 1924.**

PHOSPHATE ROCK

The greatest potential mineral resource in Idaho is the immense phosphate rock deposits in Bear Lake, Caribou, Bannock, Bingham, and Bonneville counties. Conservative estimates by members of the U. S. Geological Survey, accredit Idaho with over 85 per cent of the total phosphate resources of the United States in 268,299 acres out of a total of 396,612 acres.


PYRITE

Pyrite of commercial importance is found in Washington County. The development work which has been done on these deposits indicates an immense available tonnage.

QUICKSILVER

Cinnabar, the sulphide of mercury, has been found in placer deposits of Custer and Valley counties and in lode-deposits of Washington, Valley, Blaine, and Cassia counties. The quicksilver lode-deposits of Valley and Washington counties are being extensively developed, and considerable mercury is being produced in Washington County. The other deposits have never been opened.

Quicksilver and antimony discoveries in Central Idaho, by R. N. Bell: Idaho Mining Department Bull. 1, 1918.*


**RUTILE**

The occurrence of rutile in Clearwater County has been reported. Rutile, the natural titanium oxide, is used in paints; arc-light electrodes; dyes, and in the manufacture of leather.

**SALT**

The pioneers evaporated the brine from the salt springs of Caribou County, and this salt was transported to all of the northwestern states before the building of the railroad. The salt obtained from these springs is above the average of the commercial salts of the United States in purity and compares favorably with some of the best salt produced.


**SILVER**

Idaho was again the largest producer of silver in the United States. The output of silver in Idaho in 1939 was 17,199,600 fine ounces, valued at $11,674,880.

The largest single producer of silver in the United States is the Sunshine Mine in Shoshone County.

Silver is found associated with all the lead, copper, zinc, and antimony ores of the State, and occasionally in associations in which it is the principal metal. It is one of the most widely distributed metals, and its occurrence is such that the mining of silver can hardly be separated from that of the other metals. Shoshone County produces more silver than any other county in the State; the other important silver-producing counties are: Lemhi, Custer, Bonner, Boundary, Blaine, Butte, Owyhee, Boise, Camas, Valley, Washington, Idaho, Elmore, Adams and Cassia.

The bibliography for those ores in which silver is a secondary metal, will be found classified under the principal ore. Mining, milling and smelting methods will be found under the county in which the plant is located.


An Idaho silver-gold camp (Florida Mountain district), by F. G. Corning: Eng. and Min. Jour., vol. 60, p. 244, Sept. 14, 1895.§


The deepest mine in Idaho, the Ramshorn at Bay Horse, by R. N. Bell: Mines and Minerals, vol. 21, pp. 174-176, November, 1900.*


The Coeur d'Alene in 1905, by S. A. Easton: Eng. and Min. Jour., vol. 81, p. 11, Jan. 6, 1906.§


The geology and ore deposits of the Coeur d'Alene district, by F. L. Ransome and F. C. Calkins, reviewed by E. R. Buckley: Econ. Geology, vol. 4, pp. 178-186, 1909.§

Geology and ore deposits of the Coeur d'Alene, by F. C. Calkins, discussion of review by E. R. Buckley: Econ. Geology, vol. 4, pp. 258-261, April 1909.§


Resources of Custer and Lemhi counties, Idaho: Salt Lake Min. Review, vol 12, pp. 17-19, Mar. 15, 1911.§


Genesis of the silver-lead ores in the Wardner district, Idaho, by O. H. Hersh-
June 15, pp. 825-827, 1912. (Published later as a pamphlet by Min. and Sci. Press.)**


Geology and ore deposits of Lemhi County, by J. B. Umpleby: U. S. Geol. Survey Bull. 528, 1913.*


Secondary enrichment in the Caledonia mine, Coeur d'Alene district, Idaho, by E. V. Shannon: Econ. Geology, vol. 8, pp. 565-570, September, 1913.§


Geology and ore deposits of the Mackay region, Idaho, by J. B. Umpleby: U. S. Geol. Survey Prof. Paper 97, 1917.¶


A reconnaissance of the Pine Creek district, Idaho, by E. L. Jones, Jr.: U. S. Geol. Survey Bull. 710, pp. 1-36, 1919.¶


Big silver-lead producer in Idaho (Hecla Mine), by W. E. Carr: Compressed Air Mag., vol. 30, pp. 1375-1379, September, 1925.¶


Geology and ore deposits of Boundary County, Idaho, by V. R. D. Kirkham and E. W. Ellis: Idaho Bureau of Mines and Geology Bull. 10, 1926.**

Geology and metalliferous resources of the region about Silver City, Idaho, by A. M. Piper and F. B. Laney: Idaho Bureau of Mines and Geology Bull. 11, 1926.*


The Vienna district, Blaine County, Idaho, by C. P. Ross: Idaho Bureau of Mines and Geology Pamphlet 21, 1927.**


Geology and ore deposits of the Birch Creek district, Idaho, by P. J. Shenon: Idaho Bureau of Mines and Geology Pamphlet 27, 1928.**


Geology and silver ore deposits of the Pend d'Orielle district, Idaho, by Edward Sampson: Idaho Bureau of Mines and Geology Pamphlet 31, 1928.**


Geology and ore deposits of the Lava Creek district, Idaho, by A. L. Anderson: Idaho Bureau of Mines and Geology Pamphlet 32, 1929.**


Sequence of ore deposition in north Idaho, by A. L. Anderson: Econ. Geology, vol. 25, pp. 160-175, March-April, 1930.**

Geology and ore deposits of the Clark Fork district, by A. L. Anderson: Idaho Bureau of Mines and Geology Bull. 12, 1930.**

Geology and ore deposits of the Seafoam, Alder Creek, Little Smoky and Willow Creek districts, Custer and Camas counties, by C. P. Ross: Idaho Bureau of Mines and Geology Pamphlet 33, 1930.*


SULPHUR

Sulphur occurring in extensive deposits and as sulphur springs is found in Caribou County. During the World War a slight attempt was made toward the commercial development of the deposits.


TALC

Talc suitable to the electrical and powdered-talc industries occurs in Idaho County in sufficient extent to be of commercial importance.

TIN

Tin has been found in the placer mines in the Gravel Range mining district of Lemhi County.


TUNGSTEN

Tungsten, in the form of scheelite and wolframite, occurs in commercial value in Shoshone, Idaho, Camas, Lemhi, Boundary, Bonner, Blaine, Valley,
and Butte counties. The deposits in Shoshone County have been extensively
exploited, and during the war period of high prices a large tonnage was pro-
duced and marketed; at the same time a small amount was obtained from
Boundary and Camas counties. Sufficient work has been done on all of
these deposits to indicate that tungsten is one of the State's substantial
mineral resources.

Tungsten, cinnabar, manganese, molybdenum, and tin deposits of Idaho, by
D. C. Livingston: Univ. of Idaho School of Mines Bull. 2, vol. 14, 1919.**

Tungsten ore deposits of the Coeur d'Alene, by H. S. Auerbach: Eng. and Min.
Jour., vol. 86, pp. 1146-1148, Dec. 12, 1908.§

1917.§

**

ZINC

Zinc is found associated with lead in many of the lead mines of Idaho,
although there are numerous deposits in Shoshone and Blaine counties in
which it is the principal metal. In Shoshone County it occurs as sphalerite
(zinc sulphide), and in Blaine County as sphalerite and smithsonite (zinc
carbonate).

Selective flotation revolutionized the art of ore-dressing, and it is now
possible to treat mixed lead-zinc ores which could not be separated by gravity
concentration methods. As a consequence, the zinc content which was for­
merly lost is recovered, and many mines which at one time could not be
profitably operated are now being reopened in Blaine, Camas, and Shoshone
counties. As a result of these modern ore-dressing methods, Idaho is one
of the largest zinc-producing states in the

The principal zinc-producing counties, in order of prominence, are Sho­
shone, Blaine, Camas, Custer, Lemhi, Bonner, Boise, Boundary and Butte.

The bibliography for those ores in which zinc is a secondary metal, will
be found classified under the principal ore. Mining, milling and smelting
methods will be found under the county in which the plant is located.

Economic features of northern Idaho and northwestern Montana, by D. F.

Coeur d'Alene district, by F. L. Ransome: Min. Mag., vol. 12, pp. 26-32, July
1905.*

The geology and ore deposits of the Coeur d'Alene district, Idaho, by F. L.

Coeur d'Alene mining district, by J. P. Rowe: Min. World, vol. 29, pp. 739-740,
Nov. 14, 1908; vol. 29, pp. 777-778, No. 21, 1908; vol. 29, pp. 843-845, Dec. 5,
1908.*

Microstructure of a complex ore from Frisco mine, by William Campbell: Eng.

Economic geology of the region around Mullan, Idaho, and Saltese, Montana,
by F. C. Calkins and E. L. Jones, Jr.: U. S. Geol. Survey Bull. 540, pp. 167-
211, 1912.*

Origin of lead, zinc, and silver in the Coeur d'Alene, by O. H. Hershey: Min.

Ore deposits in the Sawtooth quadrangle, Blaine and Custer counties, Idaho,

Origin and distribution of ore in the Coeur d'Alene, by O. H. Hershey, published
for the author as a pamphlet by the Min. and Sci. Press, 32
pp. 1916.**

Genesis of the Success zinc-lead deposit, Coeur d'Alene district, Idaho, by J. B.

Geology and ore deposits of the Mackay region, Idaho, by J. B. Umpleby: U. S.
Geol. Survey Prof. Paper 97, 1917.§

A reconnaissance of the Pine Creek district, Idaho, by E. L. Jones, Jr.: U. S.
Geol. Survey Bull. 710, pp. 1-36, 1919.§


Geology and ore deposits of Boundary County, Idaho, by V. R. D. Kirkham and E. W. Ellis: Idaho Bureau of Mines and Geology Bull. 10, 1926.**


Sequence of ore deposition in north Idaho, by A. L. Anderson: Econ. Geology, vol. 25, pp. 160-175, March-April, 1930.**


Geology and ore deposits of the Seafoam, Alder Creek, Little Smoky and Willow Creek districts, Custer and Camas counties, by C. P. Ross: Idaho Bureau of Mines and Geology Pamphlet 33, 1930.*


FLOATING DREDGE
Typical of the ten floating dredges in Idaho
When gold was first discovered at Leesburg there was no U. S. Mining Laws, and following the example of the California gold miners and largely copied from them, the Leesburg gold miners formulated their own laws. The following is an abstract of Leesburg Mining laws:

At a miners meeting held on the tenth (10th) day of August, 1866, due notice having been given, F. B. Sharkey was chosen President, and Wm. Smith, Secretary.

The following mining laws were made and adopted for the government of the Leesburg District:

Article I.
This District shall be known as the Leesburg Mining District.

Article II.
There shall be Gulch, Bar and Hill Claims recognized.

Article III.
Gulch claims shall be 200 feet running up and down the stream. And in width from rise of rim rock to rise of rim rock.

Article IV.
Bar claims shall be 200 feet front, and shall extend back to the rise of the hill rock.

Article V.
Hill claims shall be 200 feet front, and shall extend back to the hill or mountain.

Article VI.
Any man may claim by location, one gulch claim, one bar claim, and one Hill claim.

Article VII.
The discoverers of this District are hereby entitled to one discovery claim each, and one claim each by right of location, on the Gulch or Creek where first discovery was made. They are also entitled to two claims each, additional, on any other gulch, bar or hill discovered by them in this district. All claims shall be designated by number and shall be measured from discovery claim No. 1.

Article VIII.
Any man or company of men making a new discovery in this district in either gulch, bar or hill shall be entitled to one claim each, by right of discovery.

Article IX.
Any claim owner shall have the privilege of cutting a drain or tail race through adjoining claims, if necessary to the working of his ground, providing no damage is done to adjoining claim.

Article X.
A man shall not be allowed to run or dump any heavy tailings on a claim below, but shall confine his tailings on his own ground.

Article XI.
Disputes in connection with mining claims shall be settled by arbitration.
Article XII.
Claims may be filed for three days previous to recording; if not recorded at expiration of said time they shall be considered forfeited.

Article XIII.
All claims in this district shall be recorded in a book kept for that purpose by the recorder.

Article XIV.
The recorder shall charge two dollars ($2.00) for recording each claim, and two dollars ($2.00) for each transfer.

Article XV.
All claims are declared unworkable between November first and June first in this district.

Article XVI.
All claims not worked June first, 1867, shall be considered forfeited.

Article XVII.
All claims in this district shall be worked one day in every seven after the first day of June, 1867, but a man working on any one of his claims in this district can represent them all.

Article XVIII.
No alterations or amendments shall be made to these laws unless the consent of two thirds of the actual miners shall be given.

Article XIX.
These laws shall go into effect immediately after this date.

Article XX.
A copy of these laws shall be deposited in a conspicuous place in this District.

UNITED STATES LAW EXTENDS TIME FOR DOING ASSESSMENT WORK ON MINING CLAIMS
July 1, 1939

The Department of Inspector of Mines, State of Idaho, under the direction of Arthur Campbell, announces that telegrams have been received from our Congressional delegation that a Bill has passed Congress which extends the time within which annual assessment work on mining claims held by location in the U. S. may be commenced, for the year commencing at 12 o'clock meridian July 1, 1938. Such assessment work must be commenced by 12 o'clock meridian September 1, 1939, which is an extension for a period of 60 days. The text of the Act, which was approved by the President June 30, 1939, follows:

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That to comply with the provisions of section 2324 of the Revised Statutes of the United States, which requires on each mining claim located, and until a patent has been issued therefor, not less than $100 worth of labor to be performed or improvements aggregating such amount to be made each year, it shall be sufficient, for the year beginning at 12 o'clock meridian July 1, 1938, if such work or improvements are in good faith commenced on or before 12 o'clock meridian September 1, 1939, and prosecuted with reasonable diligence to completion."

It will be noted that this Act requires only that the work be commenced before noon September 1, 1939, and continued thereafter with due diligence until completed.
MINING LAWS OF THE STATE OF IDAHO

PASSED AT THE TWENTY-FIFTH SESSION OF THE
IDAHO STATE LEGISLATURE 1939

CHAPTER 99
(H. B. No. 161)

AN ACT

AMENDING SECTION 46-706 OF THE IDAHO CODE ANNOTATED AS
AMENDED BY CHAPTER 124 OF THE IDAHO SESSION LAWS, 1937,
RELATING TO THE LEASING OF MINERAL LANDS BELONGING
TO THE STATE OF IDAHO AND MINERALS RESERVED TO THE
STATE OF IDAHO AND THE LEASING OF MINERAL RIGHTS IN
THE BEDS OF NAVIGABLE RIVERS WITHIN THE STATE OF
IDAHO; PROVIDING FOR PUBLICATION OF NOTICE AND PUBLIC
HEARING PRIOR TO LEASING OF MINERAL RIGHTS IN THE BEDS
OF NAVIGABLE RIVERS WITHIN THE STATE OF IDAHO.

Be it enacted by the Legislature of the State of Idaho:

SECTION 1. Section 46-706 Idaho Code Annotated as amended by Chapter
124 Idaho Session Laws, 1937, is hereby amended to read as follows:

"46-706. LEASES OF MINERAL RIGHTS IN STATE LANDS. The
State board of land commissioners may lease in tracts not exceeding 640
acres in extent to any one person, firm or corporation for prospecting and
mining purposes and mineral deposits that may be contained in any portion
of the unsold lands of the state or that may be contained in state lands sold
with a reservation of mineral deposits or belong to the State of Idaho by
reason of being situate between the high water marks of navigable rivers of
the state, for such annual rental, not less than twenty-five cents per acre per
annum, and for such royalty upon the product as the board may deem fair
and in the interest of the state, and provided that the minimum royalty shall
not be less than 2½ per cent. The rental paid for any year shall be credited
against the royalties as they accrue for that year.

"All mineral leases of state school land shall be for a period of five years,
on condition that at the end of each five-year period succeeding the first
day of the year in which the lease is issued the leaseholder shall be given
a preferential right of renewal under such readjustment of terms and condi­
tions as the board may determine to be necessary in the interest of the state.

"All mineral leases for lands belonging to the State of Idaho other than
school lands, including the lands in the beds of navigable rivers of the state,
shall be for a period not exceeding ten years upon condition that at the end
of said ten-year period the leaseholder shall be given a preferential right of
renewal under such readjustment of terms and conditions as the board
may determine to be necessary in the interest of the state.

"Applications for mineral leases shall be made under oath in such form
as the board may prescribe, and the applicant shall describe the land, indi­
cate the annual rental and royalty offered by him, specify the particular
mineral or minerals, and give such additional information as may be required
by the rules and regulations of the board. If the applicant for a lease has
previously filed a certificate of location, as provided in Section 46-703, upon
any part of the land desired to be leased, such application shall be given a
preferential right to the land covered by his location; provided, that no lands
upon which a mineral location has been duly made and recorded as provided
in section 46-703, shall be leased for mining purposes during the two-year
periods to any applicant except the person having made such location."

"Upon receipt by the State Board of Land Commissioners of an application
to lease any lands which may belong to the State of Idaho by reason of being
situates between the high water marks of navigable rivers of the State, the board shall cause at the expense of the applicant, a notice of such application to be published once a week for two issues in a newspaper of general circulation in the county or counties in which said lands described in said application are situated, which notice shall be substantially as follows:

"Notice is hereby given that .......... of .............., has applied to the State Board of Land Commissioners of the State of Idaho for a lease, for prospecting and mining purposes and mineral deposits that may be contained in any portion of the lands in the bed of the following navigable river, to-wit:........................................ and that, on the ............. day of .............., A. D. 19......, at ................................., before the State Board of Land Commissioners, or its authorized agent, the opportunity will be given to any and all persons to appear and present for its consideration any reason or reasons why a lease of the aforesaid lands for the aforementioned purposes should not be granted."

Provided, however, that the State Board of Land Commissioners shall send notice of any such application for leasing the bed of navigable rivers to the Commissioner of Reclamation, who, if he thinks advisable, shall at the expense of the applicant make an investigation. If said investigation shows that the rights of interested parties may be jeopardized by the issuance of the proposed lease, he shall give notice of such applications to parties affected thereby. If, at the above hearing, it shall appear to the State Board of Land Commissioners that the leasing of any lands between the high water marks of any navigable river, will be injurious to the rights of any person or persons having the right to the use of the waters thereof for irrigation, power, or any other lawful purpose, the State Board of Land Commissioners shall deny such application."

Approved February 25, 1939.

LAKE COEUR D'ALENE
43-2101. Short title.—This chapter may be cited as the “Occupational Disease Compensation law.”

Right to Compensation For Disablement from Occupational Disease

43-2102. Right to compensation—Applicability of Workmen's Compensation Law.—Where an employee of an employer subject to this chapter suffers from an occupational disease, as defined in Section 43-2104, and is thereby disabled from performing his work in the last occupation in which he was injuriously exposed to the hazards of such disease, or dies as a result of such disease, and the disease was due to the nature of an occupation or process in which he was employed within the period previous to his disablement limited in this chapter, the employee, or, in case of his death, his dependents, shall be entitled to compensation, as provided in the workmen's compensation law, as if such disablement or death were an injury by accident, except as otherwise provided in this chapter; and the practice and procedure prescribed in the workmen's compensation law shall apply to proceedings for compensation for such diseases, except as in this chapter otherwise provided.

43-2103. Security for compensation—Compensation remedy exclusive.—Every employer of workmen subject to the workmen's compensation law shall be subject to the provisions of this chapter and shall secure the payment of compensation in accordance with the provisions of this chapter by any method prescribed by the workmen's compensation law at the time in effect in this state. Where the foregoing requirement is complied with, the liability of the employer under this act shall be exclusive. The rights and remedies granted by the workmen's compensation law to an employee on account of a personal injury caused by accident, or, on account of the disability caused by an occupational disease named and contracted, as provided herein, for which injury, or disability he is entitled to compensation under this chapter, shall exclude all other rights and remedies of such employee, his personal representatives, dependents, or next of kin at common law, or otherwise, against the employer, on account of any injury or disability incurred in the course of or because of his employment.

43-2104. Occupational diseases defined.—Compensation as provided in this chapter shall be payable for disability or death of an employee resulting from the following occupational diseases:

(1) Poisoning by lead, mercury, arsenic, zinc, or manganese, their preparations or compounds in any occupation involving direct contact therewith, handling thereof, or exposure thereto.

(2) Carbon monoxide poisoning in any process or occupation involving direct exposure to carbon monoxide in buildings, sheds, or enclosed places.

(3) Poisoning by methanol, carbon bisulphide, hydrocarbon distillates (naphthas and others) or halogenated hydrocarbons, or any preparations containing these chemicals or any of them, in any occupation involving direct contact therewith handling thereof, or exposure thereto.

(4) Poisoning by benzol or by nitro, amido, or amino-derivatives of benzol (dinitro-benzol, anilin and others) or their preparations or compounds in any occupation involving direct contact therewith, handling thereof, or exposure thereto.

(5) Glanders in the care or handling of any equine animal or the carcass of any such animal.

(6) Radium poisoning by or disability due to radioactive properties of substances or to Roentgen-ray (X-ray) in any occupation involving direct contact therewith, handling thereof, or exposure thereto.

(7) Poisoning by or ulceration from chromic acid or bichromate of ammonium, potassium, or sodium or their preparations in any occupation involving direct contact therewith, handling thereof, or exposure thereto.
(8) Ulceration due to tar, pitch, bitumen, mineral oil, or paraffin, or any compound product, or residue of any of these substances, in any occupation involving direct contact therewith, handling thereof, or exposure thereto.

(9) Dermatitis venenata, that is, infection or inflammation of the skin, furunculosis excepted, due to oils, cutting compounds, lubricants, liquids, fumes, gases, or vapors, in any occupation involving direct contact therewith, handling thereof, or exposure thereto.

(10) Anthrax occurring in any occupation involving the handling of, or exposure to wool, hair, bristles, hides, or skins, or bodies of animals either alive or dead.

(11) Silicosis in any occupation involving direct contact with, handling of, or exposure to dust of silicon dioxide (SiO2).

No diseases or aggravation thereof, except those in this section defined, shall be deemed occupational diseases and compensable as such, and none of the enumerated diseases herein shall be compensable unless contracted in the occupations herein enumerated.

The terms “contracted” and “incurred”, as used in this chapter when referring to an occupational disease, shall be deemed the equivalent of the term “arising out of and in the course of,” as used in the workmen’s compensation act.

43-2105. Definition of Disability.—Except as hereinafter otherwise provided in this chapter, “disablement” means the event of an employee’s becoming actually and totally incapacitated, because of an occupational disease, from performing his work in the last occupation in which injuriously exposed to the hazards of such disease; and “disability” means the state of being so incapacitated.

43-2106. Law not retroactive.—The provisions of this chapter shall apply only to cases of occupational disease in which the last injurious exposure in an occupation subject to the hazards of such disease occurred on or after the date on which this chapter shall have taken effect.

43-2107. Last employer liable—Amount of compensation.—Where compensation is payable for an occupational disease the employer in whose employment the employee was last injuriously exposed to the hazards of such disease shall be liable therefor; the amount of the compensation shall be based upon the average weekly wages (as defined in the workmen’s compensation law) of the employee when last so exposed under such employer; and the notice of disability and claim for compensation shall be given and made to such employer; provided, however, that the maximum compensation to be allowed for disability, or death, or both, on account of any occupational disease, other than silicosis, shall be $5,000.00 until a transitory period of six years from the date when this chapter becomes effective shall have expired, and thereafter the total aggregate of such compensation and benefits shall be as provided in the workmen’s compensation law; provided further that in case of silicosis the only employer liable shall be the last employer in whose employment the employee was last injuriously exposed to the hazards of the disease during a period of sixty days or more after the effective date of this chapter.

43-2108. Aggravation—Proportional compensation.—Where an occupational disease is aggravated by any other disease or infirmity, not itself compensable, or where disability or death from any other cause, not itself compensable, is aggravated, prolonged, accelerated, or in any wise contributed to by an occupational disease, the compensation payable shall be reduced and limited to such proportion only of the compensation that would be payable if the occupational disease were the sole cause of the disability or death as such occupational disease, as a causative factor, bears to all the causes of such disability or death, such reduction in compensation to be effected by reducing the number of weekly or monthly payments or the amount of such payments, as under the circumstances of the particular case may be for the best interest of all the parties.

43-2109. Limitations.—An employer shall not be liable for any compensation for an occupational disease unless such disease shall be due to the nature of an employment in which the hazards of such disease actually exist, are
characteristic of, and peculiar to the trade, occupation, process, or employment, and is actually incurred in his employment and unless disablement or death results within two years in case of silicosis, or one year in case of any other occupational disease, after the last injurious exposure to such disease in such employment, or, in case of death, unless death follows continuous disability from such disease, commencing within the period above limited, for which compensation has been paid or awarded or claim made as provided in this chapter, and results within two years after such last exposure.

An employer shall not be liable for any compensation for a non-acute occupational disease unless such claimant was exposed to the hazard of such disease for a period of sixty days for the same employer.

43-2110. Medical treatment.—In the event of disability from an occupational disease, the employer shall provide reasonable medical and other treatment for such time as in the judgment of the board will tend to lessen the period of disability or provide needed relief: Provided, however, medical and other treatment shall be limited in the case of a workman disabled by an occupational disease to a period of ninety days from the date of such disablement, but the requirement for such treatment may be extended for an additional period not to exceed ninety days upon the order of the board.

43-2111. Determination of dependency.—No compensation for death from an occupational disease shall be payable to any person whose relationship to the deceased, which, under the provisions of this chapter would give right to compensation, arose subsequent to the beginning of the first compensable disability, save only to after-born children of a marriage existing at the beginning of such disability.

43-2112. No compensation in cases of misrepresentation.—No compensation shall be payable for an occupational disease if the employee, at the time of entering into the employment of the employer by whom the compensation would otherwise be payable, falsely represented himself in writing as not having previously been disabled, laid off, or compensated in damages otherwise because of such disease.

43-2113. Rules for prevention.—The industrial accident board may require all employers to adopt rules which have been approved by it for the protection and safety of his employees and to prevent the contraction of occupational diseases, and to keep the same posted in conspicuous places in and about the premises; and the board may require employers to install, use or adopt such protective or safety appliances as in the board’s opinion are necessary for the protection of the employees.

43-2114. Wilful self-exposure.—A workman or his dependents shall not be entitled to compensation hereunder if he fails to observe such rules and regulations as may be promulgated or approved by the industrial accident board and posted in the plant by the employer, or to use the protective and safety devices furnished by his employer, as prescribed by the board.

SPECIAL PROVISIONS RELATING TO PARTICULAR DISEASES

43-2115. Definition of “silicosis”.—Whenever used in this chapter, “silicosis” shall mean the characteristic fibrotic condition of the lungs caused by the inhalation of silicon dioxide (SiO2) dust.

43-2116. Definition of disability in silicosis cases.—In case of silicosis, “disablement” means the event of the first becoming actually incapacitated, because of such disease, from performing any work in any remunerative employment; and “disability” means the state of being so incapacitated.

43-2117. Period of exposure in silicosis cases.—No claim for disability or death from silicosis shall be maintained or prosecuted otherwise than under the provisions of this chapter, or come within the provisions of this chapter, unless during the ten years immediately preceding the date of disablement the employee has been exposed to the inhalation of silica dust over a period of not less than five years, the last two years of which shall have been in this state, under a contract of employment existing in this state, provided however, that if the employee shall have been employed by the same employer during
the whole of such five-year period, his right to compensation against such employer shall not be affected by the fact that he had been employed during any part of such period outside of this state.

43-2118. No compensation for partial disability from silicosis.—Compensation shall not be payable for partial disability due to silicosis.

43-2119. Compensation for total disability from uncomplicated silicosis.—In the event of total disability or death from uncomplicated silicosis, compensation shall be payable to employees and their dependents as follows: If disablement occurs, or, in the case of no claim for prior disablement, if death occurs in the calendar month in which this chapter becomes effective, the total compensation and death benefits payable shall not exceed the sum of $500.00. If disablement occurs, or, in the case of no claim for prior disablement, if death occurs during the next calendar month, the total compensation and death benefits payable shall not exceed $550.00. Thereafter the total amount of compensation for death and benefits payable for total disability and death shall increase at the rate of $50.00 per month; the aggregate payable in each case to be limited according to the foregoing formula for the month in which total disability occurs, or, in case of no claim for prior disability, in which death occurs. Such progressive increase in the limits to the aggregate compensation and benefits for total disability and death shall continue until the limit of $3,000.00 is reached, which limit shall continue until a transitory period of twelve years from the date when this chapter becomes effective shall have expired, and thereafter the total aggregate of such compensation and benefits shall be as provided in the workmen's compensation law: Provided, however, that the compensation payable in any such case shall be limited to a period not to exceed the average life expectancy of a person of the age and sex of the deceased.

43-2120. Compensation for total disability from complicated silicosis.—In case of disability or death from silicosis, complicated with tuberculosis of the lungs, compensation shall be payable as for uncomplicated silicosis, provided, however, that the silicosis was an essential factor in causing such disability or death. In case of disability or death from silicosis complicated with any other disease, or from any other disease complicated with silicosis, the compensation shall be reduced as provided in Section 43-2108.

43-2121. Non-disabling silicosis—Waiver.—Where an employee, though not actually disabled, is found to be affected by silicosis, he may, subject to the approval of the board, be permitted to waive in writing full compensation for any aggravation of his condition that may result from his continuing in his hazardous occupation. In the event of total disablement or death as a result of the disease with which the employee was so affected, after such a waiver, compensation shall nevertheless be payable as herein elsewhere provided, but in no case, whether for disability or death or both, to exceed $2,000.00 in the aggregate. A waiver so permitted shall remain effective, for the trade, occupation, process, or employment for which executed, notwithstanding a change or changes of employer: Provided, that such waiver shall not inure to the benefit of any employer who fails to comply with the provisions of Section 43-2113. The industrial accident board shall make reasonable rules and regulations relative to the form, execution, filing, or registration, and public inspection of waivers or records thereof.

43-2122. Non-disabling silicosis—Compensation upon severance from employment.—(1) When an employee working subject to this chapter is, because he has a non-disabling silicosis, discharged from employment in which he is engaged, or after an examination of an employee as provided in subsection (2) and a finding by the medical panel that it is inadvisable for the employee to continue in his employment, such employee terminates his employment, and suffers wage loss by reason of such discharge or termination of employment, the industrial accident board may allow such compensation on account thereof as it may deem just, payable as herein elsewhere provided, but in no case to exceed $1,500.00, subject to the following formula. If disablement occurs in the calendar month in which this chapter becomes effective, the total compensation payable shall not exceed the sum of $250.00; if disablement occurs during the next calendar month, the total compensation shall not exceed $275.00;
thereafter, the total amount of compensation payable shall increase at the rate of $25.00 per month; the aggregate payable in each case to be limited according to the foregoing formula for the month in which disability occurs. Such progressive increase in the limits to the aggregate compensation and benefits shall continue until the limit of $1,500.0 is reached.

(2) Upon application of any employer or employee the industrial accident board may direct any employee of such employer or such employee who, in the course of his employment has been exposed to the inhalation of silica dust, to submit to examination by the medical panel to determine whether such employee has silicosis, and the degree thereof. The cost of such medical examination shall be borne by the person making application. The results of such examination shall be submitted by the medical panel to the industrial accident board, which shall submit copies of such reports to the employer and employee, who shall have opportunity to rebut the same, provided, request therefor is made to the board within thirty days from the mailing of such report to the parties. The board shall make its findings as to whether or not it is advisable for the employee to continue in his employment.

(3) If an employee shall refuse to submit to such examination after direction by the board, or shall in any way obstruct the same, his right to compensation under this section shall be barred.

43-2123. Recurring dermatitis.—A person who has suffered disability from dermatitis and has received compensation therefor shall not be entitled to compensation for disability from a later attack of dermatitis due to substantially the same cause, unless, immediately preceding the date of the later disablement, he has been engaged in the occupation to which the recurrence of the disease is ascribed and under the same employer for at least sixty days.

MEDICAL PANEL

43-2124. Medical panel.—A medical panel shall be appointed by the industrial accident board at such compensation as the board shall fix in any case on a claim for compensation for an occupational disease other than silicosis, where a medical question shall be in controversy. It shall consist of three members who shall be licensed physicians in good professional standing, and who shall have had at least five years' practice in the diagnosis, treatment, and care of industrial diseases.

43-2125. Silicosis panel.—There shall be a silicosis panel consisting of six members who shall be licensed physicians in good professional standing, four of whom shall have had at least five years' practice in the diagnosis, treatment and care of silicosis, and two of whom shall be expert roentgenologists who shall have had at least five years' practice and experience. They shall be appointed by the Governor from a list of eligibles recommended by the board of directors of the Idaho State Medical Society. The term of office of a member of such panel shall be six years, except the members of the first panel, two of whom shall be appointed to serve until the first day of October, 1941; two to serve until the first day of October, 1943, and two to serve until the first day of October, 1945. A vacancy on the panel occurring other than by expiration of term, shall be filled by appointment for the unexpired term. Members of such panel shall receive such per diem compensation as shall be fixed by the industrial accident board. They shall be entitled to their reasonable and necessary traveling and other expenses incurred while actually engaged in the performance of their duties. In any case involving silicosis, the industrial accident board shall select three members of the silicosis panel to act as the medical panel in such case.

PRACTICE AND PROCEDURE

43-2126. Notice of contraction of disease and claim for compensation.—Unless written notice of the manifestation of an occupational disease shall be given by the workman to the employer within sixty days after the first manifestation thereof, and except in the case of silicosis within five months after the employment has ceased in which it is claimed the disease was con-
tracted, and, in case of death, unless written notice of such death shall be given within ninety days after the occurrence, and, unless claim for dis­ability, or death, shall be made within one year after the disablement, or death, respectively, all rights to compensation for disability, or death, from an occupational disease shall be forever barred.

Such notice and claim may be made by any person claiming to be entitled to compensation or by some one in his behalf.

Where compensation payments have been made and discontinued, and further compensation is claimed the claim for such further compensation shall be made within one year after the last payment.

43-2127. Post Mortem examinations.—Upon the filing of a claim for compensation for death from an occupational disease where an autopsy is necessary accurately and scientifically to ascertain and determine the cause of death, such autopsy shall be ordered by the industrial accident board or the medical panel. The medical panel may designate a duly licensed physician, who is a specialist in such examinations, to perform or attend such autopsy, and to certify his findings thereon. Such findings shall be filed with the medical panel and shall be a public record. The industrial accident board also may exercise such authority on its own motion or on application made to it at any time by any party in interest, upon the presentation of facts showing that a controversy may exist in regard to the cause of death or the existence of any occupational disease. All proceedings for compensation shall be suspended upon refusal of a claimant or claimants to permit such autopsy when so ordered, and no compensation shall be payable during the continuance of such refusal.

43-2128. Modification of award.—An award or denial of award of compensation for an occupational disease may be reviewed and compensation increased, reduced, or terminated where previously awarded, or awarded where previously denied, only upon proof of fraud or of change in conditions, and then only upon application by a party in interest made not later than one year after the denial of award or, where compensation has been awarded, after the award of the date when the last payment was made under the award, except in case of silicosis where such time limit shall be two years.

43-2129. Reference to medical panel of controverted medical questions.—If on a claim for compensation for an occupational disease any medical question shall be in controversy, the industrial accident board shall refer the case to the medical panel for investigation and report. No award shall be made in any such case until the medical panel shall have duly investigated the case and made its report with respect to all medical questions at issue. The date of disablement, if, in dispute, shall be deemed a medical question.

43-2130. Hearing on medical questions—Findings.—The medical panel, upon reference to it of a claim for occupational disease, shall notify the claimant or claimants and the employer to appear before it at a time and place stated in the notice, and shall examine the employee if living, and may examine the body of the employee if deceased. If the employee be living, he shall appear before the medical panel at the time and place specified then or there­after to submit to such examinations, including clinical and x-ray examinations, as the medical panel may require. The claimant and the employer or his surety shall each be entitled, at his own expense, to have present at all examinations conducted by the medical panel, a physician admitted to practice medicine in the state who shall be given every reasonable facility for participating in every such examination. If a physician admitted to practice medicine in the state shall certify that the employee is physically unable to appear at the time and place designated by the medical panel, such panel shall, on notice to the parties, change the place and time of examination to such other place and time as may reasonably facilitate the examination of the employee. Proceedings shall be suspended and no compensation shall be payable for any period during which the employee may refuse to submit to such examination.

43-2131. Report of medical panel.—The medical panel shall, as soon as practicable after it has completed its consideration of the case, report in writing its findings and conclusions on every medical question in controversy. If the date of disablement is controverted and cannot be exactly fixed scien-
scientifically, the medical panel shall fix the most probable date, having regard
to all the circumstances of the case. The medical panel shall also include in
its report a statement indicating the physician or physicians, if any, who ap­
peared before it, and what, if any, medical reports and x-rays were considered
by it.

The medical panel shall file its findings and report with the industrial
accident board, which shall send a certified copy thereof to the claimant or
claimants and to the employer and his surety, if any.

43-2132. Award—Review of medical findings.—The decision or award of
the industrial accident board in the case shall conform to the findings and
conclusions in such report insofar as restricted to medical questions; provided,
however, that any such findings and conclusions may be set aside, reversed,
or modified by the industrial accident board upon a review of the award or
decision, in case such a review is had as provided in Section 43-1406 of the,
workmen's compensation act, subject, however, to the following special pro­
visions: No such finding or conclusion of the medical panel shall be subject
to review unless specified objection shall be filed by a party in interest within
the time limited in which to apply for review of an award or decision. If ob­
jection is so filed, notice thereof shall be given to the medical panel, whereupon
such panel shall delegate one or more of its members to appear at the hear­
ing or hearings on review to submit to examination and cross-examination in
respect to the findings and conclusions objected to. Upon such review, no
finding or conclusion of the medical panel upon a medical question shall be
set aside, reversed, or modified unless proved to be manifestly erroneous or un­
reasonable, or due to fraud, undue influence, inadvertence, or mistake of fact
or law. But, with the consent of the medical panel, its report in any case may,
upon review, be remanded to it for reconsideration. Every decision by the
industrial accident board that sets aside, reverses, or modifies a finding or con­
clusion by the medical panel shall be subject to review by the courts, upon
appeal as in other compensation cases.

Section 3. Appropriation.—There is hereby appropriated out of any
moneys in the general fund in the state treasury not otherwise appropriated,
the sum of $10,000.00, or so much thereof as may be necessary, the same to
be placed in the industrial administration fund, and the sum of $10,000.00, or
so much thereof as may be necessary, is hereby appropriated out of the in­
dustrial administration fund to the industrial accident board for the admin­
istration of this act during the biennium ending December 31, 1940.

Section 4.—State insurance fund.—The state insurance fund created by
the workmen’s compensation law and its administrator, are hereby authorized
to insure employers against liability for compensation and to assure to the
persons entitled thereto the compensation provided by this act. In determi­
going equitable rates for the added risks of occupational diseases, the state in­
surance fund shall be governed by the provisions of Section 43-1713 Idaho
Code Annotated.

Section 5. All acts and parts of acts in conflict with this act are hereby
repealed.
# INDEX

## OCCUPATIONAL DISEASE COMPENSATION LAW

(In this index the title number "43" before the chapter and section numbers is omitted—thus, instead of the first section number appearing as 43-2101, as it does in the printed bill, it herein appears as "2101").

<table>
<thead>
<tr>
<th>Section</th>
<th>DISABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGGRAVATION of diseases</td>
<td>definition of in silicosis cases 2116</td>
</tr>
<tr>
<td>proportional compensation in case of silicosis</td>
<td>partial from silicosis 2118</td>
</tr>
<tr>
<td>AUTOPSY</td>
<td>DISEASE</td>
</tr>
<tr>
<td>AVERAGE WEEKLY WAGES AS DEFINED IN WORKMEN'S COMPENSATION LAW</td>
<td>complicated with silicosis 2019</td>
</tr>
<tr>
<td>AWARD—REVIEW OF MEDICAL FINDINGS</td>
<td>DISABILITY</td>
</tr>
<tr>
<td>modification of</td>
<td>EXAMINATION</td>
</tr>
<tr>
<td>COMPENSATION</td>
<td>x-ray 2130</td>
</tr>
<tr>
<td>amount of</td>
<td>FALSE STATEMENT, effect of</td>
</tr>
<tr>
<td>applicability of workmen's compensation law</td>
<td>HEARING ON MEDICAL QUESTIONS—FINDINGS</td>
</tr>
<tr>
<td>claim for</td>
<td>INDUSTRIAL ACCIDENT BOARD</td>
</tr>
<tr>
<td>compensation for total disability from complicated silicosis</td>
<td>may exercise authority 2130</td>
</tr>
<tr>
<td>for total disability from silicosis</td>
<td>LIMITATIONS</td>
</tr>
<tr>
<td>further in case of discontinuance</td>
<td>LAST EMPLOYER LIABLE</td>
</tr>
<tr>
<td>last employer liable</td>
<td>MEDICAL PANEL (See Silicosis Panel and hearing on Medical Questions)</td>
</tr>
<tr>
<td>liability of employer exclusive</td>
<td>MEDICAL QUESTION: Controverted</td>
</tr>
<tr>
<td>none if there has been misrepresentation</td>
<td>MEDICAL TREATMENT</td>
</tr>
<tr>
<td>none for partial disability from silicosis</td>
<td>MISREPRESENTATION, NO COMPENSATION IN CASE OF</td>
</tr>
<tr>
<td>proportional</td>
<td>MODIFICATION OF AWARD</td>
</tr>
<tr>
<td>security for</td>
<td>NON-DISABLING SILICOSIS</td>
</tr>
<tr>
<td>remedy exclusive</td>
<td>compensation upon severance from employment</td>
</tr>
<tr>
<td>right to</td>
<td>waiver</td>
</tr>
<tr>
<td>upon severance from employment for non-disabling silicosis</td>
<td>NOTICE OF CONTRACTIONS OF DISEASE AND CLAIM FOR COMPENSATION</td>
</tr>
<tr>
<td>COMPENSATION REMEDY EXCLUSIVE</td>
<td>OCCUPATIONAL DISEASES</td>
</tr>
<tr>
<td>DEATH</td>
<td>defined and enumerated</td>
</tr>
<tr>
<td>compensation in case of</td>
<td>last employer liable 2104</td>
</tr>
<tr>
<td>DEFINITIONS</td>
<td>proportional compensation in case of aggravation</td>
</tr>
<tr>
<td>disability defined</td>
<td>PARTIAL DISABILITY FROM SILICOSIS</td>
</tr>
<tr>
<td>occupational diseases defined and enumerated</td>
<td>PERIOD OF EMPLOYMENT NECESSARY</td>
</tr>
<tr>
<td>of silicosis</td>
<td>2102, 2207, 2209, 2217</td>
</tr>
<tr>
<td>of disability in silicosis cases</td>
<td>PERIOD OF EXPOSURE IN SILICOSIS CASES</td>
</tr>
<tr>
<td>DEPENDENCY</td>
<td>2111</td>
</tr>
<tr>
<td>determination of</td>
<td>2123</td>
</tr>
<tr>
<td>DERMATITIS recurring</td>
<td>2117</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
</tr>
<tr>
<td>POST MORTEM EXAMINATIONS</td>
<td>2127</td>
</tr>
<tr>
<td>PRACTICE AND PROCEDURE</td>
<td>2103, 2126 et seq.</td>
</tr>
<tr>
<td>PREVENTION, RULES FOR</td>
<td>2113</td>
</tr>
<tr>
<td>PROCEDURE SUSPENDED in case of refusal to permit autopsy</td>
<td>2127</td>
</tr>
<tr>
<td>PROPORTIONAL COMPENSATION</td>
<td>2108</td>
</tr>
<tr>
<td>RELATIONSHIP OF DEPENDENT PERSON, must exist prior to disability</td>
<td>2111</td>
</tr>
<tr>
<td>REMEDY EXCLUSIVE</td>
<td>2103</td>
</tr>
<tr>
<td>REPORT OF MEDICAL PANEL</td>
<td>2131</td>
</tr>
<tr>
<td>RETROACTIVE, LAW NOT</td>
<td>2106</td>
</tr>
<tr>
<td>REVIEW OF MEDICAL FINDINGS</td>
<td>2132</td>
</tr>
<tr>
<td>RIGHT TO COMPENSATION</td>
<td>2102</td>
</tr>
<tr>
<td>RIGHTS AND REMEDIES EXCLUSIVE</td>
<td>2102</td>
</tr>
<tr>
<td>RULES AND REGULATIONS</td>
<td>2113, 2121</td>
</tr>
<tr>
<td>SAFETY MEASURES</td>
<td>2113</td>
</tr>
<tr>
<td>SECURITY FOR COMPENSATION</td>
<td>2103</td>
</tr>
<tr>
<td>SEVERANCE FROM EMPLOYMENT</td>
<td>2122</td>
</tr>
<tr>
<td>SHORT TITLE</td>
<td>2101</td>
</tr>
</tbody>
</table>

**SILICOSIS**
- definition of | 2115 |
- compensation for total disability from | 2119 |
- compensation upon severance from employment in non-disabling cases | 2122 |
- no compensation for partial disability from | 2118 |
- non-disabling—waiver | 2121 |
- last employer only liable | 2107 |
- sixty days period | 2107 |

**SILICOSIS CASES**
- definition of disability in | 2116 |
- period of exposure in | 2117 |

**SILICOSIS PANEL** | 2125 |

**STATE INSURANCE FUND, AUTHORIZED TO WRITE COVERAGE** | 2132 |

**TERMS**
- contracted and incurred equivalent to “arising out of and in the course of” | 2104 |

**TOTAL DISABILITY FROM UNCOMPLICATED SILICOSIS** | 2119 |

**TRANSITORY PERIOD** | 2107 |

**TUBERCULOSIS OF LUNGS** | 2120 |

**UNCOMPLICATED SILICOSIS**
- compensation in case of | 2119 |
- WAIVER | 2121 |

**WILFUL SELF EXPOSURE** | 2114 |

**WORKMEN'S COMPENSATION LAW, APPLICABILITY OF** | 2102 |
AIR HYGIENE IN THE MINING INDUSTRY

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Like all higher animals man has evolved in an environment polluted by variable amounts of dust. As a consequence he has developed mechanisms which prevent his lungs from becoming clogged with foreign materials which would interfere with their proper function. These mechanisms include filters which exclude many particles from entering the respiratory tract, a special type of ciliated cell lining the larger air tubes whose activities carry dust particles away from the lung, free moving mobile dust cells or phagocytes which gather up and carry particles out of the pulmonary air spaces and finally a drainage lymphatic system to transport foreign matter to nodes located outside the lungs. These combined mechanisms provide adequate protection against ordinary atmospheric pollution, but industry has thoughtlessly created such high concentrations of dust in the atmosphere that the protective devices fail and dust often accumulates inside the lungs.

Mining is one of the oldest industries where hazards of this kind have occurred largely because of the lack of ventilation. For centuries disease of the lungs was accepted as an inevitable consequence of underground employment. Fortunately disease must have developed slowly for hand drilling produced comparatively little dust and human tolerance is high. But the introduction of machinery and particularly the pneumatic drill created so much disease that the problem became serious to management. In periods of labor shortage, like that following the Boer War in South Africa, it precipitated a crisis. Such situations together with the general awakening of social consciousness during the past 40 years led to a demand for remedial measures. It resulted in an intensive study of the incidence and cause of “miner’s consumption”.

As a consequence of this study it is now accepted that all dusts are not equally dangerous, that free silica, usually as quartz or flint, is the preeminent cause of pulmonary disease, that, while free silica produces severe reactions in the lungs, silicosis itself does not kill its victims and may not even disable them and, finally, that silicosis is particularly dangerous because it specifically predisposes its victims to tuberculous infection. In recent years certain American writers have questioned the latter generalization because the manifestations of tuberculosis in the silicotic subject may be different from those in an otherwise normal one. Their challenge, however, has not shaken the faith of those best acquainted with the condition.

Further research is defining the conditions under which free silica produces its harmful effects upon the lungs. It has been proven that while particles as large as 10μ in diameter may be suspended in the atmosphere and inhaled into the lungs, only those 3μ and less in diameter cause much damage to tissues. Experiment has proved that in general as the particle size decreases the rate of tissue reaction increases, indicating a relationship to the amount of mineral surface in contact with the body fluids.

It has been shown that the concentration of silica in the air must exceed certain undefined limits before disease will develop in a working lifetime. Tentatively the maximum permissible limit has been set at 5 million particles per cubic foot of air, but this standard may not be applicable to all exposures and may have to be revised as experience accumulates.

It is recognized that exposures have to be continued for years before evidence of silicosis become manifest. The rate of tissue reaction is modified by the concentration and size of the silica particles and by the character of the other minerals associated with it in the atmospheric dust. Under extraordinary conditions producing excessive concentrations of very fine and very pure silica dust, disease may develop within a two-year period but it then appears with
unusual anatomic manifestations. In ordinary mining operations in the past it never appeared in less than three or four years and now exposures of nine, ten or twenty years are more commonly reported.

Pathological studies of persons dying with silicosis have defined the forms of the disease in the normal and the infected lung. They have shown how subsequently developing tuberculosis or other infection has modified the pattern of disease. Without this fundamental knowledge, the x-ray film which constitutes the most reliable evidence of silicosis during life, could not be interpreted intelligently.

This audience is hardly interested in the varied patterns which the disease assumes. It is sufficient to realize that there are three main types of change registered as shadows on an x-ray film. Briefly they are characterized as follows:

1. The accentuation of the shadows of the branching tree-like blood vessels in the lung which may be produced by a variety of causes, including reaction to inhaled dust of any kind. While such changes may be produced in the early stages of reaction to silica they are so often due to other causes that they have little diagnostic significance.

2. The discrete nodular fibrosis of uncomplicated silicosis characterized by the presence of round, sharply defined shadows, not over 4 to 6 mm. in diameter, uniformly distributed throughout all parts of both lungs.

3. The so-called conglomerate fibrosis in which large localized shadows develop in one or both lungs usually upon a background of generalized nodulation. Opinions differ as to the cause of all types of conglomerate fibrosis but there is always a suspicion of complicating infection either in a healed or active phase.

Serial x-ray examinations of groups of exposed workmen, repeated year after year, have demonstrated the manner in which the disease develops and emphasized the significance of its earliest manifestations. They have indicated an unexpected frequency of complicating infection which often gives rise to no clinical symptoms in silicotic subjects.

Surveys of different industries are pointing out the wide distribution of silicosis and are determining its incidence in simple and complicated form.

Animal experiments have reproduced silicotic fibrosis and provided a tool for controlled investigation. Such experiments have demonstrated the principles governing reaction to silica and other dusts and have made it possible to investigate the effects of protector substances which could hardly be done on human subjects.

Recent research has emphasized that other minerals associated with silica in the atmosphere are not merely inert diluents but that they govern the amount of silica that is inhaled, modify the anatomical form of the pulmonary reaction and perhaps alter the symptomatology.

Experience is demonstrating that the clinical picture of silicotic subjects in different industries is not always identical. As a general rule men with uncomplicated silicosis of the discrete nodular type are not disabled and exhibit no serious symptoms. There may be exceptions in types of disease produced by certain combinations of free silica and other minerals. Persons with conglomerate forms of silicosis are almost always short of breath and incapable of severe muscular effort. Even active infection may not produce as acute symptoms as in non-silicotic subjects and in the case of tuberculosis the causative organisms may not be eliminated in the sputum for a long time after they are established in the lung. This knowledge makes diagnosis difficult but there is no disagreement as to the importance of an active infection. Sooner or later it causes disability and even if it heals the scar is apt to alter the course of the silicosis. Open cases of tuberculosis must be removed from contact with their silicotic fellows for obvious reasons. Infection of any origin makes silicosis serious and tuberculosis is particularly hazardous. The problem today is one of putting in practice the well tried procedures for combatting tuberculosis.

A cure for established silicosis is hardly within the realm of possibility for the disease, when recognized clinically, consists of innumerable nodules of scar
tissue scattered throughout the lungs. These scars, produced by the action of silica, are composed of leather-like fibrous tissue which is much more dense than scars of any other origin. No drug or other form of treatment now known could dissolve them.

Today prevention remains the only reliable means of combating silicosis. Others in this audience are experts in the use of water, ventilation and respirators to prevent dust from forming and reaching the lungs of miners. The physician's part in prevention is equally important. His findings in the lungs of exposed workmen are proof of a hazard. He can select individuals free from infection and otherwise capable of withstanding exposures to dust. He must detect evidence of complicating infection and determine whether disability exists. He must decide where men with different degrees of pulmonary involvement should work. His is the responsibility of controlling the spread of infection, which means supervision of not only the workmen but of the entire community in which they live.

New methods of control are under investigation, but they are still in an experimental stage. The discovery that other minerals associated with quartz in atmospheric dust will modify its action has led to detailed study of their influence. The widely proclaimed experiments of Denny, Robson, and Irwin proved beyond a doubt that the presence of metallic aluminum would prevent quartz from irritating the cells and producing scar tissue. Apparently the conditions defining such inhibitory action are exacting for experiments in the writer's laboratory have failed to confirm these observations. With aluminum hydroxide, however, animals have been completely protected for a period of a year or more. On the other hand, although there has not been the slightest suggestion of silicotic reaction in either group of experiments, it should be borne in mind that no experiment has fully evaluated the influence of the factor of time. The longest period of observation reported by the Toronto investigators was only 17½ months. Similar experiments with a siliceous rock like Barre granite, whose potentiality for producing silicosis in human beings is notorious, has demonstrated that it also fails to produce fibrosis within 22 months. It would appear that some element in this rock acts as a temporary inhibitor for the doses employed in experiments contained 300 times the quantity of quartz necessary to cause fibrosis in pure state. This concept is strengthened by the prolonged exposures necessary to produce silicosis in the granite industry; employment from 12 to 20 years is regularly reported.

In the writer's opinion the study of the inhibitory action of aluminum is a fertile field for investigation. The presence of this element in siliceous rocks may explain some of the paradoxical lack of reaction to dusts of high free silica content. But the influence of aluminum has not yet been investigated sufficiently to warrant its use in place of the better known methods of prophylaxis. To evaluate its influence in human beings would involve an experiment which might prove disastrous to a generation of workmen. There is probably little harm in the use of aluminum as an adjunct to other methods of prevention. To expect that this substance could have any curative effect upon silicotic fibrosis which has already been established would be optimistic. Its demonstrated effect is to neutralize the silica so that it fails to irritate living tissue. If it could establish contact with quartz already inside the lung it would prevent further reaction, but there are no grounds for believing that it could "dissolve" existing scars.

While enough knowledge has now accumulated to control silicosis in many industries there are still essential details that are lacking. Opinions differ as to the mechanisms by which silica irritates the tissues, although many believe that its solubility is responsible. The question of individual susceptibility remains an enigma although its solution is of utmost practical significance. The diagnosis of activity of the infectious complications and a determination of their seriousness in individual cases is often difficult. The discovery of an adequate method of treating the tuberculosis which complicates silicosis would be an achievement of major importance. To establish equitable codes of permissible atmospheric dust concentrations much more must be learned about the physical behavior of mixtures of silica and other mineral particles in airborne suspensions.
How to develop the great deposits of phosphate rock in southeastern Idaho and make the phosphorus which it contains available for use as fertilizer in this state and throughout the nation is a problem over which there has been much discussion for several years. The question is especially in the foreground at this time.

All parties concerned appear to be in agreement upon one point, namely, that the farms of Idaho can use phosphate fertilizer profitably in crop production. All are not in agreement as to whether this phosphate can be used effectively in the form of finely ground natural mineral (bone phosphate of lime) or raw rock. Some believe that it can. Others are convinced that it can not except in occasional cases, but that the rock must be chemically treated to make the phosphorus usable by plants.

The Idaho State Grange is actively concerned with this matter. A corporation has been formed by a number of leading Grangers and others for the apparently two-fold purpose of promoting trials in the use of raw rock phosphate and grinding and marketing the rock commercially.

A factor of importance second only if at all to crop yield increases from the use of fertilizer is the cost of it. It is argued that even though the use of raw rock phosphate be proved beneficial to crops, the small percentage of available phosphorus as compared with the high percentage in the treated product may make the result more costly, unit for unit, than the use of the treated and concentrated product.

The proposed experiments under farm conditions throughout the state, if carefully done and accurately recorded, should supplement effectively the long-time experiment station work and provide an additional safeguard against extensive use of fertilizer in its less economic form and stimulate its use in such forms as are proved more efficient.

There is a great difference of opinion as to the use and application of phosphate or phosphorus to the rundown soils to make them livingly fertile—capable of producing nature's life-giving foods, which are so all-important to plant life, animal and man.

For more than 40 years, there have been two schools of thought on the subject. These can be classified as the organic and inorganic principles.

The United States Geological Survey has determined that there is approximately 6,000,000,000 tons of high grade phosphate rock in known deposits in Idaho, Montana, Utah and Wyoming. Idaho has from 75 to 80 per cent of the known deposits in the United States and over 50 per cent of the world reserve.

These facts bring us to the consideration of the exploitation of these vast deposits and in bringing about a greater utilization of Idaho's phosphate rock in the fertilizer industry and on the farms. The direct return in money, employment, happiness and the betterment of human affairs mean much to the economic status of this state and to the nation.

Let us awake to the possibilities in the use of what nature has stored up in its treasure house and stop marking time. This will require common ground where scientists, industrialists, representatives of governmental agencies and the farmer can meet and present their views on the subject in a spirit of cooperation. However they may differ in their views fundamentally, regarding theoretical aspects and practical measures, and inquiry with the public invited can be of great benefit to mankind, if all taking part meet in an endeavor to widen their own outlook by cooperating with others for the good of the most people, rather than meeting with an idea to further their own views and interests.

Excerpts of a letter to the Idaho State Land Department, dated December 9, 1939, from Dr. G. H. Earp Thomas, Director of Earp Laboratories, Bloomfield, New Jersey. Doctor Earp Thomas is widely known for his work in soil culture and noted as a great biochemist.
"The phosphates can be made available by the action of bacteria in a lasting way, and the organic materials carry to the soil all the necessary mineral elements to produce better quality and better balanced crops."

"I have for thirty-five years been cultivating bacteria which are beneficial to the soil, and, as you must know, any introduction of new ideas finds much opposition, but I am glad to say that the progress is now very satisfactory and the reports coming in confirm my contention that organic fertilizer can produce equal, if not better, results than the stimulating chemical fertilizers, and that it is more lasting and produces crops of superior quality from the nutritional standpoint."

"I shall be very pleased to arrange to visit your state and to give you every bit of help I possibly can to carry out the fine work. Through stress of immediate commitments, I can't tell for the moment when I will be able to leave, but will arrange my plans as rapidly as possible to accept your kind invitation to address your Board on the subject."

Very truly yours,
G. H. EARP-THOMAS.

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University of Idaho Extension Bulletin No. 120.


Further data on phosphate rock by Bertrand L. Johnson and B. H. Stoddard, is contained in the Minerals Yearbook for 1936, pages 931-945 inclusive.


University Will Assist Farmers In Use of Phosphate Fertilizers

University of Idaho, Moscow, Oct. 12.—Since the phosphate conference sponsored by the Association of Land Grant Colleges at Pocatello in August an increasing number of requests have been received for information on the value of the various phosphate fertilizers now on the market, according to a statement issued by the University of Idaho experiment station and extension service. Many inquiries reveal a growing desire on the part of Idaho farmers to try out forms of phosphate that have a low cost per ton.

Consistent with their policy in the past, the experiment station and extension division will be glad to assist farmers in testing and utilizing any kind of phosphate fertilizer they desire so that the greatest possible amount of information may be obtained regarding the effects of the applications, both as to yield and cost per unit of increased yield.

It is recommended by the experiment station that farmers who make applications of any kind of phosphate fertilizer set aside an untreated strip or block so that by comparison an accurate determination can be made of the cost of benefits that may be secured. Only in this way will the farmer know whether the application is profitable.

If farmers are interested in testing, either alone or in comparison with the phosphate fertilizers now commonly used in Idaho, some of the more recently developed phosphate products, the university of Idaho will assist in obtaining test lots.

For many years the University has been doing fact finding work in the field of phosphate fertilizers. Approximately 600 tests on privately owned farms in cooperation with the owners have been made in 34 counties. The tests have covered the southern Idaho farming sections from Ashton in the upper Snake to Weiser in the extreme western portion and all the major farming sections of the northern part of the state.
The results from many years work on various crops, both in cooperative tests on private farms and at the branch experiment stations, indicate that the most economical results have been obtained from the use of the so-called "soluble phosphates" TVA triple superphosphate and western manufactured treble superphosphate and the least profitable results from the TVA fused produce and raw rock phosphate.

In all this extensive phosphate experimentation the policy of the University has been to obtain the greatest possible number of facts and make them available to the farmers of the state to assist them in determining their farm practice. This policy applies to all the University activities in crop varieties, seeds, animal feeding, poultry rations and the many other fields of investigation, as well as in fertilizers.

METHOD FOR ANALYSIS OF MOLYBDENUM IN LOW GRADE MATERIALS IS GIVEN

The latest and most improved method for the accurate analysis of molybdenum in low-grade materials is given in a report recently issued by the Bureau of Mines, Department of the Interior. The report, by C. E. Arrington and A. C. Rice, was prepared by the Bureau's metallurgical division, and is written in three parts.

In Part I, a study has been made of the volumetric determination of molybdenum by reduction in the Jones reductor, receiving the reduced solution in a mixture of ferric alum and phosphoric acid, and titrating with standard oxidizing agents. In addition to potassium permanganate, which has long been utilized for this titration, potassium dichromate and ceric sulphate have been found to be applicable. The latter oxidants have been found to be especially useful in the form of dilute solutions for the determination of small amounts of molybdenum. The taste revealed that certain internal indicators give excellent results in these titrations.

In Part II, a method that combines the alpha-benzoinoxime precipitation for molybdenum with the oxidimetric titration of molybdenum has been developed. A few methods for utilizing the alpha-benzoinoxime precipitate in oxidation-reduction procedures were tested. As a first step, conversion of the organic precipitate to molybdenum trioxide by ignition seems to be the simplest. The molybdenum trioxide may be extracted with ammonium hydroxide or dissolved in sulphuric acid. The ammonia filtrate or sulphuric acid solution is made up for reduction in the Jones reductor. The reduced solution is caught under a solution of ferric-alum-phosphoric acid and oxidized with low-grade materials the volumetric method is shorter and more precise than the alpha-benzoinoxime gravimetric method. On the other hand, the alpha-benzoinoxime precipitation procedure is a great improvement over previous methods for preparing pure molybdate solutions for the volumetric determination of molybdenum.

In Part III, a few methods for the separation of molybdenum from tungsten were tested and it was found that the sulphide-precipitation procedure offers the cleanest separation of these elements. However, a point is reached where the concentration of molybdenum or tungsten is so great that some tungsten is carried down with molybdenum tri-sulphide. The tungsten so coprecipitated can be separated from the molybdenum as tungstic acid by precipitation with acid. After the removal this tungstic acid by filtration, the molybdenum is determined in the filtrate by reduction-oxidation methods.
GOLD CHEAPLY RECOVERED WHEN FOUND

By AMERICAN WIRE

Like Parisians, placer miners devise many fashions!

Aside from the gold pan and common sluice box, other kinds of equipment for sluicing are the rocker, long tom and surfwasher. All have the same function, settling the gold beneath the material that washes over.

Each is easy to build out of light lumber and costs little. Each is operated by hand and suitable for one or two men.

Rocking is not much more difficult than panning. At the head of a short sluice box is a metal-bottomed sieve a foot and half a square, several inches deep and filled with half-inch holes. Into this is poured gravel, then water. The sieve, which fits in a frame, is shaken by a handle. The dirt dissolves and washes through onto a diagonal frame, covered with a loose canvas. Some of the gold settles in the canvas, and the rest of the material slides onto a sloping board bottom, depositing remaining gold against riffle cleats as the sand washes down the box.

When sand and clay have been washed through the sieve and the water gets clear, rocks left are sorted for nuggets and the sieve is refilled. The canvas is occasionally washed in a tub of water and the riffles cleaned.

The long tom is an open box several sections long, widening out from one to three feet and having a slope of an inch to a foot.

The sections are joined like stairs, material dropping from one into the other as it washes along. Placed across the end of a center section is a diagonal metal sieve, which strains the material and drops it onto a series of riffles below.

A surf-washer is similar, but wider and shorter. The incoming surf washes up the box, dissolves the material and carries it back across the riffle cleats.

Where water is not available, a motor-driven dry washer, similar to the rocker, can be used. Vibration takes the place of water.

Although power is sometimes used in connection with hand work, it does not alter the method. It speeds carriage of gravel to the sluice box by drag line or automatic shovel.

Riffles are an essential part of every sluice box. The heavy minerals depositing behind them are cleaned up at regular intervals to prevent gold from sliding over them. Mercury is sometimes added to the riffles to catch fine gold.

The riffles are wedged in rather than nailed, so that they may be taken out and put back when the minerals are removed. Material for pole, cobblestone or block cleats is usually nearby. Carpet matting protected by riffles, is sometimes used to catch the extra-fine gold. Shallow, wide sluices are used for fine material. Deep, narrow sluices are used for coarse gravel.

Lots of a troy ounce or more of fine gold are bought by the mints, with western offices in San Francisco, Seattle and Denver. Small amounts are sold to licensed gold buyers or smelters.

NOTE: Courtesy, Boise Capital News.
Idaho, with an infinite variety of lakes and streams, of wooded hills and majestic mountain ranges, offers recreation features of unusual appeal. Supplementing these outstanding scenic attractions, are many camping facilities and conveniences.

Freedom of action is interfered with as little as possible by restrictive rules. The visitor will find it necessary only to be careful with fire, to leave a clean camp, to damage no green trees, or signs and other improvements, and to observe the necessary rules of sanitation.

Visitors are urged to register at camps, telephone booths, and stations where they will find interesting exhibits, maps, and pamphlets.

A large part of Idaho is accessible by road, but there are many undeveloped areas which will appeal to those who yearn for the untrodden ways.
ADA COUNTY

County Seat: Boise. Area: 1,154 square miles. Population: 37,925. Principal Industries: Irrigated farming, stock raising, fruit raising and mining. Highways: Main highway, Oregon Trail; county roads excellent. Railroads: Main line of the Union Pacific. Mineral Resources: Boise was the principal distributing point for miners' supplies when the rich placer diggings of Boise County were worked in the early days. At that time mining was based on free gold operations and Ada County's small mountainous area was the scene of many active operations.

Base ore was encountered at a shallow depth causing a shutdown of the various properties. This field offers good opportunities to prospector and operator.

The chief mineral resources are: building stone, gold, lead, silver, zinc and arsenic.

Review of Year's Operations

Mining activity in Ada County for the year 1939 was confined to development work on unpatented mining claims in the Black Hornet, Shaw Mountain and Highland mining districts and to small placer operations along the Boise and Snake rivers.

BOISE OIL COMPANY

RELECES-GOLD MINING COMPANY

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ADAMS COUNTY

County Seat: Council. Area: 1,366 square miles. Population: 2,867. Principal Industries: Agriculture, fruit raising, livestock raising, and mining. Highways: North and South Highway. Branch roads to outlying communities kept in good condition. Railroads: Pacific and Idaho Northern, Weiser to New Meadows, and Union Pacific branch on Snake River. Rivers: Snake River forms western boundary; Weiser River flowing south and Little Salmon flowing north. Relief: 90% of the county is mountainous. Chief range is the Seven Devils, noted for ruggedness and grandeur. Mineral Resources: In the eighties and early nineties many mines were in operation; a railroad projected into the district; a smelter in operation and three towns established. The boom died in the panic of 1893 and the district has been practically dormant since.

The ores of the Seven Devils District are principally copper-gold-silver ores. The ores of Indian Creek section are: Silver-copper and lead-zinc-silver. In addition to these, deposits of mica, feldspar and garnets of commercial importance occur in this county.

This is a favorable district for the prospector and operator and when the mineral resources are properly exploited, the county will be recognized as one of the principal mining counties of the State.

Review of Year's Operations

Prospecting, testing and annual assessment work was noted on many claims throughout the county. Shipments of ore were made from Cuddy Mountain, Placer Basin, Indian Creek and properties along the Snake River.

Adams County presents a favorable area for the development and exploitation of Idaho's mineral resources. Large deposits of copper ores, with fairly good gold content are known to exist and have been diamond drilled to some extent. The mining districts are worthy of investigation by scouts and engineering parties.

It is reported that preliminary work is under way at the Red Ledge property of the Idaho Copper Company in the Seven Devils district, 15 miles north of Homestead, Oregon. A portable compressor and bulldozer are being shipped to the mine and it is planned to start a 300-foot tunnel in the spring of 1940.

The Hamil brothers of Council explored and rehabilitated properties in Placer Basin.

A. L. Freehafer was quite active in the development of properties in Adams County.

W. C. Dewey, of Nampa, scouted and prospected near Starkey during the summer months.

Dr. Ralph S. Cannon is making a geologic study on the Snake River and in the Seven Devils country, Adams County, as a project of the Idaho Bureau of Mines and Geology in cooperation with the U. S. Geological Survey. Mr. Cannon spent the entire 1938 field season on this project. Due to the extreme ruggedness of this country, and the wide expanse of the mineralization progress has been and will continue to be slow. The district, however, warrants the survey now in progress and the cost involved.

CRACKERJACK GOLD MINING COMPANY

IDAHO COPPER COMPANY
Office: Idaho Bldg., Boise. Officers: Wm. Devlin, Pres.; W. O. Taylor, Asst. Sec., both of Boise; Maytor Huppenyan, Mgr., Los Angeles, Calif. Inc.: Jan. 10, 1920 as Idaho Copper Company Limited; Limited dropped from the name May 24, 1926. Capital: 50,000 shares; par value $10; Feb. 9, 1925, increased capital stock to 10,000,000 shares; par value $1; shares issued, "nearly all". Property: Red Ledge group. Remarks: "The 40 claims known as the Idaho Copper Company's Red Ledge property, located in the Seven Devils Mining district, have been involved in litigation for many years. In October 1937, Cooley Butler by virtue of a court decree obtained in a settlement became record owner of these claims. However, a contest to set aside this decree may soon be started by stockholders of the Idaho Copper Company."

PLACER BASIN COMPANY

RED LEDGE INC.
Office: Idaho Bldg., Boise. Officers: Wm. H. Simons, Pres.; Elmer Fox, Sec., both of Boise; Maytor Huppenyan, Mgr., Los Angeles, Calif. Inc.: Dec. 22, 1932. Capital: 5,000,000 shares; par value $1; 1,500,000 shares issued. Property: 80 unpatented claims, Seven Devils dist.; Robinette, Oregon. Development: Exploration work. Ore: Copper, gold and silver. Men Employed: Average, 7. Remarks: "Red Ledge Inc. consists of a cooperating group of stockholders who formerly were stockholders of Idaho Copper Company. They have acquired the 80 claims adjoining the Idaho Copper Company original Red Ledge property and are doing exploration and assessment work."

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**BANNOCK COUNTY**

County Seat: Pocatello. Area, 1,837 square miles. Population: 31,266. Principal Industries: Distributing center, R. R. division and shops. Highways: Oregon Trail and Yellowstone Park highway; excellent branch roads. Railroads: Union Pacific R. R., shops and central district headquarters in Pocatello. Mineral Resources: Phosphate rock, limestone, manganese, copper, silver, gold and building stone. The limestone is suitable for cement and the phosphate rock for fertilizer. Manganese deposits near Cleveland and Lava Hot Springs were discovered in 1924 and reports indicate that there is a large tonnage of high grade ore available.

Review of Year's Operations

The Idaho Portland Cement Company, located at Inkom, own and operate a limestone quarry and manufacturing plant. The finished product is known by the trade name of "Eagle Brand" cement and is in great demand. An average of fifty men are employed by this company at the present time.

Seven men are employed at the Lava Manganese Mining Company. The property is known as the Vanza mine near Lava Hot Springs. The mine was put in production in 1929-30 by E. H. Wickham, lessee. After being idle for a couple of years, the property was leased by Bert Shurtleff and associates, whose lease expired in August of 1939. A 300-foot tunnel is being run on the 60-foot level by the owners, B. C. Madill and A. W. Miller of Lava Hot Springs, in order to undercut the old Wickham workings and put the mine on a production basis at an early date.

Some development work was performed on mining properties in the hills east of Oxford.

**IDAHO PORTLAND CEMENT CO.**

Office: Inkom. Officers: Eugene Enloe, Pres.; Raymond Enloe, Sec., both of Spokane, Wash. Inc.: July 20, 1928. Capital: 6000 shares common, no par value; 5000 shares preferred, par value $100; 5277 shares common, 4,564 shares preferred issued. Property: 175 acres patented land, unorganized dist.; near Inkom. Plant: For a complete description of plant see Idaho Thirty-first Ann. Rept. Min. Industry, 1929. Ore: Limestone. Remarks: "This company owns certain grazing land in Bannock County on which is located a deposit of limberock and shale suitable for the manufacture of Portland cement. The rock, in various grades, is so common in the vicinity that it can be classed as native. This particular formation lays in a bank or hill about 500 feet high; it is fairly loose and there is no overburden. In a simple quarrying operation, completely superficial, it is loaded in cars and hauled to the manufacturing plant. The process of making Portland cement is purely a manufacturing operation. It is made by burning proper proportions of argillaceous and calcareous materials; no mineral is extracted and there is no mineral bearing rock used from which an extraction can be made. All stock issued and sold was for the purpose of acquiring the necessary land and the construction of the plant. The only items used exclusively for the earth removal operation
are two power shovels, both exceedingly minor items as compared to the cost of the plant."

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- Geography, geology, and mineral resources of part of southeastern Idaho, by G. R. Mansfield: U. S. Geol. Survey Prof. Paper 152, 1927.‡

**BEAR LAKE COUNTY**

- **County Seat:** Paris. **Area:** 980 sq. miles. **Population:** 7,872. **Principal Industries:** Agriculture. **Highways:** Oregon Trail and excellent branch roads. **Railroads:** Main line of Union Pacific. **Mineral resources:** Phosphate rock, gypsum, manganese, copper, lead, silver and possibilities of petroleum. Idaho is credited with 85% of the known phosphate resources of the world and the largest and most accessible areas are in Bear Lake County. These deposits are practically untouched and represent one of the greatest potential resources of the State. (See U. S. G. S. Professional Paper No. 152 by G. R. Mansfield.)

Many structures similar to the Wyoming producing oil fields are found in the county and it is reasonable to expect future production on the Idaho side of the State line.

**Review of Year's Operations**

Mining in Bear Lake County during the year 1939 was practically dormant with the exception of annual assessment work. However, much interest was shown in the possibilities for the development and exploitation of the vast phosphate deposits in this section of the state.

The recently organized Teton Phosphat Co. Inc., has acquired 160 acres of deeded land 6 miles north of Montpelier, in the center of the world's greatest phosphate deposits. It is estimated that there is available 7,000,000 tons of phosphate rock in a blanket deposit with only about 1 foot of overburden that can be mined by means of power shovels. It is said that this low-grade deposit contains 25 per cent $P_2O_5$ and 55 per cent bone lime phosphate, 15 per cent organic matter and other minerals valuable to plant and animal
life. The company proposed to produce phosphate for soil building by grinding to a fineness of 300 mesh. They report splendid results on Idaho soil. The officers of this newly organized company are Houston T. Hitt, president and J. C. McKinley, secretary-treasurer. The principal office of the company is located in Boise with a branch office at Montpelier.

The McIlwee Idaho Phosphate Company has been organized and has established offices in the First National Bank Building of Salt Lake City, Utah. R. C. McIlwee of Salt Lake is president of the company, which will start operations near Paris, Idaho. About 20 years ago the McIlwee interests produced and milled phosphate from this deposit. Interested in the new company are: Ray C. McIlwee of Salt Lake City, Utah, J. A. Kinkaid of New York, and Lawrence McIlwee of Provo, Utah.

The Utah-Idaho Mining and Milling Company resumed work on 18 unpatented claims that formerly belonged to the Stray Boulder group. Under the supervision of F. L. Rignel of Paris, four to six men were employed in rehabilitating the 200-foot shaft. Buildings and machinery have been put in order and supplies taken in for winter operations. It is planned to drift and explore from the 100-foot level before cleaning out the remaining 100-foot of shaft. P. C. O'Malley of Pocatello, is president and H. H. Broomhead, of Blooming, secretary-treasurer of the company.

McILWEE IDAHO PHOSPHATE COMPANY

PARIS MINING AND MILLING CO., INC.

SAN FRANCISCO CHEMICAL CO.

STOCKHOLDERS' SYNDICATE

SUNSET MINING CO.

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BENEWAH COUNTY

County Seat: St. Maryes. Area: 786 sq. miles. Population: 6371. Principal Industries: Timbering, agriculture and mining. Transportation: Boats on Coeur d'Alene Lake and St. Joe River; a good state highway system; Spokane-Wallace branch of the Union Pacific and main line of Chicago, Milwaukee and St. Paul Railroad. Rivers and Lakes: St. Maryes River which runs north west through the eastern part of the county empties into the St. Joe River which flows west through the northern parts of the county and empties into Lake Coeur d'Alene, whose southern end touches the north boundary of the county. Relief: The county is rugged and heavily timbered except a small area along the rivers and in the northwest corner of the county. Mineral Resources: The principal mineral resources are gold, copper, silver, lead, zinc, iron and clay. These deposits have been given very little attention in the past. The St. Joe district which lies east of St. Maryes, and the Hoodoo and Camas Cove Districts in the southeastern corner of the county have received the greatest attention.

RAINBOW MINING & MILLING CO., LTD. (See Shoshone and Kootenai Counties.)

SILVER STAR MINING & DEVELOPMENT CO.

OTHELLO MINING CO.

ROUND TOP MINING CO.

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BINGHAM COUNTY

County Seat: Blackfoot. Area: 2184 sq. miles. Population: 18,561. Principal Industries: Agriculture. Transportation: An excellent system of state highways; Aberdeen, Mackay and Pocatello-Butte branches of the Union Pacific. Rivers: The Snake River flows from the northeast to the southwest diagonally through the county. Relief: Lies mostly within the Snake River Valley. Mineral Resources: Phosphate and coal beds crop out in the eastern part of the county, but have received little attention. Fine gold is known to exist in the sands of Snake River.

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BLAINE COUNTY

County Seat: Hailey. Area: 2797 sq. miles. Population: 3768. Principal Industries: Mining, animal raising and agriculture. Transportation: Union Pacific Wood River branch; Sawtooth Park state highway, state highway No. 22 and a fair system of county roads into all mining districts. Main roads kept open all year. Rivers: Big and Little Wood rivers flow southerly through the county. Relief: The county is, in the main, rugged with a few level areas along the rivers and creeks. Mineral Resources: Silver, lead, gold, zinc, copper, arsenic, antimony, bismuth, quicksilver, graphite, barytes and limestone. The first ore was shipped from this district in 1880 and since then the county has been a persistent and prolific producer.

The ores are high grade, making an ideal operation for the small operator. The possibilities for future discoveries are excellent and the district is a favorable one for prospectors, development companies and leasors.

Review of Year's Operations

The A. L. Heine Mines, Inc., report 500-ft. of development work during the year. This property has been developed for the past two years and now controls 17 claims. The company intends to build a mill, tram and power plant near the mouth of the Edna tunnel where about 2000 tons of mill ore from former operations will be treated. Some custom milling will be done.

According to reports, the faulted Minnie Moore ore body, or an equivalent ore shoot, has been located by the Minnie Moore Mine Development Company in the Hershey crosscut. Irvin E. Rockwell of Bellevue, is principal owner of the mine and manager of the operating company. An average of 15 men was employed during the year.

The Snyder Mines, Inc., with a crew of 208 men, worked the Hailey Triumph, Independence and Star mines. The property was worked through the Triumph shaft and Plummer tunnel, producing approximately 10,000 tons of complex silver-lead-zinc sulphide ore with a fair gold content monthly. This ore is shipped to Bauer, Utah for treatment. The Snyder Mines, Inc., are the largest producers of mineral in southern Idaho. Arthur Jensen, is superintendent in charge of mining operations.

The Ivanhoe and Westlake property, consisting of 10 claims and a millsite, has been leased by Charles H. and Willoughby A. Shepherd from Mrs. Susan J. Westlake and others. Clean-up work and a development crosscut preliminary to the construction of a small mill was completed during 1939. Values are in gold, silver and zinc.

The Idaho-Sun Valley Mines, Inc., has been rehabilitating the Croesus, Hope and Eclipse claims, near Hailey. About 12 men are employed in this work under the direction of Henry Olander.

The Eureka was leased by the Markham family and Earl Stewart from W. A. Wilson, 319 Dewey Block, Salt Lake City, Utah.

Si. Davis and son Lavelle made several shipments from the Red Elephant. The Gold Bottom Mining Company report 100-ft. of development work during the year with a crew of 2 men.

Gold Recovery Company, set up a cyanide plant and treated 1400 tons of mine tailings with a crew of 3 men.


A compressor was installed and one house built by the Parker Mines, Inc., with an average crew of 4 men. This property is located in the Warm Springs Creek district near Ketchum.

The Treasuremont Mining Company purchased a compressor and completed 112 ft. of development work.

B. M. Rogers was quite active at his mining property at Muldoon. It was reported that Rogers plans to build a mill and put the property on a production basis.
Triumph, Independence and North Star Mines, Hailey, Blaine County, Idaho
The Challenger Trust Company developed the Pete Snider claims which adjoin the Hailey Triumph, Independence and North Star holdings. Considerable annual labor was performed in this county by claim holders. In many instances showings were encountered which will tend to encourage further development of these mining claims.

A. L. HEINE MINES, INC., THE

BALTIMORE & VICTORIA MINING CO.

EUREKA DEVELOPMENT CO., LTD.

FEDERAL MINING & SMELTING CO. (See Shoshone County)

FIELDS MUTUAL DEVELOPMENT CO.

GOLD BOTTOM MINING COMPANY
GOLD RECOVERY CO.

GOLDEN ARROW MINES, INC.

IDAHO MINERAL PRODUCTS CO.

IVANHO MINING CO. (See Custer County)

LIBERTY GEM MINES, INC.

**PARKER MINES, INC.**
**Office**: 313 First Ave. So., Seattle, Wash. **Officers**: George S. Burdick, Pres.; Alfred A. Peat, Sec., both of Seattle, Wash.; Heber Comer, Statutory Agent, Ketchum. **Inc.**: Sept. 26, 1938. **Capital**: 200,000 shares; par value 25c; 93,000 shares issued. **Property**: 6 patented claims, Warm Springs dist.; Ketchum. **Development**: Approximate total development 3500 ft. **Plant**: Gardner Denver compressor, mine cars, etc.; compressor house, bunk house and blacksmith shop. **Ore**: Silver, lead and gold. **Men Employed**: Average, 4. **Remarks**: 110 ft. of development work during the year; installed compressor and machinery and built one house.

**SILVER SPAR MINING CO.**
**Office**: Idaho Falls. **Officers**: B. M. Rogers, Pres.; Dr. Dwight Lenzi, Sec., both of Idaho Falls. **Inc.**: Apr. 14, 1916, as Falls Mining Co.; name changed Apr. 28, 1917. **Capital**: 100,000 shares non-assessable; 100,000 shares assessable; par value $1; 94,449 shares assessable issued. **Property**: Silver Spar group; 20 patented, 6 unpatented claims, Little Wood River dist.; Muldoon. **Development**: By 6 tunnels totaling approximately 1520 ft. in length, and an inclined shaft 200 ft. long. **Plant**: Steam-driven hoist and compressor; mining camp. **Ore**: Silver. **Men Employed**: Watchman. **Remarks**: Idle.

**SNYDER MINES INCORPORATED, THE**
**Office**: 218 Felt Bldg., Salt Lake City, Utah. **Officers**: E. H. Snyder, Pres.; Guy Snyder, Sec., both of Salt Lake City, Utah; Neal Snyder, Mgr., Hailey. **Inc.**: Sept. 23, 1936. Charter forfeited Dec. 1, 1939. **Capital**: 500,000 shares, par value $1, all shares issued; 1,000 shares, no par value, 805 shares issued. **Property**: 56 patented and 13 unpatented claims, Wood River dist., some of which are held under lease from Ivanhoe Mining Co. and Federal M. & S. Co. **Development**: Approximate length of principal tunnels, 14,150 ft.; approximate length of intermediate levels, 20,700 ft. **Plant**: Complete mining equipment. **Ore**: Gold, silver, lead and zinc. **Men Employed**: Average, 208. **Remarks**: 7000 ft. of development work during the year; built a hoist house and 2 dwellings.

**TIP TOP GROUP MINING COMPANY**
**Office**: 40 North Main St., Salt Lake City, Utah. **Officers**: LeGrand Richards, Pres.; Charles S. Hyde, Sec., both of Salt Lake City, Utah; W. L. Adamson, Statutory Agent, Carey. **Inc.**: July 17, 1930. **Capital**: 100,000 shares; par value 10c; all shares issued. **Property**: 3 patented claims, Warm Springs Creek dist.; Ketchum. **Development**: Approximate total development, 2,575 ft. **Ore.**: Lead, silver and gold.

**TREASUREMONT MINING COMPANY**
**Office**: 321 Boylston Ave., No., Seattle, Wash. **Officers**: W. J. Logus, Pres.; Mildred A. Logus, Sec., both of Seattle, Wash.; O. G. Miller, Mgr., Ketchum. **Inc.**: Sept. 10, 1937. **Capital**: 2,000,000 shares par value 5c; 1,000,000 shares issued. **Property**: Lucky Coin group; 7 unpatented claims held under lease and bond, Warm Springs Wood River dist.; Ketchum. **Development**: Approximate total development, 850 ft. **Plant**: Steel dump car, track and blacksmith outfit; powder house, blacksmith shop and change room. **Ore**: Silver, lead, gold and zinc. **Men Employed**: Average, 4. **Remarks**: Compressor purchased during year; 112 ft. of development work.

**UTAH-BELLEVUE MINES CO.**
**Office**: Box 1971, Salt Lake City, Utah. **Officers**: E. W. Totten, Pres.; O. R. Totten, Sec., both of Salt Lake City, Utah; F. E. French, Statutory Agent, Hailey. **Inc.**: Filed in Idaho, Dec. 19, 1914. **Capital**: 500,000 shares; par value 10c; 100,000 shares issued. **Property**: Kelley group; 6 unpatented claims, Mineral Hill dist.; Bellevue. **Development**: Principally by 1 tunnel.
300 ft. long and a vertical shaft 125 ft. deep. **Plant:** Small gas-driven compressor; air-driven hoist. **Ore:** Lead-silver. **Remarks:** Idle.

**WOOD RIVER MINING CO.**

**Office:** Blackfoot. **Officers:** F. T. Halverson, Pres.; Lorenzo R. Thomas, Sec., both of Blackfoot. **Inc.:** July 30, 1923. **Capital:** 1,000,000 shares; par value 10c; 491,240 shares issued. **Property:** Puritan group; 8 unpatented claims, Warm Springs dist.; Ketchum. **Development:** By 3 tunnels, the principal tunnel being 937 ft. long; approximate total development, 1737 ft. **Remarks:** Idle.

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BOISE COUNTY

County Seat: Idaho City. Area: 1840 sq. miles. Population: 1847. Principal Industries: Mining, stock raising and lumbering. Transportation: Well served by Federal and State highways and a good system of county roads. The Nampa-McCall branch of the Union Pacific serves the western part. Rivers: Included within its area is part of the drainage basin of the Payette River, most of the south fork of the Payette River and all of the drainage basins of Grimes and More's creek which comprise the area known as the Boise Basin. Relief: The district is one of general ruggedness, high wooded mountains and deep canyons. Mineral Resources: Gold, silver, lead, zinc, copper, bismuth, antimony, monazite, lime and coal are known to occur.

History and Future

The history and future of Boise County dates back to the formation of the State in 1860, when placer gold was first discovered near Pierce City (Clearwater County). The overflow from this stampede resulted in the discoveries at Elk City, Florence, and Boise Basin, in quick succession, and by 1863 Boise Basin was one of the most thriving communities in the western part of the United States. In July, 1864, more than nine thousand 20-acre placer claims had been recorded in the three principal mining districts.

During the first few years after the discovery of gold all mining was confined to the placers which were susceptible to hand methods. After these became less profitable, numerous ditches 5 to 30 miles in length were constructed, and hydraulic mining of the higher bench gravels was started. These operations were conducted for many years, and a few have survived to the present day.

Shortly after the placer rush had subsided, attention was given to quartz mining; many discoveries soon were made, mills were constructed, and deep mining was started. The principal discovery was the Gold Hill mine at Quartzburg. In 1863 the vein was exposed by placer mining, and by 1867 a mill had been built and was in operation. Except at brief periods when it was being repaired, the mill was operated continuously for 12 years. The mine has been in almost continuous operation since the day of discovery and is credited with a production of six to eight million dollars. The record gives
it the distinction of being the oldest and largest producing gold mine in the State. The vein has been opened to a vertical depth of 1090 feet below the creek level; at this point the ore is still persistent and has greatly increased both in grade and extent. The mine was developed on a lower horizon. July, 1938, operations ceased.

In addition to the Gold Hill, many other gold mines have a large production record. This production, combined with that derived from placer mining, both hydraulic and dredging, held Boise County in first place in gold production in the State until the year 1923, and it regained this position in 1928. The opening of the ore bodies on the 1090-foot level of the Gold Hill mine, the past production from the Belshazzar mine, and the new ore disclosures made during 1932 were instrumental in attracting much attention to the county.

As the early-day miner was interested only in the precious metals, gold and silver, which could be recovered by the methods then in use, he disregarded all veins containing the sulphide or base ores. Before these ores became valuable, prospecting had practically ceased, with the result that this county offers one of the best fields in the State to prospectors or small development companies in search of lead-zinc-silver ores. Deposits of these metals, which contain also high values in gold, are widely distributed throughout the county, and a few have been partly developed. When properly exploited and intelligently managed, they will become an important factor in the future prosperity of Boise County and the City of Boise and will give the State an additional lead-zinc producing district.

Review of Year's Operations

The Birthday Gold Mines Consolidated Company, located 12 miles east of Lowman, recently installed a 10 to 15 ton pilot plant for its oxidized ores. Crusher, ball mill, jigs and table are powered by a Caterpillar Diesel. Shipments of concentrate are being sent to Salt Lake for smelting. The company contemplates to extend the lower tunnel to tap the No. 4 workings and tap four separate veins that show on the surface at depth. At present 7 men are employed under the supervision of Joseph D. Branson, of Lowman.

The Buckhorn Mining Company developed the Grand View group of claims and installed a sawmill, Allis-Chalmers tractor and bulldozer, Sullivan mining equipment, and Gibson mill machinery. It is reported that shipments of gold were made to the U. S. mint and concentrates to the smelter. Thirteen men were employed.

Come-Back Mining Company was operated on the leasing system. An average of 14 men were employed. The company reports that 925 ft. of development work was completed during the year.

John P. Lenz and August Reine leased the 100-ton Enterprise mill to treat ores from the Missouri mine and dumps of the Come-Back and other properties.

The Silver Jim was operated by Dr. C. C. Fairchilds associated with J. A., Ralph, Neil and Roy Thomas.

Charles Stoll developed the Lucky Star claims to some extent. This property is on the Payette drainage of Grimes Pass.

The Grimes Company operated their floating dredge near Pioneerville. This boat is equipped with 72 four-foot buckets and employs 14 men.

Parley Hudson worked the Gornick placers with 4 men during the season.

The Idaho was leased by Boni Sagasti and Paul Horting who made several shipments to the Salt Lake smelter.

The Fisher-Baumhoff interests operated the largest floating dredge in the state at New Centerville and a smaller boat, the "Mickey-Mouse" on Granite Creek. The combined yardage of these two dredges approximate 8,000 yards every twenty-four hours.

W. H. Simons, former inspector of mines, operated a washing plant on Elk and Muddy creeks near Pioneerville. The company is known as the Western Gold Corporation. Fifteen men are employed.
Several men were employed at the Mann Placer, a hydraulic operation near Placerville.

The Texas-Owyhee Mining & Development Company operating the Mayflower mine near Quartzburg employed 100 men during the spring months. The crew was reduced during the summer but now averages about 50 men. This is the largest employer of mine labor among the lode properties in the Boise Basin. 2685 ft of development work was completed during the year and plans are going forward to sink the shaft to open up new levels.

The Proffer mill, located between Idaho City and New Centerville, treated custom ores during the year with good results.

George Baker had a crew of 4 men rehabilitating the Illinois mine. The Illinois is owned by J. W. Duquette. Several other properties in this vicinity were explored and the scene of annual assessment work.

The Northwest Development Company, owned by Little & Notting, employed 30 men at the Idaho Placers, located at Idaho City. The season was short due to water giving out for hydraulic operations. This is the largest hydraulic placer in Idaho.

A. L. Ternan, 1703 North 16th Street, Boise, has leased the Last Chance and Silver Star patented group at Quartzburg. For the past year, Mr. Ternan has made an extensive study of the Quartzburg mining area by systematic underground exploration. He is not yet ready to publish the results of this exploration. However, he predicts a surprising revival of mining in the Boise Basin.

A new 25-ton ball mill was installed at the King mine near Idaho City. High grade gold values are reported in the rehabilitation of the mine's short tunnel and shallow shaft. The property is owned by the Smith brothers, John, Pete and George, of Idaho City, and is leased to Harvey and Thomas Curtis, Carl Haaki and Pete Smith, one of the owners, who is working with the Curtis brothers.

Work was performed at the Packer John mine by lessees.

The Red Lode Mining Co., Inc., was further developed by doing annual assessment work and driving Tunnel No. 3 ahead.

The More's Creek Dredging Company operated a floating dredge on property below Idaho City that was secured under lease and bond from the Idaho Gold Dredging Company. Fifteen men are employed and it is reported that the operation will continue for another five years.

Jack Dodson developed some promising looking property to some extent and was busy prospecting the last year.

Hay Fork properties were active. Hal R. Jarvis had a crew of 4 men at work during the summer months.

The Golden Seal Mining and Milling Company, which holds 12 unpatented claims north of Boise, is said to have made a recent strike by E. K. Lorimer, of Boise. Values are in lead, silver, zinc and gold. Lack of roads to the property has hindered development. L. M. Gorton, of Boise, is president.

John Jedlick and Charles Brandt developed their property at the head of Daggett Creek during the year. Fifty ft. of tunnel work was completed. Values are in gold and silver.

Lee Heller developed a promising looking property near Garden Valley.

BIRTHDAY CONSOLIDATED GOLD MINES INCORPORATED

BLUE ROCK MINES CORPORATION

CLOVERLEAF METALS COMPANY

COME-BACK MINING CO.

CONSOLIDATED MINES SYNDICATE
(See Camas, Elmore and Idaho counties.)

CRESCENT GOLD COMPANY

GOLDEN AGE MINING PROPERTIES, INC.

GOLDEN SEAL MINING & MILLING CO.

THE GRIMES COMPANY
Office: Boise. Officers: H. B. Murphy, Pres., Boise; Geo. E. Murphy, Sec., Portland, Ore.; H. B. Murphy, Statutory Agt., Boise. Inc.: March 20, 1935. Capital: 1000 shares common; no par value; 250 shares preferred; par value
$100; all shares issued. **Plant:** 4-cu. ft. Yuba-type dredge with 72 buckets. **Ore:** Gold.

### IDAHO-CANADIAN DREDGING COMPANY
Office: 630 First Nat'l Bank Bldg., Boise. **Officers:** H. B. Murphy, Pres.-Mgr., Boise; G. E. Murphy, Sec., 302 Lbrmen Bldg., Portland, Oregon. **Inc.:** July 30, 1937. **Capital:** 250,000 shares; par value $1; 67,415 shares issued. **Plant:** 7½-cu. ft. Yuba-type dredge with 72 buckets. **Ore:** Gold.

### IDAHO MINING SMELTING & REFINERS, INC.
Office: Boise. **Officers:** Dr. W. H. Innis, Pres.; Fred White, Sec., both of Boise. **Inc.:** July 14, 1936. **Capital:** 50,000 shares; par value $1; increased to 300,000 shares; 18,857 shares issued. **Property:** Owns a 60% interest in trust agreement covering Calcite deposit at Banks; other property held under lease surrendered to owner. **Remarks:** Idle.

### IDAHO MODOC PLACER MINING COMPANY
Office: Centerville. **Officers:** A. S. Holcombe, Pres.-Mgr.; O. E. Ellison, Sec., both of Centerville. **Inc.:** Sept. 13, 1924. **Capital:** 500,000 shares; par value $1; all shares issued. **Property:** 4 unpatented claims, Boise Basin dist.; Idaho City. **Remarks:** 4½ miles of road built on property.

### IDAHO-NEVADA COPPER CORPORATION, LTD.
(See Elmore County)
**Office:** 216 First Nat'l Bank Bldg., Boise. **Officers:** James O. Galloway, Pres.-Mgr.; R. A. Noakes, Sec., both of Boise. **Inc.:** Feb. 3, 1938. **Capital:** 2,000,000 shares; par value 5c; 1,310,218 shares issued. **Property:** 4 unpatented claims, Morris Creek dist., Idaho City, held under lease and option from Fred J. Kuntz, Boise. 42 unpatented claims, Cope and Elko districts, Mountain City, Nevada. **Ore:** Gold-silver-copper. **Men Employed:** Average, 15. **Remarks:** 397 ft. of development work during the year.

### IRON DYKE MINES CO.
**Officers:** S. T. Schreiber, Pres.-Mgr.; M. M. Schreiber, Sec., both of Boise. **Inc.:** April 16, 1923. **Capital:** 150,000 shares; par value $1; shares issued, not stated. **Remarks:** Idle.

### MAYFLOWER GOLD MINES, INC.
**Office:** Noble Bldg., Boise. **Officers:** J. B. Eldridge, Pres.; G. R. Eldridge, Sec., both of Boise. **Inc.:** May 20, 1931. **Capital:** 300,000 shares; par value $1; 158,855 shares issued. **Property:** Mayflower group; 2 patented, 7 unpatented claims, Quartzburg dist.; Quartzburg. **Remarks:** Property under lease to Texas-Owyhee Mining & Development Company.

### MEADOW CREEK GOLD PLACER COMPANY
**Office:** 110 Main St., Boise. **Officers:** S. O. Kerley, Pres.; John F. Lukens, Sec., both of Boise. **Inc.:** Sept. 13, 1924. **Capital:** 500,000 shares; par value 10c; all shares issued. **Property:** 4 unpatented claims, Boise Basin dist.; Idaho City. **Remarks:** 4½ miles of road built on property.

### PACKER JOHN MINES CORPORATION
**Office:** 304 Capitol Securities Bldg., Boise; **Officers:** Gordon C. Smith, Pres.-Mgr.; J. W. Gwinn, Sec., both of Boise. **Inc.:** November 3, 1937. **Capital:** 3,000,000 shares; par value 1c; 1,709,705 shares issued. **Property:** 6 unpatented claims, unorganized dist.; Smiths Ferry. **Ore:** Silver. **Remarks:** Work during the year by lessees only.

### PITTSBURGH-IDAHO HYDRAULIC MINING CO.
**Officers:** John P. Moss, Pres.; G. W. Colwell, Treas., both of Pittsburgh, Pa. **Inc.:** Jan. 11, 1916. **Capital:** 250,000 shares, par value $1; all issued. **Remarks:** Idle.

### RED LODE MINING CO., INC.
**Office:** Spokane, Wash. **Officers:** W. H. Krause, Pres., Spokane, Wash. **Inc.:** August 3, 1936. **Capital:** 100,000 shares; par value $1; 88,110 shares issued. **Property:** 13 unpatented claims, Summit Flat dist.; Idaho City. **Development:** Principally by 2 tunnels, No. 1, 584 ft. long and No. 3, 442
ft. long. Remarks: “all claims are being worked and developed in doing assessment work and driving Tunnel No. 3.”

**SHEEP CREEK MINING CORPORATION**


**TEXAS-OWYHEE MINING & DEVELOPMENT CO.**


**WESTERN GOLD CORPORATION**

Officers: S. K. Atkinson, Pres.; Wm. H. Simons, Sec.; L. W. Thraillkill, Mgr., all of Boise. Inc.: Dec. 14, 1936. Capital: 1,000,000 shares; par value $1; approximately 200,000 shares issued. Property: 160 patented claims, Boise Basin dist.; Boise. Plant: Dragline dredge, 2500 cu. yds. daily capacity. Ore: Gold and silver. Men Employed: Average, 15. Remarks: “Property and equipment formerly belonging to the Mineral Products Co.; Gold Production Co.; Idaho Gold Dredging Corporation; Idaho Development Co.; Metals Syndicate were all taken over by the Western Gold Corporation and the above mentioned companies have been liquidated and have gone out of business and are not filing reports this year. The dredging equipment formerly belonging to the Western Gold Corporation was sold to the U.S. Gold, Inc., an Oregon corporation operating in Oregon, and the Western Gold Corporation has discontinued all of its mining operations in the State of Idaho for the time being. The Western Gold Corporation conducted a gold dredging operation for a short time last year on the South Fork of the Clearwater River, near Golden, Idaho, and during the month of August 1938 moved all of its equipment onto some placer property that it leased in Grant County, Oregon.” Additions made during the year: Truck and tractor.

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BONNER COUNTY

County Seat: Sandpoint. Area: 1748 sq. miles. Population: 13,152. Principal Industries: Lumbering, mining, agriculture and stock raising. Transportation: Boats ply Lake Pend d'Oreille, one of the largest bodies of water in the State. Two State highways and a system of excellent county roads reach almost every district. Three transcontinental railroads traverse the county. Mineral Resources: Silver, lead, zinc, copper and limestone.

History and Future

Mining history started with the discovery of silver ores near Lakeview in 1888. Since that time there has been a small amount of mining but the county did not attract a great deal of attention until the Talache mine on the west shore of the lake proved to be a successful operation.

This was followed by the discoveries in the vicinity of Clark Fork which have added another profitable lead and silver producing district to the State's resources.

This county, particularly the districts around Clark Fork and on the east side of Lake Pend d'Oreille are very favorable for the prospectors, operators and investors.

Review of Year's Operations

The Auxer Gold Mines, near Hope, report assessment work completed on the company's 9 unpatented claims in the Pend d'Oreille district. James Camp-
bell of Hope, is president of the company and C. H. Patton, Sandpoint, secretary-treasurer.

The Hope Silver-Lead Mines, Incorporated, located near Clark Fork, employed a crew of 17 men. 650 ft. of development work was performed with most of the muck going as mill feed. Albert M. Nash is president-manager of the company in direct charge of operations.

Development work of 125 ft. was reported by the Lawrence Consolidated Mining Company.

The Whitedelph Mining and Development Company maintained production throughout the year from the main level and lower workings. High-grade silver ore is being mined from the newly discovered extension of the faulted Pearl vein. The mine was electrified and other improvements made. Concentrate shipments are made to the Bunker Hill Smelter at Kellogg.

Silver Leaf Mines Corporation, which operates the Keep Cool property near Lakeview, plan to enlarge capacity of their mill. At a stockholders' meeting the office of the company was changed from Lakeview to Sandpoint and the stock made non-assessable. W. M. Cady of Sandpoint, is president of the company. For the last fiscal year assessment work, maintenance and retimbering was the only work done at this property.

King Solomon's Mines Co. employed 2 men to complete 60 ft. of development work.

Maintenance and repairs were the order of things at the Lucky Strike Mining Co.

Milwaukee Mines, Inc., report that a tunnel was driven ahead a distance of 35 feet, and the Nevada Mines drove a tunnel forward 20 ft.

AMALGAMATED GOLD MINING CO.

AUXER GOLD MINES

BIG FIVE MINING CO.

BINARCH CREEK MINING CO.

CAMP BIRD MINING & DEVELOPMENT COMPANY

CAROLINA CLAIMS, INC.

CENTENNIAL CLAIMS INC.

DEL MONTE CLAIMS, INC.

EMPIRE TUNGSTEN MINING CO.

HOPE SILVER-LEAD MINES, INC.

IDAHO LAKEVIEW MINES CO.

KANIKSU MINING CO.

KEEP COOL MINING CO.

KING SOLOMON'S MINES CO.

LAWRENCE CONSOLIDATED MINING CO.

LUCKY STRIKE MINING CO.

MILWAUKEE MINES, INC.
Office: 501 City Hall Bldg., Spokane, Wash. Officers: Arthur L. Hooper, Pres.-Mgr.; John Barclay, Sec., both of Spokane, Wash. Inc.: April 6, 1928. Capital: 2,000,000 shares, par value 25c; increased Jan. 22, 1930, to 5,000,000 preferred, par value 10c, and 5000 common, no par value; changed July 30, 1930, to 250,000 preferred, par value $10, and 500,000 common, no par value.
changed Feb. 4, 1932, to 3,500,000 shares, par value $1; Dec. 12, 1933, reduced capital stock to 1500 shares, no par value; 690 shares issued. Property: Milwaukee group; 12 claims; Priest river. Development: Main cross-cut tunnel 575 ft. with drift of 197 ft. Plant: Equipped for hand mining. Camp buildings, bunk house, boarding house, blacksmith shop and boat house. Men Employed: Average, 1. Remarks: 35 ft. of tunnel work during the year.

MINERVA SILVER, INC.
Office: 1104 1/2 W. 2nd St., Spokane, Wash. Officers: E. R. Lindsey, Pres.-Mgr.; E. B. Lindsey, Sec., both of Spokane, Wash. Inc.: July 25, 1929. Capital: 1,500,000 shares, par value 25c; 183,710 shares issued. Remarks: "This corporation has no mining property at the present time and has transacted no business for the last five years."

NEVADA MINES

OPPORTUNITY MINING CO.

PONDERA MINING & POWER CO.

PONDEROSA MINING CO.

SILVER LEAF MINES CORPORATION

SILVER MOUNTAIN MINING CO.
WHITEDELFT MINING & DEVELOPMENT CO.

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BONNEVILLE COUNTY

History and Future

The county was the scene of many active mining operations during the early day gold rush when placer gold was discovered on McCoy and Gray creeks in the Mt. Pisgah or Caribou districts. This activity had long since died down until the search for gold in the last few years led placer miners to again explore the creeks.

IDAHO GOLD MINING CO.

MAGRE MINING COMPANY

PALISADE PETROLEUM COMPANY
Office: Idaho Falls. Officers: Dr. H. Ray Hatch, Pres.; H. C. Harris, Sec., both of Idaho Falls. Inc.: Aug. 19, 1936. Capital: 250,000 shares; par value $1; 233,083 shares issued.

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BOUNDARY COUNTY


History and Future

In the past a number of properties have been operated profitably and the many favorable areas make this county a favorable one for the prospector although heavy overburden and dense vegetation makes prospecting expensive.

Review of Year's Operations

A crew of 30 men is stated to have been employed at the Idaho Continental lead-silver mine 26 miles from Porthill, which Truman Higginbotham is operating under lease. Work will be continued throughout the winter. Concentrates from the 50-ton mill are trucked to Kellogg for smelting.

It is reported that a new company has been recently organized to operate the property formerly known as the Cyanide Gold Mining Company and later as the Sylvanite Mining Company. This property is comprised of a group of 18 claims in the Moyie-Yaak district near the Montana line. It is planned to raise the capacity of the present plant from 30 tons to 50 or 60 tons by the new operators. Frank M. Handy, 603 West Fourteenth Street, Spokane, Washington, will be in general charge of mine and mill.

The International Molybdenum Company employed a crew of 4 men and report 230 ft. of new development and a new portal entrance. The property is the Hottentot group of eight unpatented claims in the Porthill and Priest Lake districts. Besides mining equipment, a 25-ton mill is on the ground.

The Golden Sceptre Mining Company continued to develop its property, four miles east of Porthill. It is said that the company drove a raise at a point 600 feet from the portal and 500 feet from the surface to connect up with the upper tunnel and that some shipments were made from the property.

Metals Production Company worked the Idamont Lead-Zinc Mines Co. ground in the Moyie-Yaak district. 4 men were employed in washing 1500 yards of placer ground, making improvements and completing 35 ft. of development work. A. W. Nelson of Spokane, Washington, has been working the property continuously since October, 1938.

The Silver Crescent, Inc., plans to continue sinking its two-compartment, inclined shaft before cutting station and drifting at the company's Reigel mine, near Bonners Ferry. Indications are stated to be good, the shaft following a vein in which the values are said to be increasing. Development at the mine has been continuous since last April, except for a three-week shutdown due to a break in the power supply. The electric hoist and pumping system is powered by Diesel generator with an ample supply of power assured for development work.

CLANCY MINING CO.

Capital: 500,000 shares; par value $1; 274,184 shares issued. Property: 7 unpatented claims, Boulder Creek dist.; Leonia. Development: By 1 tunnel 425 ft. long. Ore: Lead-silver.

**GOLDEN SCEPTRE MINING CO.**

**IDAHO LEAD-SILVER MINES CO.**

**IDAMONT LEAD-ZINC MINES CO.**

**INTERNATIONAL MOLYBDENUM CO.**

**MOLYBDENUM PRODUCTS COMPANY**

**METALS PRODUCTION COMPANY**

**MONTGOMERY MINES, INC.**
Office: Bonners Ferry. Officers: J. A. Berry, Pres.-Mgr., Bonners Ferry; Robert Chadwick, Sec., Copeland. Inc.: Nov. 7, 1935. Capital: 1,000,000 shares; par value 10c; 411,000 shares issued. Property: 6 unpatented

SYLVANITE MINING COMPANY

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BUTTE COUNTY


Review of Year's Operations

The Horn Silver Consolidated Mines Co. completed 90 ft. of development work during the year.

The Era Mining and Development Company, Inc., has been newly organized to further develop and exploit the old original Horn Silver mine about 20 miles southwest of Arco. The property is divided into the Horn Silver group of four patented claims; the Bucking Pinto, Horn Silver, East Side, and Last Chance; the Rattlesnake group of one patented claim, the Whale, and three unpatented claims, the Moran, Arco and Valley. These claims are held under lease and option to purchase from Mrs. Agnes Williams of Salt Lake City, Utah. The officers of the Era Mining and Development Company, Inc., are William E. Clark, president and general manager; Ed. J. Clark, vice-president; Allan R. MacKenzie, secretary; Thos. H. Clark, treasurer. Kenneth S. MacKenzie and Ray F. Williamson are general counsel. The property is equipped with complete mining machinery for development purposes. Values are in gold, silver, lead, zinc and copper. Main offices are located at Idaho Falls.

Shipments of ore have been resumed from the Great Western mine in the Lava Creek district, Butte County, near Arco, Idaho. N. E. Arave and
associates of Idaho Falls are operating the mine under lease from Daniel Romney of Arco, owner. Ore is sent to the Murray plant in Utah for treatment.

Five men are employed on a group of claims on Antelope Creek near Arco, Idaho, under the management of M. J. Mullins who is making headquarters at Arco. The New Liberty Mining Company is leasing the property from Mark Cherry and William Jones, both of Arco. A 75-foot tunnel is stated to open an ore body containing values in lead, copper, and gold. The New Liberty company was formed about 13 years ago to operate the Liberty mine near Sweet in Gem County under lease from the Old Liberty Mining Company. Later the property reverted to the company, and thus left the New Liberty concern without a mine. R. L. Goddard of Salt Lake City, Utah, is president and Burley Jones of Twin Falls is secretary. Company mail is received in Box 1368, Boise.

R. F. Braithwaite, manager of the Arco Limerock quarry for the Utah-Idaho Sugar company, reports 99 carloads of lime rock have been shipped in the past six months. This makes an approximate 11,871,660 pounds of lime rock from the present site. He plans to keep the quarry open all winter. New machinery has been installed recently, including a compressor, jackhammer, drilling steel with latest bits and airpipe extend to all workings. In the spring, it is said, the company plans to open another quarry on the opposite side of the hill, capable of producing large quantities of high grade lime rock.

BADGER MINES CO.

HORN SILVER CONSOLIDATED MINES CO.
Office: Arco. Officers: L. M. Capps, Pres., Blackfoot; M. M. Dahle, Sec.-Mgr., Arco. Inc.: Dec. 21, 1925. Capital: 100,000 shares; par value $1; Nov. 8, 1934, increased to 1,000,000 shares; par value $1; 138,625 shares issued. Property: 6 unpatented claims, Lava Creek dist.; Martin. Development: By 3 tunnels, the principal one being 550 ft. long. Ore: Gold, silver and copper. Men Employed: Average, 2. Remarks: 90 ft. of development work during the year.

WILBERT MINING CO., LTD.
Office: 220 Kearns Bldg., Salt Lake City, Utah. Officers: J. A. Foley, Pres.-Mgr.; T. L. Mitchell, Sec., both of Salt Lake City, Utah. Inc.: April 10, 1907. Capital: 2,000,000 shares; par value 50c; 1,177,180 shares issued. Property: Daisy Black group; 7 patented, 33 unpatented claims, Dome dist.; Howe. R. R. Arco, 42 miles. Development: Approximately 18,000 feet of underground workings, the principal of which is No. 4 tunnel, in which is an inclined shaft 550 ft. long with 4 intermediate levels. When this tunnel was completed to 2800 ft. in length, a raise was put through at its end and connection made with the old workings. Plant: MINE: Hoist and 2 compressors, one electrically driven, one oil-driven; complete mining equipment and camp. MILL: 75-ton concentrator, electrically driven. Ore: Silver-lead. Remarks: Idle.

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CAMAS COUNTY


History and Future

The mines of this county have a good production record. With present activity in both lode and placer and with the intelligent application of modern geologic and metallurgical principles, this area presents excellent opportunities for mining in the future.

Review of Year's Operations

The Princess-Blue Ribbon groups in the Mineral Hill district, owned by the Consolidated Mines Syndicate, were operated by lessees. The portal of No. 6 Tunnel was cleaned out with other repairs to mine and roads. The shipments from the property were taken from surface outcrop and shipped to Salt Lake City for smelting.

Dixie Queen Mining Company, Inc., report 400 ft. of development work during the year with a crew of 6 men. This property located in the Little Smoky district carries values in gold, silver, lead and zinc.

Gold Mountain Mines Co., in the Skeleton Creek district, completed 20 ft. of development work with a crew of 4 men.

H. D. Jones of Hailey holds an option on the Taft mine in the Little Smoky district until July 1, 1940. Development work is going forward and some production is also reported. The 300-ft. crosscut is being extended 250 feet to give a depth of 300 feet on the vein. It is planned to erect a small mill during 1940.

The Grant Mining Company completed 110 ft. of development work with a crew of 3 men. Since the end of the fiscal year, May 31, 1939, the directors were reelected and include: E. F. Mobley, 104 Fourteenth Street, Idaho Falls, who is secretary-treasurer; F. H. Higbee, Judge Taylor, and Norland Beamer. It is reported that Reed F. Welch has subleased the Carrietown property from the Grant Mining Company, which in turn hold a sublease from Fred Higbee, who holds a lease from the owner, Henry Weise of Kansas.

The Richard Allen Mining Co., the Five Points Mining & Milling Company, Inc., a lode property located near Fairfield, and the Hi-Bar Mining Company,
a placer property, near Featherville, forfeited their Charters, Dec. 1, 1939, or the right to do business in Idaho until such time as the corporations have been reinstated.

Ira Adams, of Fairfield, shipped ore from his Jane Lee mine, near Carrie-town to Salt Lake smelters for treatment. Values were in silver and lead. A crew of 5 men was employed.

Other activity in Camas County was confined mostly to annual assessment work. Prospecting and testing was carried on in the Skeleton, Big Smoky, Little Smoky and Willow Creek districts. An important disclosure of molybdenum was developed east of Corral in the foothills of the Soldier Mountains.

CONSOLIDATED MINES SYNDICATE
(See Boise, Elmore and Idaho counties.)

DIXIE QUEEN MINING COMPANY, INC.

EL ORO MINE

FIVE POINTS MINING & MILLING COMPANY, INC.

GOLD MOUNTAIN MINES CO.

GRANT MINING COMPANY, THE
Office: Idaho Falls. Officers: C. J. Taylor, Pres.; E. F. Mobley, Sec.-Mgr., Idaho Falls. Inc.: Oct. 20, 1938. Capital: 1,000,000 common shares, par value 10c; 100,000 preferred shares, par value $1; all common shares issued, 48,000 preferred shares issued. Property: 7 unpatented claims, Little Smokey dist.; Ketchum. Development: Approximate total development,
MINING INDUSTRY OF IDAHO


HI-BAR MINING COMPANY

LITTLE SMOKY MINING COMPANY, INC.

PARADISE GOLD DREDGING COMPANY, INCORPORATED, THE

RED HILL MINING & MILLING CO.

RICHARD ALLEN MINING CO.

ROSETTA MILLING & MINING COMPANY

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CANYON COUNTY

The only known mineral resources of this county are gold in the Snake river sands, diatomaceous earth, and clays of excellent quality.

A number of companies have been formed to drill for oil and gas, but to date no results have been obtained.

BIBLIOGRAPHY

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CARIBOU COUNTY


History and Future

The tremendous resources of this county have only been scratched. A large part of five billion tons of marble phosphate rock estimated to be in Idaho, lies in this county. The Anaconda Mining Co. at Conda has the only development making use of this deposit. They have a modern plant for the production of ground phosphate rock which is shipped to Anaconda, Mont., for treatment. This company has expended more than $6,000,000 in its mine, mill, railroad, power lines and town site.

The salt deposits and mineral springs are other potential resources that are not being utilized.

A number of structures favorable for the accumulation of petroleum are found in the eastern part of the county.
C. B. Wilson developed his property near Alexander to some extent during the year. Other activity in this county was confined to annual assessment work and some prospecting in the vicinity of Grays Lake and Caribou Mountain.

Caribou County among its potential resources has a deposit of sulphur and is dotted with mineral springs that are not exploited or utilized at the present time.

ANACONDA COPPER MINING CO.
Office: Anaconda, Mont. Officers: C. F. Kelley, Pres.; D. B. Hennessy, Sec., both of 25 Broadway, New York City; E. M. Norris, Local Mgr., Conda, Idaho. Inc.: Filed in Idaho, April 10, 1916. Capital: 12,000,000 shares; par value $50; 8,919,086 shares issued. Property: 23 patented claims, 3403 acres, unorganized dist.; Conda. Development: 3 adits, 45 ft. above railroad track level, 9x9 ft. inside of timbers; No. 1, 6650 ft. long; No. 2, 2660 ft. long; No. 3, 5987 ft. long. Approximate total development 53,771 ft. The main operating tunnels are equipped with 25-lb. rail, 36-in. gauge track, two 20-ton storage battery locomotives capable of hauling a 100-ton net load at a speed of 4 to 7 miles per hour, 10-ton side dump ore cars, power loading machines operated by compressed air and No. 4 sirocco fan. Plant: MINE: 1000 cu. ft. compressor; drill sharpeners; machine, blacksmith and carpenter shops with latest type power-driven equipment; switch boards and motor generator charging set; laboratory; electric substation, sawmill and preservative plant for treating mine timbers, all housed in fireproof gunited and steel buildings; 100 h. p. electrically driven hoist. MILL: Crushing and drying plant. The mill feed and storage bins are connected with the main tunnels by large trestles. The storage bins, with a capacity of over 4000 tons, and houses over them are protected with several inches of gunite. The main storage bin is equipped with an Ottumwa boxcar loader and modern railroad scales. The rock drawn from the mill feed bin, which has a capacity of 450 tons, passes over shaking grizzlies, the oversize going to a 12-in. Traylor gyratory crusher, which reduces it to about 2½ in. The product from the crusher and the undersize is elevated and passed over a Mitchell vibrating screen. The rock passing through this screen goes to the dryer feed bin, and the oversize to 22x54-in. Anaconda rolls that reduce it to three-fourths of an inch. The product from the rolls is elevated and again passes over the Mitchell vibrating screen. The crushed rock drawn from the dryer feed bins is conveyed into class A-12 Ruggles-Coles dryers by apron feeders. After leaving the dryer the rock goes over a shaking feeder to a chain bucket elevator. This elevator carries it to the top of the mill where it passes through a Vezin sampler, and it is then conveyed to the storage bins. The present capacity of the mill is 400 tons in 24 hours. This output can be increased to 1000 tons in the same time by adding another dryer. Railroad: 8-mile branch from Soda Springs to mine, with storage tracks that will accommodate 100 fifty-ton railroad cars, spurs to mill and coal bins, and Wyes at each end of the yards. The gradient of the storage tracks is such that the cars are operated by gravity to and from the storage bins. Town: The company has erected a model mine town consisting of modern homes, which are rented to employees at a nominal figure. Company offices, bunk and boarding houses, superintendent's home, recreation hall, and a number of small homes have been erected. A fully equipped store is maintained by the company, a postoffice has been established, and a modern schoolhouse erected, and a school maintained. A complete water system for the town and plant has been installed; the water is piped a distance of 2 miles to a 100,000 gallon storage tank from which it is distributed. Ore: Phosphate rock. Men Employed: Average, 89. Remarks: Remodeled crushing and screening equipment to produce more finely crushed rock. Prospective new equipment: new reinforced concrete coal bin, fireproof steel frame warehouse and fireproof steel frame timber framing plant.
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CASSIA COUNTY

stone, marble, cinnabar and lignite. The high-grade lead-silver and silver-copper ores of the Stokes and Dolomite districts offer excellent opportunities to the prospector and operator.

**BIG BERTHA MINING CO., INC.**


**SILVER HILLS MINING CO.**

Office: 1258 Crandall Ave., Salt Lake City, Utah. Officers: A. A. Firmage, Pres.-Mgr.; L. M. Francis, Sec., both of Salt Lake City, Utah. Inc.: March 31, 1920. Capital: 800,000 shares; par value 10c; Aug. 7, 1930, increased to 1,000,000; 601,615 shares issued. Property: Busy Bee and Joveon groups; 39 unpatented mining claims, Black Pine dist.; Black Pine. Development: 3 tunnels, 1 shaft; approximately 3400 ft. total development. Plant: Gas-driven compressor; complete mining equipment and camp. Ore: Lead-silver. Remarks: “The property at present is being worked under lease to be paid for out of any ore that is mined.”

**WHITE MICA MINING AND MILLING COMPANY**

Officers: Seth F. Harper, Inc., Burley. Inc.: Oct. 30, 1939. Capital: 1,000,000 shares, par value 2c; amount issued, not stated. Property: 320 acres of homestead land on which suit to quiet title has been completed. Development: 60 ft. vertical shaft on the main fissure adjoining mill; 27 ft. incline shaft on a fissure that crosscuts the main fissure and open pit diggings. Plant: MINE: 6x6 Curtiss Air Compressor; 12 h. p. Air cooled Hercules Motor; Hoist; Western Rock Crusher and complete mining equipment. MILL: Hammer Mill, Automatic Feed, 7-ton capacity, or 1¼ tons of milled mica per hour. Mineral Sought: Mica. Men Employed: Average, 15. Remarks: “Building quarters for 15 men at present and must house the mill and build a warehouse large enough to store at least six cars of mica before winter sets in.” The property is capable of employing from thirty to fifty men as soon as it is put in operating shape.”

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CLARK COUNTY


BIRCH CREEK MINING CO., LTD.

HIGHLAND PETROLEUM, INC.

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CLEARWATER COUNTY


History and Future
The Pierce City district was the scene of the first discovery of gold in Idaho in 1860. The placer diggings were rich and the overflow from the resulting stampede caused the settlement of the State. In common with all of the early gold mining districts, the more easily handled ore was mined and the district became dormant. The present search for gold has caused much new activity in the district.

Dense vegetation and heavy overburden has made prospecting extremely difficult and has prevented a thorough examination of the county in the past.
This is one of the most favorable districts in the state for the prospector and small operator.

One of the finest lime deposits in the State is located just outside of Orofino on the railroad. This deposit has received some development and is being exploited to some extent at the present time.

Review of Year's Operations

Crawford Gold Strike, owned by J. R. Crawford, Orofino, consists of 2 patented and 14 unpatented claims on Cow Creek in the Pierce district. Development during the year was confined to work on the surface.

Crystal Lime Company, located on Lime Mountain, mined lime rock from open cuts with a crew of 8 men. This property, held under lease from the state of Idaho, is equipped with hoist, compressor, kiln for burning lime, cook and bunkhouse, mill buildings and shop. W. F. Robertson is president-manager; L. L. Loomis, secretary, both of Orofino. The charter of this company was forfeited December 1, 1939.

Independence Placer Mining Co., Ltd., temporarily leased their property of 8 unpatented claims in the Moose Creek district, near Rivulet, Montana. No work was done by the company during the past year.

M. & I. Mining Co. was leased to T. P. Jones of Elk River, who agreed under terms of the lease to develop the property and mine for ore.

The American Placer Mining Co., Ltd. and the Musselshell Mining Company were idle during the fiscal year ended May 31, 1939.

Quartz Creek Dredging Company, with a crew of 15 men, operated a 2½ cubic foot close connected bucket line gold dredge, diesel electric drive with usual equipment on ground near Pierce. The property is held under lease from William J. Harris, Spokane, Washington. Chas. L. Ross is manager in direct charge of operations.

Silver Creek Gold Mining Company worked an average crew of 24 men at its Silver Creek mine in the Pierce district. The 75-ton mill was in operation and the company report the addition of a saw mill, compressor, and 1500 ft. of diamond drilling completed during the year.

Washington-Idaho Lime Products Co., E. J. Simons, president, Spokane, Washington, quarry lime rock and manufacture "Orofino Brand Cement". The property, located at Orofino, consists of 150 acres. The company employs an average of 60 men. This venture has stimulated business in Clearwater County and the finished product of this company is very much in demand. E. R. Smith, secretary, Spokane, Washington, filed the report for the year 1939 under protest claiming the Washington-Idaho Lime Products Co. is a manufacturing concern, not a mine. However, as long as lime rock is quarried and used in the manufacture of cement we thank Mr. Smith for his cooperation in compliance with Section 25-1616, Idaho Code Annotated.

AMERICAN PLACER MINING CO., LTD.

CRAWFORD GOLD STRIKE
Officers: J. R. Crawford, Mgr., Orofino; C. O. Walter, Acting Secretary, Spokane, Wash. Inc.: Not incorporated. Property: 16 claims, west slope of Bald Mt. Remarks: Development during the year consisted of surface work.

CRYSTAL LIME COMPANY
"This lime rock mined by open cuts." **Plant:** Complete equipment which includes hoist, compressor, kiln for burning lime, cook and bunkhouse, mill buildings and shop. **Mineral Sought:** Lime rock. **Men Employed:** Average, 8.

**INDEPENDENCE PLACER MINING CO., LTD.**  
**Office:** Wallace. **Officers:** Wm. Fahle, Pres.-Mgr., Hugh Toole, Sec., both of Wallace. **Inc.:** Oct. 25, 1906. **Capital:** 1,000,000 shares; par value $1; 422,942 shares issued. **Property:** 8 unpatented claims, Moose Creek dist.; Rivulet, Mont. **Ore:** Placer gold. **Remarks:** "No work was done by the company during the past year. The property is temporarily leased to others."

**M. & I. MINING CO.**  
**Office:** 2947 Oliver Ave., N. Minneapolis, Minn. **Officers:** William J. Dwyer, Pres.; John J. Dwyer, Sec.-Treas., both of Minneapolis, Minn. **Inc.:** Filed in Idaho, March 13, 1916. **Capital:** 100,000 shares; par value $1; 60,500 shares issued. **Property:** 8 patented claims, Elk River. **Ore:** Gold-silver. **Remarks:** "Under date Feb. 28, 1932 M. & I. Mining Company made a lease to one T. P. Jones, Elk River, Idaho, under the terms of which said Jones is to develop and operate mining on the above described claims at any time. Under the terms of the lease Mr. Jones was to begin at once to do development work and mine for ore."

**MUSSELSHELL MINING COMPANY**  
**Office:** Boise. **Officers:** George P. Woollard, Pres.-Mgr., 4 Queens Place, Princeton, N. J.; D. L. Richardson, Sec., New York City. **Inc.:** June 12, 1936. **Capital:** 1,000,000 shares; par value $1; 84,875 shares issued. **Property:** 630 acres patented and 160 acres of unpatented land. **Ore:** Placer gold. **Remarks:** Idle.

**OXFORD COPPER MINING CO., LTD.**  
**Office:** Orofino. **Officers:** Samson Snyder, Pres.-Statutory Agent; Theodore Fohl, Mgr., both of Orofino. **Inc.:** April 10, 1907. **Capital:** 1,000,000 shares; par value $1; 430,668 shares issued. **Property:** 7 unpatented claims, Pierce dist.; Pierce. **Remarks:** "Shaft caved in and took all machinery with it except steam boiler."

**QUARTZ CREEK DREDGING COMPANY**  
**Office:** Carson City, Nevada. **Officers:** Walter W. Johnson, Pres.; C. C. Trowbridge, Jr., both of San Francisco, Calif.; Chas. L. Ross, Mgr.-Statutory Agent, Pierce. **Inc.:** May 13, 1939. **Capital:** 250,000 shares; par value 1c; 70,000 shares issued. **Property:** Patented and unpatented property held under lease from William J. Harris, Spokane, Washington. **Plant:** 2½ cu. ft. close connected bucket line gold dredging machine, diesel electric drive with usual equipment. **Ore:** Gold. **Men Employed:** Average, 15. **Remarks:** Approximately 40,000 cu. yards mined to date. Complete gold dredging machine installed during the current year, about July 8, 1939.

**SILVER CREEK GOLD MINING COMPANY**  
**Office:** Pierce. **Officers:** E. A. Campbell, Pres.-Mgr., Pierce; Fred Ackley, Sec., Spokane, Wash.; Marcus J. Ware, Statutory Agent, Lewiston. **Inc.:** Jan. 5, 1937. Charter forfeited Dec. 1, 1939. **Capital:** 1,500,000 shares; par value 10c; 940,000 shares issued. **Property:** 4 unpatented claims, Pierce dist.; Pierce. **Development:** By 3 tunnels, the principal one being 1200 ft. long. **Plant:** Complete mining equipment. **Mill:** 75-ton 6'x22" Hardinge ball mill, Dorr classifier, Denver and Dorr thickeners and agitators, Merrill-Crowe precipitation. **Ore:** Gold. **Men Employed:** Average, 24. **Remarks:** 1500 ft. of diamond drilling during the year; added sawmill and compressor.

**WASHINGTON-IDAHO LIME PRODUCTS CO.**  
**Office:** Spokane, Wash. **Officers:** E. J. Simons, Pres.; E. R. Smith, Sec., both of Spokane, Wash. **Inc.:** Not incorporated in Idaho. **Capital:** 250,000
shares; par value $1; all shares issued. **Property:** E. R. Smith, Secretary, reports: "This is a manufacturing plant not a mine. Report filed under protest."

**WESTERN METAL PRODUCTS CO.**

Office: Wardner. **Officers:** H. T. Hardy, Pres., Kellogg; R. L. Brainard, Sec., Wardner. **Inc.:** May 16, 1933; name changed from Old Veteran Gold Mining Co., Aug. 16, 1934. **Capital:** 1,500,000 shares; par value 25c; shares issued, 15,000. **Property:** 3 unpatented claims, Pierce dist. **Remarks:** Idle.

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**CUSTER COUNTY**

**County Seat:** Challis. **Area:** 4921 sq. miles. **Population:** 3162. **Principal Industries:** Mining, stock raising, particularly sheep and agriculture. **Relief:** High and mountainous, few level spots except at head waters of Salmon River. The county contains the headwaters of the Salmon River, Big and Little Lost Rivers. **Transportation:** A system of well kept state and federal highways serves all of the valleys. The only railroad transportation is the Mackay branch of the Union Pacific which terminates at Mackay. **Mineral Resources:** Silver, copper, gold, zinc, antimony, molybdenum, tungsten, graphite, bentonite and garnet.

**History and Future**

This county was the scene of much early day activity in both precious and base metal mining. At one time there were several smelters running in the county and the production of high-grade silver-lead and silver-copper ores made the county one of the principal mining districts of the State.
SURFACE PLANT — CLAYTON SILVER MINING CO.
Custer County

Review of Year's Operations

A 250-ft. tunnel is reported to have opened a 6-ft. ore body showing high values in the property of the Elk Creek Mine, Inc. The company holds three unpatented claims 11 miles west of Stanley. E. V. Howard, Stanley, is president.

Stanley Basin Placer, operated by Colonel George B. Walbridge, Thomas and Walter Courtis of Detroit, Michigan, carried on an extensive testing, exploration and experimental campaign with a crew of 15 men. The holdings consist of 2400 acres located in the upper Stanley Basin with approximately 45,000 yards of available placer ground to the acre.

John C. Cobb and A. J. Franklin operated the Why Not mine on Estes Mountain, under lease from Amos Franklin of Stanley. It is reported that ore was shipped which averaged $500.00 a ton.

Clayton Silver Mines Co., operating a lead-silver property near Clayton, employed an average crew of 33 men. 1365 ft. of development work was completed during the fiscal year ending May 31, 1939. Later a new sump plant was installed preliminary to sinking the shaft an additional 150 ft. The company plans to increase the capacity of the mill and power plant. H. B. Kingsbury, Wallace, is president and C. A. Fay, Clayton, manager.

The Grey Eagle property on Batchelor Mountain was worked by Dr. Kirtley of Challis.

Ford Motor Company reports a small amount of repair and maintenance work to chutes, ladders and stull timbers, with no actual mining during the year 1939.

Western States Mining, Milling & Exploration Co., Ltd., hold 31 unpatented claims in the Boulder and Yankee Fork mining districts. During the past year assessment work was performed with prospecting and development work on the Ibex group. The Ibex group and the Silver Bug claims are leased to parties who expect to develop the properties extensively. Values are in gold, silver and lead.

A large low-grade silver-lead deposit on Kinnikinick Creek in the Clayton district was acquired under bond and lease by L. S. Campbell and George Williams of Clayton. The new operators plan a development program with large scale operations in view.
Shipments were made from the Custer mines on Custer Mountain, held by William A. Dunn of Dillon, Montana, and associates. The property consists of the Custer, Charles Dickens, Lucky Boy and Continental groups of claims. It is reported that A. H. Burroughs, Jr., of Boise, has made a deal for this property and will continue its operation.

The Sawtell Mining Company operated the old Parker Mine 28 miles west of Challis for a short time. Due to the complex condition of the ore the company discontinued work at the property.

The Twin Apex Mines Company, located in the Bay Horse district, repaired the No. 2 and No. 3 tunnels, overhauled equipment and is now driving a 300-ft. connecting raise. John Zrno of Clayton is mine superintendent.

Strunk and Sherry developed a molybdenum property at the head of Lost River on Little Fall Creek.

W. B. Swigert of Challis is reported to have leased the entire property of the Ramshorn Mines Company, comprising the Ramshorn and Beardsley groups of 10 patented claims in the Bay Horse district. For some time Swigert has been leasing a portion of the property and other lessees have operated on other parts. Present arrangements, however, include the whole mine. Values are in silver-copper and equipment includes a small mill. Some subleases will be let by Swigert who is now employing about 15 men on his own account. The company completed 400 ft. of development work during the year. O. J. Salisbury, 321 Felt Building, Salt Lake City, Utah, is president and manager of the company.

Two lessees are working in the holdings of the White Knob Mining Company, located in the Alder Creek district. This company is controlled by the U.S. Smelting, Refining and Mining Company. Work has been started by the W. P. A. on a road into the district which will be open the year around.

The Mackay Exploration Company has been organized by a group of Mackay people for the purpose of operating the old Mackay Metals property. The property was acquired in May and in December 20 sets of lessees, employing a total of 45 men, were working on several levels. The mine was rehabilitated and reopened to the 1000-ft. level with 480 ft. of new development work completed since July 1, 1939. The Cossack tunnel on the 1600-ft. level was reopened and development started. Ted Cherry is president; John N. Lee, secretary; Alex Cameron, treasurer; R. T. Greene and Dud Dillingham additional directors. J. Ray Weber, also of Mackay, who has been receiver and is familiar with the mine, has been appointed manager. Numerous attempts to return the mine to production have been made recently. For several years the property was under option but the optionees lacked the funds to carry on operations. The entire group includes 19 patented and 23 unpatented claims.

Some development work was performed at the old Livingston mine by New York and Portland interests. It is reported that extensive diamond drilling to determine the depth and quantity of the ore body was part of the program.

Red Dog Mining Company, Incorporated, developed their holdings in an unorganized district near Challis, a total of 150 ft.

Copper Basin Consolidated Mines Corporation, with a crew of five men, report 500 ft. of development work. Values are in silver, copper and gold. The property consists of 6 patented and 10 unpatented claims in the Copper Basin district, 14 of which are held under lease and bond. George L. Judd of Mackay, is president and R. D. Leach of Pocatello, secretary.

AETNA MINING & INVESTMENT CO., LTD.

AMERICAN DOLLAR MINING & MILLING COMPANY
being 3500 ft.; approximate total development, 8000 ft. **Plant:** MILL: 2-stage crushing plant—ten stamps—10 mesh—1 Ellis regrinding mill and Wilfley tables. **Ore:** Gold-silver. **Men Employed:** Average, 1. **Remarks:** "General rehabilitation of buildings, retimbering and opening old tunnel, addition of small tools and equipment."

**AZTEC MINING & MILLING CO.**

**Office:** 839 W. Lander St., Pocatello. **Officers:** C. P. Groom, Pres.; Dr. D. C. Ray, Sec., both of Pocatello. **Inc.:** May 26, 1917. **Capital:** 25,000 shares; par value $1; increased March 2, 1915, to 50,000 shares, par value $1; 37,708 shares issued. **Property:** Kingfisher group; 3 unpatented claims, Stanley dist.; Stanley. **Development:** Inclined shaft 650 ft. long; total development, approximately 1850 ft. **Plant:** MINE: 25 h. p. steam-driven hoist. MILL: Gibson mill and amalgamation plates. **Ore:** Gold. **Remarks:** Idle.

**CATHARINE MINING CO., NO. 1**

**Office:** Boise. **Officers:** Gale Michaelson, Pres., Boise; Kate Finch, Sec., Clayton. **Inc.:** December 30, 1937. **Capital:** 1,000,000 shares; par value 5c; 668,969 shares issued. **Property:** 9 unpatented claims, Bay Horse dist.; Clayton. **Plant:** MINE: Steam shovel and dragline washing plant. **Ore:** Gold.

**CLAYTON SILVER MINES CO.**

**Office:** Wallace. **Officers:** H. B. Kingsbury, Pres.; Herman Marquardt, Sec., both of Wallace; C. A. Fay, Mgr., Clayton. **Inc.:** Jan. 20, 1934; name changed from Clayton Mining Company May 31, 1935. **Capital:** 3,000,000 shares; par value $1; all shares issued. **Property:** Camp Bird group; 32 patented and 4 unpatented claims, Bay Horse dist.; Clayton. **Development:** Principal tunnel, 2650 ft.; approximate total development, 13,025 ft. **Plant:** MINE: Coeur d'Alene Electric Hoist; Ingersoll Rand Compressor; blacksmith shop, power houses, boiler house and assay office. MILL: 150-ton flotation. **Ore:** Lead-silver. **Men Employed:** Average, 33. **Remarks:** 1353 ft. of development work during the year. "During 1939 will sink shaft an additional 150 ft. New sump plant installed to take care of this additional depth. Planning additional power capacity to increase mill."

**COPPER BASIN CONSOLIDATED MINES CORPORATION**

**Office:** Pocatello. **Officers:** George L. Judd, Pres., Mackay; R. D. Leach, Sec., Pocatello; Grover Crocker, Mgr., Mackay. **Inc.:** Oct. 4, 1937. **Capital:** 600,000 shares; par value 1c; 273,117 shares issued. **Property:** 6 patented and 10 unpatented claims, Copper Basin dist.; Mackay, 14 of which are held under lease and bond. **Development:** Approximate total development, 10,000 ft. **Plant:** Chicago Pneumatic compressor, air drills, air pipes, etc.; frame bunkhouse, cook shack and blacksmith shop. **Ore:** Silver, copper and gold. **Men Employed:** Average, 5. **Remarks:** 500 ft. of development work during the year.

**ELK CREEK MINE, INC.**

**Office:** Gooding. **Officers:** E. V. Howard, Pres., Los Angeles, Calif.; Miss Olive Hughes, Sec., Gooding. **Inc.:** Nov. 15, 1937. **Capital:** 20,000 shares; par value $1; 7,597 shares issued. **Property:** 3 unpatented claims, Stanley Basin dist.; Stanley. **Development:** Principally by 1 tunnel, 240 ft. long. **Plant:** Complete mining equipment. **Ore:** Gold. **Men Employed:** Average, 4. **Remarks:** 90 ft. of development work during the year; additions made, 35 h. p. turbine water wheel with necessary ditching, piping, etc., Sullivan air compressor and receiver with necessary piping, Byron Jackson Sponge pump.

**FORD MOTOR CO.**

**Office:** Dearborn, Mich. **Officers:** Edsel B. Ford, Pres.; B. J. Craig, Sec., both of Dearborn, Mich.; F. E. Lundstrom, Branch Mgr., Salt Lake City, Utah. **Inc.:** Filed in Idaho, Jan. 6, 1925. **Capital:** 1,000,000 shares; par value $100. **Property:** Red Bird and Silver Rule groups; 30 patented claims, including 5 millsites, Bay Horse dist.; Clayton; R. R. Mackay, 70 miles.
Development: Principal development on Red Bird group consists of 4 tunnels; No. 1, 500 ft. long; No. 2, 1300 ft. long; No. 4, 510 ft. long; No. 9, 1680 ft. long, giving a total depth of 900 ft. on the vein; total development approximately 23,817 ft. Plant: Hand tramming and storage battery motor; shops and mining camp consisting of 11 buildings. Ore: Lead-silver. Men Employed: 1 watchman. Remarks: "The only work done on property during year was a small amount of repairs to chutes, ladders and stull timbers. No actual mining work done."

GREYHOUND MINING & MILLING CO., LTD.

IVANHOE MINING CO.
Office: 485 California St., San Francisco, Calif. Officers: Edward H. Clark, Pres.; C. B. Greeley, Sec., both of San Francisco, Calif.; Earl J. Michael, Statutory Agent, Challis. Inc.: Filed in Idaho July 28, 1909. Capital: 2500 shares; par value $1; all shares issued. Property: 34 patented and 2 unpatented claims, Yankee Fork and Warm Springs dists. (Custer and Blaine counties.) Ore: Silver and lead. Remarks: "The owners of these claims formed the company to consolidate their scattered holdings and conveyed same for the capital stock of the company. No operations were conducted by the company. The claims of the “Triumph Group” in Blaine County are under lease to the Snyder Mines, Incorporated, whose post office address is 21R Felt Bldg., Salt Lake City, Utah."

LOON CREEK HYDRAULIC PLACER MINING CO., LTD.

MACKAY EXPLORATION COMPANY

NEW LIBERTY MINING COMPANY (See Elmore County)

RAMSHORN MINES CO.
RED DOG MINING COMPANY, INCORPORATED  

SALMON RIVER MINING CO.  

STANLEY-FIVE BARS MINING COMPANY  (See Elmore County)  
Office: Box 1368, Boise. Officers: Oliver O. Haga, Pres.; M. Burt, Sec., both of Boise. Inc.: Sept. 8, 1925. Capital: 25,000 shares; par value $1; 20,000 shares issued. Property: Stanley and Gold Dust group consisting of 6 claims, Mackay. Ore: Placer gold. Remarks: “Property under option to dredging company operating on adjoining ground.”

TWIN APEX MINES CO.  

WASHINGTON BASIN MINING & MILLING CO.  

WESTERN STATES MINING, MILLING & EXPLORATION CO., LTD.  

WHITE KNOB MINING CO.  

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The Livingston mine, Custer County, Idaho, by J. B. Stewart: Mining and Metallurgy, vol. 7, No. 233, pp. 223-224, May, 1926.§


Geology and ore deposits of the Seafoam, Alder Creek, Little Smoky and Willow Creek districts, Custer and Camas counties, Idaho, by C. P. Ross: Idaho Bureau of Mines and Geology Pamphlet 33, 1930.*
ELMORE COUNTY


History and Future

The county was a noted early day producer of gold and silver, both placer and lode. In common with most of the gold producing districts, interest in gold mining lagged with the extraction of the free gold and the district became dormant. The recent search for gold has given the mining districts new life and a profitable production.

Improved metallurgical methods and more efficient application of geology opens up an excellent future for this district. It is a favorable one for the prospector, operator and investor.

Review of Year's Operations

The Neil district was rather quiet with the exception of some development by the Cordova Mining Company to cover annual assessment work. J. R. Compton reports annual labor was performed on holdings in the Neil district, known as the Sunset and Rescue groups.

Activity was noted among placer miners along the Snake River. J. R. Mathis operated a power shovel, trucks and washing plant on ground east of the Bruneau Bridge. An average crew of 12 to 15 men was employed.

Consolidated Mines Syndicate, rehabilitated the main tunnel of the Revenue group. This group consists of 11 unpatented claims in the Volcano district near Hill City.

Charlie Ford, Joe Babington and John May developed the Mountain View tungsten property to some extent during the year. The mine is located about 3 miles from the town of Corral.

Old Channel Mining Company, Inc. completed a testing and exploration program on 7 unpatented claims in the Pine Grove district. Ditching and other work on Bear and Wood Creek was in charge of R. S. Towse. Equipment consists of a 1-yd. Bagley scraper and dragline powered by a steam donkey engine. It is planned to install portable equipment, including washing plant.

It is rumored that a company will be formed to reopen the old Franklin property near Pine during the year 1940.

Annual labor was performed on mining claims along the Feather River and in the Red Warrior mining district.

Work progressed on the proposed 1000 ft. tunnel in the Ada-Elmore mine, near Rocky Bar. L. S. Breckon and associates of Bingham Canyon, Utah, let a contract for this work. Equipment includes a Worthington Diesel powered portable compressor. The tunnel is expected to open the Alturas and Elmore veins in undeveloped territory.

Daley Consolidated Mines Co. was optioned and plans for retimbering shaft and added equipment to mine ore from the 450 ft. level are underway.

Dick Peck performed assessment work on the Hard Scrabbel property. Charles Sayko and son with Vern Dodge also performed annual labor on the Glenn Eden tunnel site below Rocky Bar.

E. G. Platts and Aaron G. Carlsson of Montana, representing the Gold Hill Mining Corporation, performed some development work at a quartz mine on Skeleton Creek. The equipment consists of: 1 25-ton capacity mill with crusher, Gibson mill and concentrating tables.

Assessment work was done at the Hub by Sam Nelson. This property is located on Lava Creek.

The Silver Bell was worked by E. J. Samuels. Assessment work was performed at the Martin Mining Company. The values are in silver, lead and gold.
The Flag Staff Mining Company, a Washington corporation, hold a lease on two unpatented claims in the Bear Creek district near Rocky Bar. A crew of 11 men was employed in construction work and tunnel development. The company reports that development work will continue, with mining and milling to be resumed in the spring of 1940.

The Independence mine at Rocky Bar, owned by William A. Nixon, was worked under lease by Oscar Pearson, Roy Peterson and R. N. Anderson. A large body of free milling gold ore is stated to be exposed that will average $15.00 a ton. Development is going forward on the Independence and Empire No. 1 and No. 2 groups of claims in an effort to pick up an extension of the Mountain Goat vein, a former producer of high grade gold ore.

Idaho Gold Chief Mining Co., W. M. Caldwell, president, Mountain Home, reports maintenance and repair work on 7 unpatented claims in the Bear Creek district, near Rocky Bar.

Charlie Orm, Lafe Atha, Dave Lucier and Seth Harris worked the ground formerly known as the Canada Gold Mines Inc. in an effort to produce enough ore to recover back wages and square up other obligations of the company. Assessment work was performed by R. A. Peck at the Sky Line No. 1, No. 2 and the Ophir Bill mining claims.

Work was performed on mining claims situated on the Yuba River and on properties in other mining districts of Elmore County which the inspector did not have an opportunity to visit due to the extension of the time to commence annual labor from July 1, 1939 to September 1, 1939. Among these properties are: The Idaho Gold Chief Mining Company, Idaho Mines, Inc., Marsh Creek Mining Co., Winner Group, Homestake Group of George F. Roth Co., Yaqui Jack Mining Company, Vre-Non Mining Corporation and many others.

For the past year the Monarch mine has been operated by the Last Chance Mining Company under direction of Hooper, Kimball and Williams, Inc. of Boston, Mass. Lindsey Hooper is president of the firm. Under the supervision of A. A. McLeod the company opened up good surface showings to a width of 40 feet. Stopes on the 100 ft. level produced commercial ore that was trucked to the Monarch mill at Atlanta. A crew of about 50 men was employed. It is reported that this property has been taken over by the Talache Mines, Inc., to be worked in conjunction with the Boise-Rochester mine. In addition to a lease and option on the Monarch, the deal included the hydroelectric power properties of the Atlanta Power Company and the Kirby power site on the Middle Fork of the Boise River below its confluence with the Yuba River.

The old mining camp of Atlanta is staging a strong comeback, thanks to the courage and convictions of its possible future by A. H. Burroughs, Jr., president of Talache Mines, Inc. Housing facilities are at a premium. The big problem is in keeping the water grade road up the Middle Fork of the Boise River passable during the winter months. All agencies should cooperate in keeping the road free of snow so that the residents of this thriving mining camp could come and go to Boise any time of year.

Other properties near Atlanta that are being developed include the Petit, Big Lode, Minerva, Pal Group, Tahoma, Jessie Benton and Grey Eagle. These properties are all grouped along Quartz Creek, Atlanta Ridge and on the Yuba drainage of the ridge.

The Good Luck Group, owned by Dollie M. Money, completed 70 ft. of development work during the year. The property consists of 4 unpatented claims in the middle Boise district, Atlanta.

Talache Mines, Inc., A. H. Burroughs, Jr., president-manager, Boise, is enlarging its holdings in the Atlanta district. During the past two years the company has driven more than 6000 ft. of exploration work. The Boise Rochester was obtained from the St. Joseph Lead Company and the Monarch mine has been lately acquired by this company. Consolidation of these two properties under one management brings together two of the famous old properties that made history in the early days of mining in Idaho. During the past year an average crew of 150 men was employed under the direct
supervision of Joe H. Skidmore. William Settles is mine foreman, and Perry Grammer has been in charge of milling operations. It is planned by the Talache Mines, Inc. to increase the capacity of the milling plant and to develop more power so that both properties can be worked in conjunction.

The Black Warrior district is a well mineralized area and worthy of more investigation by scouts and engineers who are seeking gold and silver properties. Assessment work was performed on many claims in this district during the year 1939 with activity noted at the placer property of Harold E. Cullen, at the Overlook mine, and on Wilson Creek, Grouse Creek Eagle Creek and on the West Warrior.

By a ruling of years standing by the reclamation department all land above Arrowrock Dam on the Middle Fork of the Boise River to a point above Alexander Flats has been withdrawn from entry. However, this ruling does not effect locations made prior to the Arrowrock Reclamation Project and activity on placer operations was noted along the Middle Fork of the Boise River from the town of Barber to Atlanta. Some of these operations include: The Sheep Creek Mining Corp., owned and operated by John J. Kinsela; D. W. Simmons, 5 miles below Boise King property, Si Blodgett and Jess Hatcher near the Boise King; Duke Ross and Jess Hatcher at the mouth of Swanholm Creek; H. B. Bowers and C. B. Almandinger had a bulldozer, giant and sluicing operation on Eagle Flat; Jack McKinnis operated on Birch Creek; Frank A. Flaherty operated the Bread Winner Creek placer while the Goodenough placer mining claims were leased by Frank Clinkhammer and John C. Hibbard from the owners,—John and Grace Kinsela, P. H. and Vera C. Quirk and John and Myrtle Jedlick, all of Boise.

George F. Hirt operated during the year in the Oliver Basin above Atlanta, the Pioneer placer on Queens River, at Pleasant Cove and on Bald Mountain Creek.

**APEX GOLD MINING CO.**

**CONSOLIDATED MINES SYNDICATE**
Office: 623 First Natl. Bank Bldg., Boise. Officers: Frank E. Johnesse, Pres.-Mgr.; Paul L. Oakes, Sec., both of Boise. Inc.: May 6, 1924. Capital: 10,000 shares, no par value; Aug. 15, 1924, changed to 10,000,000 shares, $2.50 par value; May 2, 1925, decreased to 10,000,000 shares, par value $1; 3,555,187 shares issued. Property: Revenue group; 11 unpatented claims, Volcano dist.; Hill City. Development: By 1 tunnel 1453 ft. long. Plant: Gas-driven compressor; complete mining equipment and camp. Ore: Copper, gold and silver. Men Employed: 1 watchman. Remarks: During the year work consisted of cleaning out and retimbering portion of tunnel.

**DALEY CONSOLIDATED MINES CO.**

**FLAG STAFF MINING COMPANY**

GOOD LUCK GROUP

IDAHO GOLD CHIEF MINING CO.

IDAHO MINES INC.

IDAHO-NEVADA COPPER CORPORATION, LTD.
(See Boise County for capital structure.) Property: 1 unpatented claim, Neal district; held under lease and option from R. E. Beeson and Fremont Wood of Boise.

KASLO MINES CORPORATION
Office: 402 Empire State Bldg., Spokane, Wash. Officers: H. G. Loop, Pres.-Mgr.; E. I. Fisher, Sec., both of Spokane, Wash.; R. W. Fulton, Statutory Agent, Cœur d’Alene. Inc.: Jan. 19, 1926 as Omo Mines Corporation; name changed Nov. 19, 1936. Capital: 2,000,000 shares; par value 5c; Nov. 19, 1936, reclassified capital stock to 1,000,000 shares non-assessable, par value 3c and 1,000,000 shares assessable, par value 7c; 961,802 non-assessable and 158,000 assessable shares issued. Property: “The Kaslo Mines Corporation holds deed to millsite at Pine, Idaho. All other property owned by the company is located in British Columbia, Canada.”

MARSH CREEK MINING CO.
Office: Boise. Officers: Roy Y. Bogard, Pres.-Mgr.; Curtis F. Pike, Sec., both of Boise. Inc.: July 9, 1921. Capital: 1,000,000 shares; par value $1; 39,625 shares issued. Property: 2 unpatented claims on Marsh Creek, Bear Creek dist.; Featherville. Remarks: Assessment work only.

NEW LIBERTY MINING COMPANY
(See Custer County)

OLD CHANNEL MINING COMPANY, INC.

GEORGE F. ROTH CO.
STANLEY-FIVE BARS MINING COMPANY

(See Custer County)

Property: Five Bars Group, consisting of 4 claims; Barber.

TALACHE MINES, INC.

Officers: A. H. Burroughs, Jr., Pres.-Mgr.; B. K. Burroughs, Sec., both of 715 Grove St., Boise. Inc.: Apr. 21, 1917, as Armstead Mines; name changed June 8, 1922. Capital: 1,600,000 shares; par value $1; shares issued, 1,580,233.

Property: 10 patented and 22 unpatented claims, Atlanta dist., Atlanta.


Remarks: Constructed new timber shed at 900 level and several hundred feet of snow shed, built 1 new dwelling, remodeled and made improvements on several others; also remodeled interior and exterior of old St. Joe Mill building for present 125-ton plant, and installed 300 h. p. Fairbanks-Morse diesel engine. The mine has been under development since July 1937. Milling operations began September 27, 1938, on a 70-ton per hr. basis and have been gradually increased to the present rate of 125 tons per day as of May 31, 1939.

WINNER GROUP


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See pages 6-7 for publisher's address, meaning of reference marks, and abbreviations.


Mineralogy of some black sands from Idaho, with a description of the methods used for their study, by E. V. Shannon: U. S. Nat. Mus. Proc., vol. 60, art. 3, pp. 1-33, 1921.


FREMONT COUNTY

Coal, phosphate rock, oil shale and asbestos occur in different sections of this county. The occurrence of coal in commercial quantities in the northeastern corner of the county has been reported, but these deposits are too far removed from transportation to be available. The other deposits have never been sufficiently developed to prove their extent.

BIBLIOGRAPHY

See pages 6-7 for publisher's address, meaning of reference marks, and abbreviations.


GEM COUNTY


History and Future

The Pearl district was once a famous gold producer; this and a few outlying sections have seen considerable activity in the past. Much base ore amenable to modern methods of concentration is reported in the old properties. This section should be given more attention by the present day operators.

Review of Year's Operations

Annual assessment work was performed on several mining properties in the Pearl district during the year, including the Gold Digger Group owned by K. H. Swanholm of Boise, the King Tut Group owned and operated by Fred Babcock and Earl Murphy of Boise, and the La Trinidad owned by J. C. Johnson and Walter White.

Merton Smith and associates extended the working tunnel at the Checkmate. This mine was a producer when the Pearl district was one of the leading mining camps in the state and may again be listed among the producing mines in the near future.

Huron Mines, Inc., with an average crew of 17 men, dewatered the old Lincoln mine, cleaned out and retimbered the drifts. Development was done by extending the drifts, driving a contract raise and by diamond drilling. The mill building was rehabilitated and new machinery with a daily capacity of
GEM COUNTY

60 tons was installed to place the operation on a production basis. James L. Fozard is president of the company, and in direct charge of operations.

Lincoln Mine Operating Company, Wm. I. Phillips, president, Boise. This company is still in litigation and the mining property is in the possession of the owners, Manufacturers Trust Company, New York City.

Old Liberty Mining Company report that 75 ft. of development work was completed during the year. Harry Sweet of Montour is president of the company.

Ojus Mining Company, Wm. I. Phillips, president, of Boise. Company still in litigation and has been inactive since 1923. Property is now in possession of the owners, Manufacturers Trust Company, 55 Broad St., New York City.

A small tonnage of coal was mined on the surface near Montour and delivered by truck to local consumers. Henry Reims of Payette is owner of the property.

Ralph Davis Inc. had a lease on what is known as the Gatfield Ranch near Montour. 272,700 cubic yards of gravel were supplied to the floating washing plant by means of a Monighan Power Shovel during the year. The plant was dismantled during 1939 and moved to Montana with no further operation in Idaho at this time.

The Pearl Mining Company installed a 30-ton mill on its property in the Pearl mining district. An average crew of about 10 men was employed.

FELIX MINING CO.

GOLD DIGGER GROUP

GRANITE STATE CONSOLIDATED MINES CO.

HECLA CHECKMATE MINING & MILLING CO., LTD.

HURON MINES, INC.
Office: % Hawley & Worthwine, Boise. Officers: James L. Fozard, Pres.-Statutory Agent, Pearl via Eagle; Chas. M. Close, Sec., 55 Broad St., New York City, N. Y. Inc.: April 4, 1938. Capital: 100 shares; no par value. Property: 5 patented and 4 unpatented claims, West View dist.; Eagle. Development: Principally by 1 tunnel 1000 ft. long; approximate total development, 2000 ft. Plant: Complete mining equipment. Men Employed: Average, 17. Remarks: "During the year the mine was dewatered, drifts cleaned out, retimbered and principal prospecting was done by diamond drilling."

LINCOLN MINE OPERATING CO.
Office: Boise. Officers: William I. Phillips, Pres.; Arthur McIlveen, Jr., Sec., both of Boise. Inc.: May 20, 1926. Capital: 1,000,000 shares; par value 25c. Remarks: "This company is still in litigation and the mining property is in the possession of the owners, Manufacturers Trust Company, New York City."
OLD LIBERTY MINING COMPANY


OJUS MINING COMPANY


RALPH DAVIS, INC.


BIBLIOGRAPHY

See pages 6-7 for publisher's address, meaning of reference marks, and abbreviations.


IDAHO COUNTY

County Seat: Grangeville. Area: 8539 sq. miles. Population: 10,107. Principal Industries: Agriculture, stock raising and mining. Relief: With the exception of the high table land known as Camas Prairie, the county is of rugged mountains extending from the Snake River on the west to the Continental divide on the east. Rivers: South fork of the Clearwater, Salmon and Snake. Transportation: The western part of the county is served by a system of well maintained state and county roads. A highway up the south fork of the Clearwater River serves the Elk City district. That portion south of the Salmon River is served by the McCall-Edwardsburg forest highway. The balance of
the county has very little transportation facilities but is being developed fast.

The Stites and Grangeville branches owned jointly by the Northern Pacific and Union Pacific railroads are the only railroads. These serve the northern and Camas Prairie portion of the county. Mineral Resources: Gold, silver, copper, lead, zinc, antimony, tungsten, asbestos, talc, mica and molybdenum.

History and Future

During the early days of gold mining this county was one of the most productive in the State. Due to the inability of the early operators to handle base ore and the terrific handicap of lack of transportation facilities, mining became dormant throughout the county. Modern metallurgical process, new highways and truck transportation has given new life to these mining communities.

This county contains one of the largest and most favorable undeveloped mining districts in the United States.

One of the greatest opportunities presented today to the prospector, operator and investor is in the tremendous development which is due to take place in this region.

Approximately 800 men were actively engaged in mining within the confines of Idaho County during the past year.

Review of Year's Operations

Elk City District

The Mary K. Mines, Inc., Richard Kleesattel of Elk City, president, is operating on a 24-hour basis. The company holds a group of 19 lode claims in Idaho County near Elk City known as the Mary K. or Black Pine mine.

The Clearwater Concentrating Company operated a 60-ton custom mill at the confluence of the Clearwater and Crooked rivers. The plant is known locally as the Crooked River Mill. The gravity system is used and there is no pumping or rehandling of pulp or ore, the flow is moving from top to bottom. Assay and test equipment are housed in a separate building. Living quarters have been provided nearby. This company was organized about a year ago to buy outright and treat custom ore in the Elk City district. Gold and silver will be recovered by flotation, cyanide, leaching, and amalgamation methods. J. E. McCloskey of Elk City is general superintendent and C. H. Nethaway, Route 1, Bothell, Washington, is secretary and field engineer. A. W. Kennard, Elk City, is mine superintendent and is assisted by Bert Peterson. About 16 men are employed.

A loss estimated at $25,000.00 was incurred when the washing plant of the American River Mining Company, located about three miles from Elk City, was destroyed by fire of unknown origin. This company with a dragline, had been treating around 3000 yards of gravel every 24 hours. After the fire they moved the 1½ yard dragline and built a new washing plant on Butcher Bar at the upper end of the South Fork of the Clearwater River. Frank Cummings of Elk City, is superintendent and C. E. Cummings is secretary.

Noon and Noon of Portland, Oregon, had 4 crews with top equipment testing placer deposits in the Red River Valley on Seigle Creek, on Red Horse Creek and on Crooked River during the past year.

Reed, Sebastain and Horner of Seattle, Washington, have closed a deal on placer ground situated on Little Elk Creek and are moving in a washing plant.

Lessees are mining ore at the Banner-Forsythe property with shipments going to the Kellogg Smelter.

Stanley Litchfield is running his 2-stamp mill on ore from the Madre d'Ore mine.

The Grangeville Gold Corporation enlarged the capacity of the mill to 40 tons of ore daily. The new plant was built at a new site on Relief Creek. Additional equipment include a larger ball mill, classifier, and 5 flotation cells. Mike L. Savage is in direct charge of operations.

Completion of the new 50-ton mill at the Center Star property on the south fork of the Clearwater River about half way between Golden and
Elk City was reached late this fall. Ted Ward and associates have done considerable development in the past two years and believe they have sufficient good mill feed readily at hand to run the plant steadily. The mine is an old one and includes a very large amount of earlier development.

Sons of Dr. Boyd are working some high grade streaks in the old American Eagle mine and operating the American Eagle mill.

The Cal-Idaho Mining Company moved about 150,000 yards of gravel during the year.

Frank Ruby had a power shovel and washing plant on Little Elk Creek. The Red Fir was worked by Richard S. McKee of Natchee, Washington.

A crew of eight men was employed for four months, from June until October, at the Black Lady property. Surface work was performed by a bulldozer uncovering vein showings. Underground work was confined to cutting these surface showings by crosscut tunnel. It is reported that lessees are now working the Black Lady mine and treating the ore by means of cyanide.

Lessees are mining ore from Grant Litchfield’s Mankato mine and shipping to the Bunker Hill Smelter at Kellogg.

The Mogul was rehabilitated by Cookingham and Green.

Florence District

Included among properties operating in the Florence district which have made good returns during the summer months when water was available are the Old Waverly holdings being operated under lease and bond by Fred Johnson as the Monte Cristo; the Idaho Quartz claims operated by Otto Egloff; the William Paul claims; Jack Hardin’s property; the old Banner property which is being operated as the Gold Bug by Hugh Drenan; the Archie Adsley quartz property; the continued placering of the old townsite of Florence by James Ward, Theodore Holt and Mackey Williams; the Orvie Heilman placers and the Walt Jones placers on the upper end of the east fork of Sand Creek where a small dragline and bulldozer have been utilized.

Ten Mile District

The Clearwater Mining Company with 22 unpatented claims in the Ten Mile district also acquired the Blackbird Mine. Ore from the Blackbird was trucked to the Clearwater 20-ton mill. It is planned to increase the capacity of the mill to 50 tons. A crew of 18 men was employed until December 20, 1938, when the mine was closed down for the winter. Very little work was done at the property after that date.

Eight men were employed at the Golden Fleece near Golden. A. M. Malcolm, Golden, is in charge of operations and expects to put the mine on a production basis.

A crew of 14 men was employed in mill construction and surface work at the Center Star Mine, which the Eli-Nevada is operating. The property is being leased from the owner, Herman Brown of Elk City, and has been opened to a depth of 300 feet by former operators.

The McAdoo Gold Mining Company installed two small stamp mills and produced about five tons of gold ore daily. The mine consists of six claims which are owned by the McAdoo concern and five leased claims. The five are being purchased under contract from the Williams Brothers of Grangeville. The property is located near Golden. The tunnel has been driven through four of the company’s claims, opening a vein, and will be continued into the leased portion of the property. Ore was sent to the Clearwater Concentrating Company’s custom mill on Crooked River, a distance of three miles. G. H. Moen, 2105 Summit View Avenue, Yakima, Washington, is president.

A small amount of dump ore was milled by the Mountain Gold Producers, which acquired the New York, also known as the Shamrock Mine, under bond and lease from H. W. White of Tekoa, Washington. The property is on the north side of Fall Creek, 4½ miles from the Fall Creek settlement. A small mill is on the ground and a crew of six men was employed.

The Elk City Gold Mining Company, Frank H. Mangis of Creston, Washington, president, shipped ore to the custom mill on Crook River. The Elk City Company, which holds the Jack Montgomery Group of 20 claims in the
Ten Mile district, has a flotation and amalgamation plant of its own. About 1000 ft. of development work has been done in the mine and shaft sinking from the present working tunnel was started during the year.

The North Hill Mining Company was worked to some extent. Gold-silver ore from the vein west of the shaft was shipped to a custom mill in the district.

The Newsome Dredging Company had a very successful year at its operations on Newsome Creek near Golden. The company is controlled by Joe Ferris and J. W. Marchbank, who also have placer operations in Oregon. Andy Molinari is the foreman in charge of a crew of about 15 men.

The Lone Pine Mine near Golden formerly operated by F. O. Miller of Clarkston, Washington, is now operated by Frank W. Holzheimer of Seattle, Washington, and Andrew McGregor and O. C. Thompson both of British Columbia. The mine was operated steadily during the year with an average crew of about 40 men under the direct supervision of Sam Aim of Golden. Approximately 50 tons of ore are treated at the mill daily. The company installed a saw mill, built a 400 ft. snowshed and completed 1170 ft. of development work during the year.

**Buffalo Hump District**

Walt Reamer constructed a 25-ton mill on the St. Louis property. In 18 days milling of about 23 tons daily from the 4½ ft. St. Louis vein it is said that after shipping the concentrate to the Bunker Hill Smelter that Reamer cleaned up about $60,000.00 During the winter months Reamer timbered the 300-ft. shaft of the Concord Mine in the Buffalo Hump district.

It is reported that Nate Pettibone and Son are opening up the Baby Mine which is near the Concord in the Buffalo Hump district.

**Orogrande District**

Orogrande-Frisco Gold Mines, Inc. operated their open pit mine at Orogrande until about the first of December, 1938.

The Mount Vernon Dredge was moved from Deadwood and put into operation on Crooked River. Digging began during the first spring thaw. A crew of about 12 men is employed.

The Pasadena Company moved their 15-ton mill to Frank Peck's Knob Hill and Moon Groups, near Orogrande. The property is being further developed and the mill put into operation.
The Penman Mines Corporation reports steady progress. Its 27 claims lie over the top of a mountain. Its No. 3 tunnel is at an altitude of 6300 ft. A drift from its No. 2 tunnel is proceeding on the Homestake Vein, raises are ascending on ore in the Homestake Vein from the No. 3 to the No. 2 levels, and a crosscut proceeds from the Homestake Vein to the Badger Vein, which it expects to reach about July 15, so it is working in three places, according to an official.

A small crew was employed at the Una Mine. The main office is located in Spokane, Washington. Ralston McCaig is secretary-manager; J. M. McClain is president.

The Golden Copper mine near Orogrande has been taken over by Roy Bovey, Marty Bardoff, and Charles Alexander, all of Orogrande. A shaft is being sunk and a road to the property has been finished. The operators plan to ship to the Clearwater mill at Elk City.

**Warren District**

The Warren Dredging Company, E. T. Fisher, manager, Warren, operated throughout the year on Warren Meadows with a crew of 16 men. The property consists of 486 acres patented and 240 acres unpatented land. Values are in gold and silver and there is about four years work ahead of this dredge.

The Baumhoff, Fisher and McDowell boat, which was formerly known as the Anderson Dredge, worked during the year on high-bar gravel below the town of Warren, which presented many problems to the operators. There is a possibility that this electrically driven dredge will be moved to ground that will afford more feasible working conditions in the near future.

Equipment for another bucket line dredge was moved in during the year to be erected in what is called the narrows at the lower end of Warren Meadows.

Unity Gold Production Company report maintenance and repairs and the installation of a standard pneumatic sponge pump and that the locomotive storage battery was renewed. An average crew of 11 men was employed.

W. R. McDowell had a small crew at work on the Rescue property and handled some custom ore at the Rescue Mill.

Activity on Warren Summit at the Bear Track and other properties in this district gave an optimistic look to the future development of properties of merit near Warren.

The Salmon River Placer Company, J. J. Oberbillig, Box 1271, Boise, president and general manager, built a road into the property which is five miles below Painter Bar on the South Fork of the Salmon River near Warren. Heretofore, men and supplies have been taken in by air to Mackay Bar, which the company owns in addition to 1400 acres on both the South Fork and the main Salmon River. A dragline dredge and jig are being installed. W. L. Long of Seattle, Washington, holds control of the company. Ernest Oberbillig of Boise, metallurgical engineer, assisted in the installation work.

A. F. Richards of Warren operated the Bear Track Mine under a sales contract from George E. Eipp of Warren, owner. The claims are located about seven miles from Warren and have values in gold and silver. A small production was maintained and treated in the 6-ton mill at the mine. Eventually a 15-ton modern mill will be installed. A drift is being run from the 90-ft. shaft and later a 2-compartment raise will be put up.

Iola Consolidated Mines Corporation, Ltd., built a blacksmith shop and three cabins; laid 1000 ft. of track and cleaned out and retimbered tunnels.

**Dixie District**

Because of activity on the placer bars of the Salmon River and the development on the Painter property in the same district, roads have been constructed through the breaks to the river which are now being used by most any type of good car. The U. S. Forest Service also made roads through the breaks to the Salmon farther west so that a trip to the Salmon River may be made by car in more than one place in this hitherto inaccessible area.

N. B. Pettibone of Grangeville shipped ore from the Mammoth Mine near Dixie. Pettibone, a stockholder and director of the Mammoth Mines Corpora-
tion, leased the property with his son. Three men were engaged in development work during the winter. This work started during October, 1938 and the ore was stockpiled. Robert S. Erb of Lewiston is president of the owning company.

Loyalty Mines, Inc. shipped some ore to the Clearwater Concentrating Company's custom mill.

Robinson Mining and Milling Company report annual assessment work only.

Other properties active during the year include the Dixie Comstock Gold Mining Company, Loyalty Mines, Inc., The American Gold Mining Company, the War Eagle and the “L and L”.

**Burgdorf-Marshall Lake District**

The Golden Anchor Mining Company, with an average crew of 54 men, completed 4,598 ft. of development work during the year and installed a new diesel power plant (10x12 I-R 175 h. p. engine). This company is the largest in the district and ranks among the leading gold producers of the state. A road was built from this property to the Salmon River which will no doubt encourage mining in the Marshall Lake area and facilitate operations during the winter.

The Goodenough United Mining and Milling Company, Ltd. is being worked under lease by the Two Margarets Mining Company. Cornelius Meyers, Portland, Oregon, is president. An average crew of 15 men was employed and 500 ft. of development work completed during the year. Annual labor was performed by many claim holders in the Burgdorf-Marshall Lake district during the year.

The Gold Run Mining Company report that the operation of the property was taken over by the Kimberly Gold Mines Inc. during the month of February, 1938. A crew of men was employed by the company in further development of the property.

Idaho Klondike Mining Company, located on California Creek, report 250 ft. of development work with an average crew of four men. This property consists of five unpatented claims and is an underground placer which taps an old river channel. Mark Evans, Burgdorf, is president of the company in direct charge of operations.

At the Gold Crest, adjoining the Golden Anchor, E. T. Fisher of the Warren Dredging Company, employed a crew of 15 men driving a crosscut to determine the extent and value of the ore bodies at depth. It is reported that 800 foot of this work was completed during 1939 and that this work will be pushed ahead another 2000 feet to further prove the property.

**Edwardsburg District**

The Pierce Metals Development Company, R. D. Inman of Grandview, Washington, president and general manager, employed a crew of 20 men at its Snowshoe Mine and 25-ton mill near Big Creek Headquarters. 440 ft. of development work was completed during the year. The Ingersoll Rand 312 ft. compressor and Hesselman Power Plant was totally destroyed by fire in January 1939 and had to be replaced. Some drilling is being done to develop the property and the 25-ton plant equipped with flotation, cyanide and amalgamation units, was operated day and night. The property has been opened to a maximum depth of 200 ft. Values are in gold, silver and copper. E. T. Peterson of Big Creek is in direct charge of the mine and mill.

Placer miners worked claims on Smith and Big Creek; other activity was widely scattered on Ramey Ridge, Sheep Eater Mountain and the Chamberlain Basin.

The Golden Hand, Inc., located on Cache Creek, a tributary to Beaver and Big creeks worked a few men and milled some ore. It is rumored that this company will be reorganized before further development.

Walter A. Estep Estate, Burt B. Spillman, Administrator, reports 20 ft. of development work done during the year. The ore is run through a 1½ ton crusher and washing plant to save free gold and a few shipments were made during the year.
Ella Gold Mines, Inc., employed a crew of 11 men for four months. 170 ft. of development work was completed during the year. W. H. Hayden is president and W. D. Vanderbilt, secretary, both of Seattle, Washington.

Salmon River Gold Ores Company, J. J. Oberbillig, president-manager, Boise, employed 4 men at the Logan Creek Group of 11 unpatented claims in the Big Creek district, Big Creek. Values are in gold and silver. This property is the north continuation of the Moscow Lode and the same is located on the north side of Logan Creek. The company plans to start a working tunnel which will be driven on the ore body following along its strike where the first 500 ft. will attain a vertical depth of 350 ft.

Salmon River District

The Juneau-Bob Mines Company is a new organization which expects to start production in January of 1940. W. G. Cowan is president; L. L. Barrett, vice-president; and G. G. Schneller, secretary-treasurer, all of Walla Walla, Washington. Holdings are on the Salmon River at Kelley's Bar, about 14 miles north of Riggins.

The Salmon River, from the mouth of French Creek to the Box Canyon below Whitebird, had the usual quota of placer miners throughout the year. Every kind of contraption was in use from modern power shovel and washing plants to the crude rocker and screens used by individuals in skim digging.

Roy Green of Grangeville has sold his equipment on Large Bar in Salmon River Canyon near Slate Creek. He was forced to suspend operations, which he had conducted since last September, on account of high water. Machinery includes an eight-inch pump and hydraulic monitor, both powered by a Caterpillar Diesel engine, and a gold washing plant.

A 2½-yard new Lima dragline and a three-yard jig equipped Bodinson Manufacturing Company floating washing plant are being used at the Shorts Bar placers at Riggins. The ground was recently acquired by a firm consisting of E. F. Leese, C. H. Grones and F. F. Kippley, all of Minneapolis, Minnesota. E. F. Leese is in charge at Riggins where 3,000 yards are being handled daily with a crew of 15 men.

Assessment work was performed by the B. R. and R. Co., and the McKinley Gold Mining Co., located near Lucile. The Liberty mine, also known as the "Big Three" was worked to some extent during the year. This property is located about three miles up the river from the mouth of French Creek.

American Rand Research Corporation continued research work on the metallurgical problem connected with commercial recovery of values from the difficult ores of the Pollock district.

AMERICAN RAND RESEARCH CORPORATION

Office: Pollock. Officers: Ben G. Gellenbeck, Pres., Tacoma, Wash.; Chas. J. Heidenreich, Sec., Spokane, Wash.; H. F. Gellenbeck, Mgr., Pollock. Inc.: Dec. 1, 1938. Capital: 90,000 shares common, par value 10c; 90 shares preferred, par value $1; all common shares issued. Property: 580 acres, Salmon River dist.; Pollock, held under lease from American Rand Mines Company. Ore: Gold, silver and platinum. Remarks: "American Rand Research Corporation is not a mining operation at the present moment but arrangements have been made to lease the property of American Rand Mines Co. and to continue the research work on the metallurgical problems connected with commercial recovery of values from the difficult ore of the Pollock district, after a satisfactory commercial recovery method has been developed, the American Rand Research Corporation will engage in mining operations under its lease. American Rand Mines Co. has spent approximately $100,000.00 in research operations, mill buildings, laboratory equipment, land purchases, living quarters, water works, power plant etc. and American Rand Research Corp. will take over the entire operation in due course. All of the common shares in American Rand Research Corp. (except 7 qualifying shares for directors) are owned by American Rand Mines Co. and the Board of Directors and officers of both corporations are identical."
AMERICAN RIVER MINING COMPANY
Office: Elk City. Officers: G. B. Peterson, Pres.-Mgr.; C. E. Cummings, Sec., both of Elk City. Inc.: July 20, 1938. Capital: 50,000 shares; par value $1; 6,200 shares issued. Property: 12 unpatented claims and 80 acres patented ground, Elk City dist.; Elk City, held under lease and bond from the Washington Trust Company and C. E. Marr, both of Spokane, Wash. Plant: Floating dredge using a dragline of 1½ yard capacity. Ore: Gold and silver. Men Employed: Average, 12. Remarks: “Our work is confined entirely to Placer Mining on the American River 1½ mile west of Elk City. We employ steadily 12 men on our boat; some extra men are being used for prospecting and testing during part of the operating season. During the year ending Dec. 31, 1939 we moved approximately 200,000 cu. yards of material.”

B. R. AND R. MINING COMPANY INC.

CAL-IDAH0 MINING CO.
Office: 403 Seventh St., Huntington Beach, Calif. Officers: Edward H. Cookingham, Pres., Bremerton, Wash.; M. G. Jones, Sec., Huntington Beach, Calif. Inc.: Not filed in Idaho. Capital: 250,000 shares; par value $1; all shares issued. Property: Gold Hill placer; 7 patented claims, 9 unpatented claims, held under lease and option, Elk City dist.; Elk City. Plant: 8-mile ditch; complete hydraulic equipment and mine camp. Ore: Placer gold. Men Employed: Average, 3. Remarks: During the year moved about 150,000 yards of gravel. "Property was leased until October 1, 1938, to James A. Green, Spokane, Washington. Advances made by stockholders was for materials used in development work and assisting in removing slide. This year we are employing men to elevate gravels and accomplish a clean up.”

CLEARWATER EXPLORATION COMPANY (A Trust)

CLEARWATER MINING CO.

CONSOLIDATED MINES SYNDICATE
(See Boise, Camas and Elmore counties)
Property: Blue Jacket group; 7 patented claims, Crooks Corral dist.; Lucile. Development: By 3 tunnels, the principal one being 888 ft. long; approximate total development, 3234. Remarks: Idle.

CONSOLIDATED RAPID RIVER MINING & MILLING CO., LTD.
Lett., name changed July 10, 1937. **Capital:** 1,500,000 shares; par value $1; May 8, 1939 reduced capital stock to $150,000 divided into 1,500,000 shares, par value 10c; 294,507 shares issued. **Property:** 12 unpatented claims, Rapid River; Pollock. **Remarks:** Report not filed for 1939.

**COPPER QUEEN MINING CO., INC.**

Office: Kamiah. **Officers:** Daniel Laverty, Pres.-Mgr., J. H. Garbutt, Sec., both of Kamiah. **Inc.:** Oct. 29, 1929. **Capital:** 1,000,000 shares; par value $1; 533,750 shares issued. **Property:** 9 unpatented claims, Lolo dist.; Pardee. Development: 3 short tunnels. **Ore:** Copper-gold-silver. **Men Employed:** Average, 2. **Remarks:** 120ft. of development work during the year.

**CROOKS CORRAL MINES, LTD.**

Office: Grangeville. **Officers:** Frank McGrane, Pres., Grangeville. **Inc.:** Sept. 13, 1897. **Capital:** 1,000,000 shares; par value $1; 990,000 shares issued. **Property:** 8 patented placer claims, Crooks Corral dist.; Lucile. **Ore:** Gold. **Remarks:** Idle.

**DANDY GOLD PLACERS, INC.**

Office: Lucile. **Officers:** E. W. Butcher, Pres., Lucile; Jos. E. Kulick, Sec., McCall. **Inc.:** Sept. 10, 1938. **Capital:** 3,500,000 shares; par value 10c; 1,798,300 shares issued. **Property:** 6 unpatented claims, Simpson dist.; Lucile. **Remarks:** Assessment work only.

**DAVIS MINING CO.**

Office: 304 Railway Exchange Bldg., Seattle, Wash. **Officers:** W. G. Estes, Pres.; C. H. Steffen, former secretary, both of Seattle, Wash. **Inc.:** Not incorporated in Idaho. **Capital:** 100,000 shares; par value 5c; 50,000 shares issued. **Property:** 25 unpatented claims, Burgdorf. **Ore:** Placer gold. **Remarks:** C. H. Steffen, former secretary, advises: "Please be advised that the Davis Mining Co. has ceased to exist; that all property held by it is now being operated by Dr. Don S. Numbers, McCall, Idaho."

**ELK CITY GOLD MINING CO.**

Office: 1117 E. 3rd, Spokane, Wash. **Officers:** Frank H. Mangis, Pres., Creston, Wash.; H. M. Warren, Sec., Spokane, Wash.; Wilbur L. Campbell, Statutory Agent, Grangeville. **Inc.:** Not incorporated in Idaho. **Capital:** 2,000,000 shares; par value 1c; 1,041,732 shares issued. **Property:** Jack Montgomery group; 20 unpatented claims, Ten Mile dist.; Elk City. **Development:** Approximate total development, 1,000 ft. **Plant:** MINE: Gardner Denver 310 cu. ft. compressor, 4 tram cars, 2 IR jackhammers and misc. equipment; assay office and complete housing facilities. **MILL:** 75-ton flotation and amalgamation. **Ore:** Gold and silver. **Men Employed:** Average, 4. **Remarks:** Additions made: crusher, rolls, belts, pulleys, shafts, con. table, corduroy table; 80 ft. of development work and surface prospecting in amount of $400.00 during the year.

**WALTER A. ESTEP ESTATE**

**Officers:** Burt B. Spillman, Administrator, Big Creek. **Inc.:** Not incorporated. **Property:** 13 unpatented claims, Ramey Ridge dist.; Big Creek. **Development:** Approximate total development, 343 ft. **Plant:** MINE: Crusher —1½ tons 8 hours; cabins, and mill shed. **Ore:** Gold. **Men Employed:** Average, 2. **Remarks:** 20 ft. of development work during the year.

**ELLA GOLD MINES, INC.**

Office: 840 Central Bldg., Seattle, Wash. **Officers:** W. H. Hayden, Pres.; W. D. Vanderbilt, Sec., both of Seattle, Wash.; Edwin Snow, Statutory Agent, Boise. **Inc.:** Jan. 14, 1939. **Capital:** 250,000 shares; par value $1; 49,005 shares issued. **Property:** 35 unpatented claims, Big Creek dist.; Big Creek. **Development:** Approximate total development, 1621 ft. **Plant:** MINE: Gardner Denver 310 cu. ft. compressor, 4 tram cars, 2 IR jackhammers and misc. equipment; assay office and complete housing facilities. **MILL:** Stamp mill—ball mill—wilfley table—classifier, oil flotation. **Ore:** Gold. **Men Employed:** Average 11—for 4 months. **Remarks:** 170 ft. of development work during the year.
EXPLORERS INC.
Office: 526 Hutton Bldg., Spokane, Wash. Officers: Leon Starmont, Pres.; Henri Parmelee, Sec., both of Spokane, Wash.; Walter C. Clark, Statutory Agent, Kellogg. Inc.: Mar. 4, 1930. Capital: 250,000 shares; par value $1; Jan. 26, 1939, reclassified capital stock as follows: 125,000 non-assessable common, par value $1, and 1,250,000 shares assessable preferred, par value 10c; 81,733½ shares non-assessable common issued; 432,665 assessable common issued. Property: 16 unpatented claims, mining district unknown, held under lease and bond from Japhet Nousson, Hugo Nousson and Floyd C. White. Remarks: "The bond and lease on the Sunnyside properties were acquired by Explorers Inc. from The Last Frontier, Inc. on the 31st day of March, 1939. The property is inaccessible during the winter and we cannot give any report on the work accomplished during the past winter. We understand two men have been on the property all winter performing the necessary assessment work. Explorers Inc. has an interest in the Gibbonsville Mining and Exploration Company, Treasure Knob Mining Company and Snow Bird Mining Company."

FAR WEST GOLD-SILVER MINING COMPANY (See Shoshone County)

FRENCH CREEK GOLD MINING & MILLING CO.

GNOME GOLD MINING CO.

GOLD BAR PLACER, INC.

GOLD BUG MINING CO.

GOLD CROSS MINING CO.

THE GOLD EAGLE DREDGING COMPANY

GOLD MASTER CONSOLIDATED MINING CO., INC.

GOLD POINT MINES, INC.

GOLD RUN MINING COMPANY
Office: Colman Bldg., Seattle, Wash. Officers: Clifford O. Olson, Pres., Parkland, Wash.; Edward M. Hay, Sec., 564 Colman Bldg., Seattle, Wash.; Wilbur L. Campbell, Statutory Agent, Grangeville. Inc.: Aug. 22, 1935, under the laws of Washington. Capital: 25,000 shares; par value $1; March 18, 1936, amendment filed classifying the capital stock into 20,000 shares of Class A with voting power and 5000 shares of Class B without voting power; July 23, 1937, increased capital stock to 50,000 shares, divided into 40,000 shares of Class A with voting power and 10,000 shares of Class B without voting power; 37,155 shares Class A issued and 9,288% shares of Class B issued. Property: Holte group 6 patented, 29 unpatented claims, Marshall Lake dist.; Burgdorf. Development: There are approximately 1500 ft. of tunnels and raises. Plant: Complete mining equipment and buildings. Ore: Gold. Remarks: "Operation of property taken over by Kimberly Gold Mines, Inc. in February 1938."

GOLDEN ANCHOR MINING CO.

GOODENOUGH UNITED MINING & MILLING CO., LTD.
GRANGEVILLE GOLD CORPORATION

GREEN-HILL MINING CORPORATION

HARPSTER MINING COMPANY

IDAHO GOLDFIELDS, INC.

IDAHO KLONDIKE MINING CO., INC.

IDAHO RAINBOW MINES INC.

IOLA CONSOLIDATED MINES CORPORATION, LTD.

JUMBO MINING & MILLING CO.
JUNOBOB MINING CO., INC.

KEITH'S STAR MINING CO.

KEY PLACERS CORPORATION

KIMBERLY GOLD MINES, INC.

LONE PINE GROUP (a partnership)

LOYALTY MINES, INC.

LUCKY FIVE MINING CO.
MAMMOTH MINE CORPORATION  

METALS RECOVERY COMPANY  

MINERAL ZONE MINING COMPANY  

MOUNTAIN PRODUCERS GOLD CO.  

NORTH HILL MINING CO.  

OROGRAINDE-FRISCO GOLD MINES, INC.  

OROGRAINDE GOLD MINING COMPANY  
company. The possession of these properties is now in J. R. Moore under the option and all assessment work and other expenses are being done by the option holder.”

PASADENA MINES, INC.

PIERCE METALS DEVELOPMENT CO.
Office: Lewiston. Officers: R. D. Inman, Pres., Grandview, Wash.; Marcus J. Ware, Sec., Lewiston. Inc.: Nov. 21, 1932. Capital: 2,500,000 shares; par value 1c; May 6, 1938, increased capital stock from $250,000 to $300,000, divided into 3,000,000 shares, par value 10c; shares issued, 2,557,707. Property: Snowshoe group: 20 unpatented claims, Ramey & Edwardsburg dist.; Big Creek. Development: Approximate total development, 3063 ft. Plant: MINE: Complete mining equipment and camp. MILL: 25-ton combination flotation and gravity concentration. Ore: Gold, silver and copper. Men Employed: Average, 18. Remarks: 440 ft. of development work during the year. “Ingersoll Rand 312 ft. compressor and Hesselman power plant was totally destroyed by fire in January 1939.”

RARE METAL MINES INC.
Office: E. 601 Crown Ave., Spokane, Wash. Officers: Arthur L. Hooper, Pres.; Victor S. Green, Sec., both of Spokane, Wash.; Chas. A. Kerr, Statutory Agent, Priest River. Inc.: March 9, 1939. Capital: 500,000 shares; par value 1c; 27,000 shares issued. Ore: Gold, silver, rare metals in platinum group. Men Employed: Average, 2. Remarks: “This is a Washington corporation licensed to do business in Idaho as a foreign corporation. Its purpose is to explore and operate rare metal properties in both of these states, its activities depending largely on the turn of financial affairs.”

REEDS CREEK GOLD MINES CO.

ROBINSON MINING & MILLING COMPANY

SALMON RIVER GOLD ORES COMPANY
Office: 256 Sonna Bldg., Boise. Officers: J. J. Oberbillig, Pres.-Mgr.; J. H. Ramsey, Sec., both of Boise. Inc.: May 24, 1938. Capital: 3,000,000 shares; par value 10c; 1,950 shares issued. Property: Logan Creek group; 11 unpatented claims, Big Creek dist.; Big Creek. Development: Approximate total development, 130 ft. Ore: Gold and silver. Men Employed: Average, 4. Remarks: “This property is the north continuation of the Moscow lode and the same is located on the north side of Logan creek in the Big Creek Mining District, Idaho County, Idaho. Here the company is going to start a working tunnel which will be driven on the ore body following along its strike where the first 500 feet will attain a vertical depth of 350 feet.”

SALMON RIVER MINING & MILLING CO.
Office: N. 222 Post St., Spokane, Wash. Officers: John Wm. Errington, Pres.; H. M. Browne, Sec., both of Spokane, Wash. Inc.: June 8, 1931. Capital: 500,000 shares; par value 10c; increased Jan. 3, 1932, to 1,500,000
shares; 1,243,232 shares issued. Property: 12 unpatented claims, unorganized dist.; Riggins. Ore: Gold. Remarks: "This company has had no operation during the year under review, excepting sampling and testing of ore values."

SECESH DREDGING MINING & MILLING CO.

SENTINEL MINES CORPORATION

SPRING BARR PLACER CO.

SYLVANITE GOLD COPPER CO.

TWO MARGARETS' MINING COMPANY
Office: 513 Board of Trade Bldg., Portland, Ore. Officers: Cornelius W. Meyers, Pres.; Edgar M. Burns, Sec., both of Portland, Ore.; R. Fields, Statutory Agent, Burgdorf. Inc.: June 3, 1937. Capital: 1000 shares; par value $1; Jan. 20, 1938, increased capital stock from $1000 to $150,000, divided into 150,000 shares, par value $1; Oct. 6, 1938, reduced capital stock from $150,000 to $1000 divided into 1000 shares at $1; Dec. 28, 1938, increased capital stock from $1000 to $75,000 divided into 25,000 shares, par value $1 and 25,000 shares, par value $2; all shares issued. Property: 10 patented claims, Mt. Marshall dist.; Burgdorf. Development: Approximate total development, 800 ft. Ore: Gold and silver. Men Employed: Average, 15. Remarks: 500 ft. of development work during the year.

UNA MINE CO.
Office: 808 Medical Arts Bldg., Duluth, Minn. Officers: William Cruse, Pres.; Dr. F. J. Lepak, Sec.; John Oberg, Mgr., all of Duluth, Minn.; John K. Coe, Statutory Agent, Coeur d'Alene. Inc.: Feb. 6, 1925. Capital: 1,250,000 shares; par value 1c; Feb. 24, 1935 increased capital stock to 1,750,000 shares; 1,168,760 shares issued. Property: 6 unpatented claims, Orogrande dist.; Golden. Development: "During the year upraise at incline of 160 feet from tunnel level to surface completed. Una vein crosscut in west drift off tunnel 23 feet. Drift off upraise 60 feet below surface of 90 feet."

UNITY GOLD PRODUCTION CO.

WARREN DREDGING CO. (Partnership)
dist.; Warren. **Plant:** Complete mining equipment. **Ore:** Gold and silver. **Men Employed:** Average, 16.

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Mining and milling in Elk City district, by B. K. Welch: Min. and Eng. World, vol. 37, pp. 391-392, Aug. 31, 1912.§


Mineralogy of some black sands from Idaho, with a description of the methods used for their study, by E. V. Shannon: U. S. Nat. Mus. Proc., vol. 60, art. 3, pp. 1-33, 1921.‡


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KOOTENAI COUNTY


History and Future

Very little development work has been done on these mineral resources but some very encouraging results have been obtained. They are worthy of further attention.

Review of Year's Operations

Crystal Spring Mining Company completed 150 ft. of development work during the year with an average crew of six men. The property consists of 15 unpatented claims in an unorganized district near Cataldo. Luther G. Evans is president and Clayton H. Evans is secretary, both of Coeur d'Alene.

The Shamrock lead-silver mine near Hayden Lake is reported to have been acquired by the Fitsum Mining Company, 415 Hyde Building, Spokane, Washington. The property consists of five unpatented claims developed by about 1,700 ft. of workings. 51 ft. of development work was done during the year. Complete mining and camp equipment are said to be on the ground. It is owned by the Shamrock Silver Mining Company, Inc., J. E. Meinhardt,
president. The Fitsum concern also holds the Wheelbarrow lode mine and the Atlas lode and placer claims in the Gold Hill district of Latah County. B. M. Taylor of Moscow is state agent for the Fitsum company.

The Idaho Diamond Sulphide Mining Company, Inc. report 70 ft. of development work with a crew of three men.

Palisade Mining and Milling Company employed four men and report 70 ft. of development work completed during the year.

Rainbow Mining and Milling Company, Ltd., with property located near Medimont, was further developed. Values are in silver, lead and zinc.

Radio Mining Company was the scene of some development in its lead-silver property near Wolf Lodge.

Sunshine Metals Corporation reconditioned tunnel. This property consists of 7 unpatented claims in the Hayden Lake district.

Mining claims in the Fourth of July Canyon were the scene of active development.

BLUE BIRD MINING CO.

CARIBOU MINING CO., LTD.

COEUR D'ALENE-SPOKANE MINING CO.

CRYSTAL SPRING MINING COMPANY

HAYDEN LAKE MINING AND MILLING CO.

HIGH CROPPING SILVER-LEAD MINING CO.

IDAHO DIAMOND SULPHIDE MINING COMPANY, INC., THE
LITTLE NORTH FORK COPPER MINING & MILLING CO., LTD.

PALISADE MINING & MILLING CO.

RAINBOW MINING & MILLING CO., LTD.
(See Shoshone & Benewah Counties)
(See Benewah County for capital structure.)

RAINBOW NO. 2

RAINBOW NO. 4

THE ROYAL BASIN MINING CO.
Office: Coeur d'Alene. Officers: A. H. Moe, Pres.-Mgr.; Vina Moe, Sec., both of Coeur d'Alene. Inc.: Dec. 24, 1910, as Royal Mining Company; name changed June 8, 1934. Capital: 1,500,000 shares; par value $1; June 8, 1934, capital reduced to $150,000, divided into 1,500,000 non-assessable shares; par value 10c; 550,000 shares issued. Property: 9 unpatented claims, Wolf Lodge dist.; Coeur d'Alene. Development: By 3 tunnels, the principal one being 500 ft. long. Ore: Gold-silver. Remarks: Idle.

SHAMROCK SILVER MINING COMPANY, INCORPORATED

SUNSHINE METALS CORPORATION

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Composition and origin of certain commercial clays of northern Idaho, by Edward L. Tullis and F. B. Laney, vol. 28, No. 5, Econ. Geol., 1933.

LATAH COUNTY


History and Future

Very little has been done to develop the metallic resources of the county, however, the non-metallic resources, particularly the fire clay deposits near Troy have been actively exploited.

Many opportunities for profitable development are available in this district.

Near Elk City is a district of merit that should receive more attention in future.

Review of Year's Operations

The Fitsum Mining Company employed a crew in development work on the Atlas group of lode claims in the Gold Hill district. At present no work is being done on the placer claims of the Atlas property, but testing will be undertaken later. The company purchased the entire Atlas group outright during 1938. It also holds the Fitsum placers in Valley County, where test work will be resumed soon. The company hopes to have this phase of the work completed this season. Besides its active mining interests the Fitsum concern owns the patent rights on the Stickney expansion drill and expects to have arrangements completed in a short time to have this drill manufactured and put on the market. B. M. Taylor of Moscow is agent for the company and L. J. Moore, Box 1, Potlatch, is also associated with the company.

Many opportunities present themselves for a profitable development of properties in Latah County, especially in the Hoodoo district near Harvard. Very little work has been done to develop the metallic resources of Latah County. It has been reported that millions of yards of good placer ground are available. For further information contact Otto A. Huefner, 518 W. 15th Avenue, Spokane, Washington. However, non-metallic deposits have been actively exploited, particularly the fire clay near Troy which is some of the best to be found anywhere for refractory purposes.

Gold Hill Mining and Milling Company built a blacksmith shop, powder house and completed 75 ft. of development work on the property during the year.

Idaho Fire Brick and Clay Company, J. F. McCarthy, president, report that clay is mined by glory hole method from the surface. 225 ft. of development work was done during the year. An average crew of 22 men is employed.

Ten-Said Mining and Milling Company report that 60 ft. of development work was accomplished by the owners in 135 days.
Moscow Queen Mining Company is looking for a purchaser for the mine. This property is a prospect located on Moscow Mountain.

ACE MINING CO.

CASSIDY GOLD MINING & MILLING CO., LTD.

COLUMBIA MINES CORPORATION

MIZPAH GROUP

RIVERSIDE GROUP

ENGINEERS GOLD MINING COMPANY

GOLD HILL MINING & MILLING CO.
902,445 shares issued. **Property:** Gold Hill group, 198 acres; Hoodoo dist.; Harvard. **Development:** Approximately 1500 ft. of tunnels and drifts and 1 vertical shaft 300 ft. deep. **Plant:** 1 Gardner Denver compressor; 2 ore cars, 1 I.-R. Jackhammer; small sawmill for own use; all necessary buildings. **Ore:** Gold, lead, silver and copper. **Men Employed:** Average, 2. **Remarks:** 75 ft. of development work during the year; built a blacksmith shop and powder house.

**IDAHO CERAMIC MATERIALS CO.**

**Officers:** Carl R. Suksdorf (resigned), Pres.-Mgr., Troy. **Inc.:** Sept. 17, 1927. **Capital:** 275,000 shares, par value $1; increased Oct. 14, 1929 to 450,000 shares common, 50,000 shares preferred, par value of $1; 203,272 shares common, 14,038 shares of preferred issued. **Property:** 120 acres of patented farm land near Troy. **Mineral Sought:** Kaolin, silica, mica. **Remarks:** "Company lost all its property in 1938 through foreclosure. Charter in the State of Washington has been forfeited. Company has forfeited all rights to do business in either Washington state or Idaho."

**IDAHO FIRE BRICK & CLAY CO.**

**Office:** Troy. **Officers:** J. F. McCarthy, Pres.; Bert P. Woolridge, Sec., both of Wallace. **Inc.:** May 31, 1928. **Capital:** 1000 shares; par value $100; all shares issued. **Property:** Owns 179 acres of patented land; 80 acres held under a 99-year lease. **Development:** Approximate total development, 750 ft. **Plant:** Electrically driven drag-line hoist. **MILL:** Steam-driven puddling and molding equipment furnaces. **Mineral Sought:** Fire clay. **Men Employed:** Average, 22. **Remarks:** 225 ft. of development work during the year. "Clay is mined by glory hole method from surface into chutes in tunnel."

**MOSCOW QUEEN MINING CO.**

**Office:** Moscow. **Officers:** John Kusterin, Pres.; Abe Goff, Sec., both of Moscow. **Inc.:** June 23, 1936. **Capital:** 50,000 shares; par value $1; 32,000 shares issued. **Remarks:** Idle.

**TEN-SAID MINING & MILLING CO.**

**Officers:** Wm. Furze, Pres.-Mgr.; H. A. Finlay, Sec., both of Wardner. **Inc.:** Nov. 9, 1937. **Capital:** 1,000,000 shares; par value 1c; 1110 shares issued. **Property:** 8 unpatented claims, Poor Man Creek dist.; Potlatch. **Plant:** 8x8 Gardner-Rex compressor, dump cars, etc.; bunk house, compressor room and blacksmith shop. **Development:** By 3 tunnels: No. 1, 300 ft. long; No. 2, 110 ft. long; No. 3, 180 ft. long. **Ore:** Silver, lead and gold. **Men Employed:** Owners worked 135 days. **Remarks:** 60 ft. of development work during the year.

**TROY GOLD & COPPER MINING CO., LTD.**

**Office:** Troy. **Officers:** E. J. Gemmill, Pres.-Mgr., Moscow. **Inc.:** May 26, 1909. **Capital.** 1,000,000 shares; par value $1; 511,000 shares issued. **Property:** 20 acres patented farm land, unorganized dist.; Troy. **Ore:** Copper. **Remarks:** Idle.

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**LEMHI COUNTY**

County Seat: Salmon City. Area: 4597 sq. miles. Population: 4643. Principal Industries: Agriculture, stock raising and mining. Relief: This county contains the broad valleys of the Salmon, Lemhi and Pahsimeroi rivers but otherwise is high and mountainous. Transportation: The main valleys are served by a well maintained system of state highways and the back country can be reached over a system of Forest Service roads. Mineral Resources: Lead, copper, silver, gold, zinc, tungsten, manganese, molybdenum, nickel, cobalt, gypsum, tin and lignite.

History and Future

This county has had a very productive and profitable mining career in the past, both of base and precious metals. In common with most gold producing districts, with diversified resources, the trend was toward base metal until the present activity in gold mining.

During the last few years, a tremendous activity in the gold fields has taken place and the district is rapidly assuming importance in this respect. The people are alive to their opportunities and have formed the "Lemhi County Mining Ass'n" for the express purpose of presenting these opportunities to investors and operators.

This district has a prosperous future in prospect and is an ideal territory for the prospector, operator and investor.

Review of Year's Operations

Alaska Idaho Mining Company installed a Marion Dragline Shovel and Washing plant in the Mackinaw district near Leesburg. A crew of 14 men was employed.

Condor Gold Mining Company employed an average crew of 30 men and report 3,274 ft. of development work during the year. The property consists of 7 patented and 43 unpatented claims in the Yellow Jacket district near Forney and is known as the Yellow Jacket mine. Dudley A White is president and Rom Warburton, secretary, both of Salt Lake City, Utah. H. M. Hartman of Forney is manager and agent.

Gibbonville Premier Gold Mine, Ltd., Inc., report 261 ft. of development work during the year with a crew of four men. H. M. Vasey of Gibbonville is president.

Gold Canyon Mining Company, Inc. employed a crew of four men and report 48 ft. of development work completed during the year.

Gold Hill Mines, Inc., Arthur W. Hall, president-agent; J. C. Bangs, secretary, both of Pocatello, worked 3 patented and 46 unpatented claims in the Mineral Hill district at Shoup. The mill has a capacity of 80 tons. Jig and wifley table installed in mill during the year and 125 ft. of development work was performed with an average crew of 10 men.
Gold Producers, Inc., installed a new mill during the year and an average crew of 25 men was employed. L. L. McLean is president-manager and A. R. McLean, secretary, both of Shoup.

Goldstone Mine, W. L. Zeigler, Mgr. and statutory agent, Wallace, employed an average crew of 25 men on its property located in the Pratt Creek district located near Baker. 520 ft. of development work was completed during the year. It has been reported that during the year a fire destroyed the surface buildings and operations have been temporarily suspended.

Ima Mines Corporation, B. R. Tillery of Twin Falls, president, has completed its 700 ft. haulage tunnel which is now being put into operation. All haulage tracks are being equipped with 30-pound rails and electric haulage. Mine development work is being carried forward continuously and the company states that sufficient ore is now developed for 10 years at the present operating rate. About 120 tons of tungsten, silver, copper, and lead ore are produced and milled daily. The plant is a 150-ton flotation and gravity concentration mill. An additional Diesel engine and compressor will be installed in the near future. Plans also call for the complete change to screen classification; larger crushing capacity; 10 additional flotation cells; one additional Rowland Weatheril magnetic separator, equipped with a 24-inch belt and magnets of a 150,000 ampere rating; conditioners, reagent feeders; and other equipment necessary to bring the mill capacity to 250 tons of ore daily. All equipment has been ordered. W. P. Barton of May is general manager. Others on the operating staff at May include: Owen Hickey, general superintendent; C. Fullmer, assistant mine superintendent; Afton Crofts, mill superintendent; C. M. Dice, chief mine engineer and metallurgist; and Floyd Harper, chief clerk. An average crew of 50 men was employed in the early part of the year. The crew has since been increased to 72 men. 5,270 ft. of development work was completed during the year.

According to reports the General Electric Company is diamond drilling property in Lemhi County about 45 miles north of Mackay. The ground covers 24 tungsten claims in the Blue Wing district. The General Electric concern has been represented by Frank B. Shissler of Germany, Washington, mill superintendent of its Germania tungsten mine, and H. H. Barrows, Oakland Lamp Works, Oakland, California, general manager.

Clyde Thornton worked the Monolith property, located on Boulder Creek near Shoup, with a crew of five men. Mill equipment includes: 10-stamps, ball mill and flotation cells.

The Good Hope Mining Company performed development work on the Kitty Burton and Ulysses properties, located on Indian Creek, with a crew of five men, under the direct supervision of T. M. Seidell. R. L. McKever of Monesano, Washington, is president and W. J. Martin of Aberdeen, Washington, secretary.

A ball mill and other machinery from the Pope-Shenon property, near Salmon, was purchased and taken to the Allie Mine at Gilmore. The Allie Company is headed by A. A. Fagnant, 2416 Third Avenue, Seattle, Washington, who is also general-manager. R. M. Taylor, Box 97, Gilmore, is chief engineer and general superintendent. The mine is being operated under bond and lease from the Gilmore Mercantile Company.

The Uncle Sam Mining and Milling Company, Inc., has been organized to operate the Black bird mine about 36 miles southwest of Salmon. The mine, which has been idle for 35 years, was leased by James G. Sims, Box 686, Salmon, and his son, Howard Sims of Salmon, late in 1938. The purchase of a 50-ton pilot plant is being considered and seven miles of truck road have been built to connect with the Panther Creek road. The group includes 34 patented and 6 unpatented claims with values in gold, copper, nickel and cobalt. L. C. Walsh is president and Merle Stevenson, secretary-manager, both of Forney.

The Twin Peaks mine, consisting of five claims on Corral Creek about 18 miles south of Salmon, has been taken under lease and bond by N. N. Gray and son of Salmon, formerly of Dillon, Montana, from Charles Kapp of Salmon, locator and owner. Since January 1 of this year two men have been employed sinking on a lead-silver vein. A Sullivan compressor and other
equipment is being installed. Copper and gold values are also present in the property. An oiled highway runs within three miles of the mine and is said to be open the year round.

The Gibbonsville Mining and Exploration Company suspended operations during December, 1938 due to severe winter weather; mechanical difficulties were also encountered in one of the diesel power units. This company is said to be backed by a group of employees of the Bunker Hill and Sullivan Company. Philo Seelye is president of the company and in direct charge of operations.

Lemhi Union Company was operated under lease and bond by the Lemhi Lead Mines, Inc.

Owl Mining Company, Inc. report road work, trenching and prospecting during the year. Values are in gold, silver and molybdenum.

Placers Exploration Syndicate, Inc. report that the ground has been tested two seasons by compact drilling with a large 71 Keystone drill. The property is located in the Mackinaw district near Leesburg.

Silver Consolidated Mines, Inc. has a group of 28 claims in the Spring Mountain district about 10 miles from Gilmore. The property is stated to be fully equipped and is developed chiefly by a 2000 ft. tunnel which is to be extended. R. E. Maynard of Gilmore is in charge of operations.

Latest Out Mining and Smelting Company, Ltd., D. L. Nichols of Salmon, secretary-manager, was worked under bond and lease by Milo Zook. The company has been producing regularly for the past several years. The property consists of one patented claim in the Texas district at Gilmore and is opened by a tunnel and two inclined shafts. Values are in lead and silver.

N. W. Gray and son, Harold Gray all of Forney have leased the Bryan Lode Mine from Fred Brough, Salmon. A 50-ton ball mill, formerly used in the Twin Brothers mill of Gold Producers, Inc., was purchased from Lawrence L. McLean of Shoup for installation on the Bryan Lode. The mill is diesel powered. A crew of 10 men is employed.

South Gilmore Mining Company own nine unpatented claims in the Spring Mountain district near Gilmore and report 60 ft. of development work with a crew of three men.

Sun Valley Gold Silver and Copper Mines, Inc., report prospecting and development work only.

Assessment work was performed at the Tacoma Placers. F. C. Zirtzman, 1209 North Alder, Tacoma, Washington, is secretary.

Tendoy Copper Queen Syndicate, C. A. Dye, president-owner, worked a crew of 35 men on the Copper Queen, Gold Flint and Kimberly claims. The property is well equipped with modern camp, complete mining machinery and a 50-ton concentrator. The values have a peculiar occurrence of native gold in bornite with calcocite and chalcopyrite in quartzite shear zone. All country rock is quartzite and gneiss.

Golden Dawn Mining Company, Inc., moved its equipment from Wallace Creek to ground located on Sheep Creek. J. W. Abbott is in direct charge of operations.

Benson Evans and a brother of the late Joe M. Denton worked a crew at the Silver Gulch Mine. Some shipments of high-grade silver ore were mined during the year.

The Maryland, owned by A. C. Amonson and E. S. Edwards, has been developed to the extent of about 3000 ft. of tunnels, drifts and winzes and has opened rather extensive ore reserves from which a few carloads of high-grade silver-lead ore has been shipped. The presence of a large body of manganese ore in the Maryland and the Sellars Group makes them especially interesting. More than a half million tons of 22 to 36 percent manganese have been exposed by the development work on these claims.

ALASKA IDAHO MINING CO.
Men Employed: Average, 14. Remarks: Installing Dragline-Shovel (Marion) 1 yd. and washing plant with trommel 54" x 16'.

BUCKHORN GOLD CORPORATION

CONDOR GOLD MINING COMPANY

CONTINENTAL MINES, INC.

DELAWARE IDAHO GOLD MINING CO.

GIBBONSVILLE PREMIER GOLD MINE, LTD., INC.

GOLD FLOTATION DEVELOPMENT CO.

GOLD CANYON MINING CO., INC.

GOLD HILL MINES, INC.
LEMHI COUNTY

MINE: Sullivan compressor, blacksmith shop, change room, warehouse, bunkhouse and 4 homes. MILL: 80 ton capacity. Ore: Gold. Men Employed: Average, 10. Remarks: "Jig and Wilfley Table installed in mill during the year; 125 ft. of development work performed."

GOLD PRODUCERS, INC.

GOLDSTONE MINE (Partnership)

GOLDEN REWARD MINING CO.

IDAHO FALLS GOLD MINING COMPANY

IMA MINES CORPORATION

LANG MINES, INC.

LEESBURG BONANZA PLACER CO.

LEESBURG LODE & PLACER MINING CO.
Office: Leesburg. Officers: O. E. Kirkpatrick, Pres.-Mgr., Leesburg, Inc.: May 12, 1930. Capital: 600,000 shares; par value 10c; all shares issued. Property: Gold Dust group; 6 patented, 3 unpatented claims, Mackinaw

LEESBURG MINING COMPANY
Office: 702 N. Eye St., Tacoma, Wash. Officers: J. S. Heisey, Pres.; N. B. Cowan, Sec.; S. M. Collins, Treas., all of Tacoma, Wash. Inc.: In Washington, Aug. 4, 1936. Capital: 500,000 shares; par value 10c; 371,750 shares issued. Property: 2 patented, 12 unpatented claims, Mackinaw dist.; Leesburg. Development: Length of intermediate level 1000 ft. Remarks: "The Leesburg Mining Company has leased its properties on a royalty basis to the Alaska-Idaho Mining Company of Idaho who are now operating the placer property by shovel, dragline and washer and expect to put more equipment on the placer property next spring. Under the terms of the lease the Alaska-Idaho Mining Company has contracted to diamond drill the quartz property next year and, should the results of this drilling warrant development to begin active operations on or before May 20, 1941."

LEMHI LEAD MINES, INC.

LEMHI UNION COMPANY

MEADOW MINES, INC.

OWL MINING CO., INC.

PLACERS EXPLORATION SYNDICATE, INC.

POCATELLO-LEMHI MINING & EXPLORATION CO.
RESCUE GOLD MINES CO.  

SILVER CONSOLIDATED MINES INCORPORATED  
Office: Pocatello. Officers: Wood D. Parker, Pres.-Mgr., St. Anthony; Chas. S. Watson, Sec.; Pocatello. Inc.: Sept. 23, 1937. Capital: 1,000,000 shares; par value 10c; 745,000 shares issued. Property: 19 unpatented claims, Spring Mountain dist.; Gilmore. Development: By 3 tunnels, the principal one being 1950 ft. long. Ore: Lead, silver, copper and gold. Remarks: 125 ft. of development work during the year. “Silver Consolidated Mines Inc. has a lessee operating the property on a straight lease royalty payments. This lease is not exclusive and the company may at its option mine in accordance with the existing lease or add other lessees. 200,000 shares sold by giving stock for labor and stock sold for cash and traded for machinery. Amount would figure up to about $25,000 to $30,000 for 1937, 1938 and to June 20th, 1939.”

SOUTH GILMORE MINING CO.  
Office: Idaho Falls. Officers: Richard Martin, Pres.; Henry S. Martin, Sec., both of Idaho Falls. Inc.: Nov. 12, 1929. Capital: 300,000 shares; par value 10c; April 1, 1931, increased par value to $1 and capital stock to 1,000,000 shares. Property: 9 unpatented claims, Spring Mountain dist.; Gilmore. Development: By 3 tunnels, the principal one being 180 ft. Plant: MINE: 2 ton hoist, I-R compressor and haulage cars; barn, hoist and house. MILL: 100-ton flotation. Men Employed: Average, 3. Remarks: 60 ft. of development work during the year.

SUN VALLEY GOLD, SILVER AND COPPER MINES, INC.  

TACOMA PLACERS  

TENDOY COPPER QUEEN SYNDICATE  

TRI-STATE GOLD MINING CO.  

UNITED IDAHO MINING CO.  
Property: Pittsburgh-Idaho group; 5 patented claims, Texas dist.; Gilmore. Development: By 4 tunnels: No. 1, 600 ft. long; No. 2, 1000 ft. long; No. 3, 1600 ft. long; No. 4, 1300 ft. long, in which is an inclined shaft 1200 ft. long, which gives a vertical depth of 988 ft on the vein. Ore: Lead-silver. Remarks: Idle.

UNCLE SAM MINING & MILLING CO., INC.

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The copper deposits near Salmon, Idaho, by C. P. Ross: U. S. Geol. Survey Bull. 774, 1925.†


LEWIS COUNTY


SPOKANE DREDGING AND MINING COMPANY
Office: 423 W. First Ave., Spokane, Wash. Officers: Martin J. Bray, Pres.-Mgr.; Kenneth G. Luke, Sec., both of Spokane, Wash.; Martin J. Bray, Weisgerber Bldg., Lewiston. Inc.: April 23, 1936. Capital: 500,000 shares; par value 10c; 307,342 shares issued. Property: 120 acres on Salmon River, leased from State of Idaho. Plant: Ford Pick-up (new), Suction Pump, nozzle, electric motors, generator, etc.; Bunk house and cook house. Ore: Gold. Men Employed: Average, 3. Remarks: “The company has just completed construction of new dredge on the Salmon River 12 miles south of Cottonwood and has just completed installation of machinery and equipment thereon expecting to be in full operation by June 15th providing high water in river does not delay operations. Where the company rented suction nozzle the past year in trial operations on Snake River, they have now just had manufactured for the company new 4” nozzle costing better than $1800.00 built by Union Iron Works, Spokane, Wash., and believe everything is now in order to commence operations on newly leased ground where good values are expected.”

BIBLIOGRAPHY

See pages 6-7 for publisher’s address, meaning of reference marks and abbreviations.


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NEZ PERCE COUNTY

County Seat: Lewiston. Area: 851 sq. miles. Population: 17,591. Principal Industries: The county is primarily an agricultural community and Lewiston is the commercial and civic center for this section of the state. Transportation: Lewiston is at the junction of the Clearwater and Snake rivers and will eventually be an important shipping point by water to the Pacific Coast. Good highways and two railroads serve the county. Mineral Resources: Copper, silver, gold, marble and limestone. Very little attention has been given these resources. The marble and limestone deposits particularly should be developed.

ALDER CREEK MINING COMPANY

Office: 500 First Nat'l Bank Bldg., Duluth, Minn. Officers: Thomas Owens, Pres., Two Harbors, Minn.; Lyon H. Fowler, Sec., Duluth, Minn. Inc.: April 4, 1902. Capital: 200,000 shares; par value $1; 180,000 shares issued. Ore: Placer gold. Remarks: "Property has been inactive till the 9th day of May, 1939, when it was leased by the company, or rather part of it, to Mr. Robert S. Pike and Charles W. Helps, of Eveleth, Minn., The rest of the property remains inactive. The part of the property leased is situated in County of Clearwater, State of Idaho, to-wit: N½ of NW¼; SE¼ of NW¼; NW¼ of NE¼; N½ of SE¼; SE¼ of SE¼; and the SW¼ of NE¼, of Section 26, Township 38, North of Range 4, East of the Boise Meridian. The property has been leased to said parties for 15 years for the purpose of exploring for, mining, taking out and removing therefrom the gold deposits, etc."

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Mineralogy of some black sands from Idaho with a description of the methods used for their study, by E. V. Shannon: U. S. Nat. Mus. Proc., vol. 60, art. 3, pp. 1-33, 1921.*
ONEIDA COUNTY

The only known mineral resources of this county are: Bentonite; various clays of excellent quality; and the reported occurrence of copper-lead ores carrying gold and silver.

BLUE JAY MINING CO


OWYHEE COUNTY

County Seat: Murphy. Area: 7596 sq. miles. Population: 4103. Principal Industries: Agriculture, stock raising and mining. Transportation: The roads of Owyhee County are very poorly maintained on account of its vast area and small taxation. One railroad, the Murphy branch of the Union Pacific, serves the county. Mineral Resources: Silver, gold, copper, lead, zinc, antimony, diatomaceous earth, opals, manganese and nitrates.

History and Future

After the discovery of the rich silver veins of the Silver City district in 1863, the county was the chief producer in the state. The ores were some of the richest ever discovered and made the operators fabulous profits. The tremendous cost of the early day operations and poor milling methods caused a decline in the operations until the district became almost deserted. Greater geological knowledge, more efficient transportation and modern metallurgical methods will once again give this district the prominence it once had. It is extremely favorable as a field for operators and investors.

Review of Year's Operations

Addie Mining Company, Carl Spencer, president; N. Ned Williams, secretary-manager, both of Boise, with an average crew of seven men rehabilitated over 1000 ft. of tunnel and extended the drifts to explore the Ruth and Josephine veins. The company reports: "On June 1 leased 50-ton Potosi Mill at Silver City; also purchased a new 25-ton Gibson ball mill and additional equipment; purchased Ross Process Amalgamator, as well as a 240' Schramm compressor and number seven Cameron Sinker Pump, Ingersoll Rand Station Pump, complete blacksmith equipment, one Ford truck, one Tugger Hoist, one Ore Car; complete mining equipment, small tools; also purchased on contract, the Florence claim (unpatented) one claim located in the heart of Silver City; purchase price $10,000.00. The company expects to be in production and close the sale of capital stock by July 15, 1939."

Daly Mines, Inc. extended development work on the No. 2 tunnel.

Delamar Milling Corporation, with an average crew of 28 men, treated material from the dumps of the famous Delamar Mine in their 200-ton flotation mill. During the year production was increased from 100 to 200 tons daily. Values are in gold and silver. John H. Smith is president and M. D. Carter, secretary, both of Oregon City, Oregon. R. H. Lowe, Delamar, is manager.

The De Lamar Placers, owned by the Brendel Oil Company, operate a 2-yd. dragline and washing plant on Jordan Creek in the Carson district below De Lamar. The property consists of 22 claims held under lease and bond. Production is said to be 150 yards an hour with recoveries averaging about 25
cents a yard. Frank A. Kennedy, 710 North 19th Street, Boise, is manager and engineer in charge. 15 men are employed by this company on a three shift basis.

Goldflour Mining Company operated on ground held under lease near Grandview. Officers of the company include: L. A. Hoalst, president; R. M. Davidson, vice-president; Waldo Thurber, secretary-treasurer and Blain C. Hoalst, manager. The plant consists of one power shovel, dragline, two dump trucks and washing plant with a small shack for tools and cleanup. An average crew of six men is employed.

The Knowles Brothers moved some equipment onto Big Foot Bar west of Grandview during the year.

Fred J. Test and Harry Butler operated the Golden Sunday Mine.

Ida Bell Gold Mines, Inc., holds 12 unpatented claims on Reynold's Creek in the Carson district. The property has been operated by the Idaho Exploration, Inc. since January, 1936. This latter company holds a ten-year lease on the property.

Orogrande Gold, Inc., report 700 ft. of development work during the year with the addition of a power line, transformers, motors, tool grinder and miscellaneous tools and truck. A 50-ton mill was constructed and put into operation. A 1000-ft. tunnel on the 200 ft. level is being continued for development purposes. It is planned to re-open the 2,800 ft. tunnel on the 800 ft. level that was acquired by the company last year.

Ymir Consolidated Mines Company, K. L. Stoker, president-manager, and H. R. Statham, secretary, both of Pocatello, report 100 ft. of development work during the year with a crew of five men. The property consists of 2 patented and 2 unpatented claims in the Carson district, Silver City, and is held under lease and bond from R. H. Leonard, Murphy. Additions made during the year include: a road to the property and installation of power plant and mine buildings.

W. J. Stoddard of Silver City rehabilitated and made a rich strike on the Wells Fargo claim which is an extension of the Morning Star located at Silver City. It is stated that some of this ore assayed $1253.00 in gold and 823 ounces of silver to the ton.

Morrison-Knudsen Company did considerable surface work testing and trenching ground on Florida Mountain. Values were recovered by screening and washing.

John R. Rhodes of Melba operated the Rhodes Placers on the Snake River with a crew of 10 men. The ground is stripped from four to eleven feet in depth with an RD8 and Bulldozer. Pay dirt is loaded by an Austin Western Badger Shovel and hauled to a washing plant in Ford V-8 dump trucks. Recovery is by gravity and amalgamation. Water for washing purposes is pumped by Gardner-Denver Pump, powered by Hercules Diesel Engine. The property is leased from J. E. Gray and normally produces about 20 ounces of amalgam daily.

Annual labor was performed at properties in the vicinity of Oreana and Castle Creek.

Annual assessment work was performed throughout the county with activity noted on War Eagle and Florida mountains in the vicinity of DeLamar and at the old town of Flint.

C. M. Brooks operated the South Empire property on War Eagle Mountain and uncovered ore that is stated to go $270.00 a ton.

The Owyhee Processing Co., Inc., has been formed to exploit an important deposit of diatomaceous earth about 70 miles south of Grandview. It is reported that the deposit consists of eighteen 20-acre claims from 0 to 70 ft. deep and that the material will go $70.00 a ton for filter material and $23.00 a ton for insulation. Interested in the new company are: S. A. Mullenix, J. R. Cornell, Justo Echverria, Ralph Thomas and Guy Givens.

ADDIE MINING COMPANY

Office: Boise. Officers: Carl Spencer, Pres.; N. Ned Williams, Sec.-Mgr., both of Boise. Inc.: Collateral Trust Agreement filed March 17, 1939. Capital: 3,000,000 shares; par value 1c; 1,408,100 shares issued. Property: 6 patented claims, Carson dist.; Silver City, held under lease and bond
from W. A. Lewis, Silver City. Development: Approximate total development, 2000 ft. Plant: Some tools, blacksmith's shop, mill buildings, change room and transformer house. Ore: Gold and silver. Men Employed: Average, 7. Remarks: “On June 1st leased 50 ton Potosi Mill at Silver City; also purchased a new 25 ton Gibson Ball Mill and additional equipment; purchased Ross Process Amalgamator, as well as a 240’ Schramm Compressor and No. 7 Cameron Sinker Pump, Ingersoll Rand Station Pump, complete blacksmith's equipment, 1 Ford truck, 1 Tugger hoist, 1 ore car; complete mining equipment, small tools; also purchased on contract, the Florence Claim (unpatented) one claim located in the heart of Silver City; purchase price $10,000. The company expects to be in production and close the sale of capital stock by July 15, 1939.”

BANNER MINING & MILLING CO.

COSMOPOLITAN MINING CO., LTD.

Daly Mines, Inc.

Delamar Milling Corporation

De Lamar Placers

Empire Mines Co.

Golconda Group Mining Co.
MINING INDUSTRY OF IDAHO


**GOLDFLOUR MINING COMPANY**
Office: Boise. **Officers**: R. M. Davidson, Pres.; W. A. Thurber, Sec., both of Boise. **Inc.**: May 2, 1938. **Capital**: 400 shares; par value $50; 291 shares issued. **Property**: Placer ground held under lease—acreage not stated. **Plant**: 1 dragline, 1 shovel, 2 dump trucks and washing plant; small shack for tools and cleanup. **Ore**: Gold. **Men Employed**: Average, 6.

**IDA BELL GOLD MINES, INC.**
**Officers**: Frank Chamberlain, Pres.-Mgr., Meridian; Mrs. Alma Milks, Sec., Boise. **Inc.**: Oct. 6, 1930. **Capital**: 500,000 shares; par value $1; 45,449 shares issued. **Property**: 12 unpatented claims on Reynolds Creek, Carson dist.; Murphy. (Property is under 10-year lease to Idaho Exploration Inc.) **Development**: By 2 tunnels, the principal one being 600 ft. **Plant**: 50-ton gas-driven mill. **Ore**: Gold. **Remarks**: "Property operated by Idaho Exploration Inc. since Jan. 1936."

**IDAHO EXPLORATION INCORPORATED**

**WALTER J. LONG PLACERS, INC.**
**Officers**: Walter J. Long, Pres.; Frances Long, Sec., both of Boise. **Inc.**: Sept. 15, 1934. **Capital**: 250 shares; par value $100; 20 shares issued. **Property**: 2 unpatented claims, Carson dist.; De Lamar. **Remarks**: "Dragline being operated by Frank Brendel under supervision of Frank Kennedy."

**MOTHER LODE GOLD MINING & MILLING CO.**
Office: Nampa. **Officers**: B. A. Smith, Pres.; E. G. Chaffer, Sec., both of Nampa. **Inc.**: Aug. 30, 1932. **Capital**: 500,000 shares; par value $1; 317,808 shares issued. **Property**: Wannensten group; 11 unpatented and 2 patented claims, held under lease and option, Carson dist.; Silver City. **Development**: Approximate total development, 4500 ft. **Plant**: MINE: 2 compressors, Ingersoll Rand and Sullivan; complete mining equipment. **Ore**: Gold and silver. **Remarks**: Report not filed for 1939.

**OROGRANDE GOLD, INC.**
Office: Boise. **Officers**: J. A. May, Pres.; Corinne May, Sec., both of Boise. **Inc.**: Aug. 28, 1935. **Capital**: 100,000 shares; par value $1; 84,479 shares issued. **Property**: 13 unpatented claims, French dist.; Silver City. **Development**: Approximate total development, 7400 ft. **Ore**: Gold and silver. **Men Employed**: Average, 3. **Remarks**: 700 ft. of development work during the year. Additions made: Power line, transformers, motors, tool grinder, misc. tools and truck. 50-ton mill in process of construction.

**OWYHEE DEVELOPMENT COMPANY, INC.**
**Officers**: Frank W. Roberts, Pres., Caldwell. **Inc.**: Sept. 29, 1930. **Capital**: 500,000 shares; par value $1; amount issued, not stated. **Remarks**: "Inactive for the past several years. What leases held by the company have expired."

**SNAKE RIVER EXPLORATION COMPANY**
Office: Cleveland, Ohio. **Officers**: A. E. R. Schneider, Pres.; R. E. Ives, Sec., both of Cleveland, Ohio. **Inc.**: Feb. 5, 1937. **Capital**: 50,000 shares; par value $1; 27,728 shares issued. **Property**: Snake River mine; 200 acres near Grandview. **Development**: Pits dug averaging 300 ft. in width. **Plant**: Pumping equipment, ramp washing machine, cook house, bunk house. **Ore**: Gold. **Remarks**: Idle.
WAR EAGLE CONSOLIDATED MINING CO.

WESTERN MINING & EXPLORATION CORPORATION

YMIR CONSOLIDATED MINING COMPANY

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Geology and water resources of the Bruneau River basin, Owyhee County, Idaho, by A. M. Piper: Idaho Bureau of Mines and Geology Pamphlet 11, 1924.*


Geology and metalliferous resources of the region about Silver City, Idaho, by A. M. Piper and F. B. Laney: Idaho Bureau of Mines and Geology Bull. 11, 1926.*


PAYETTE COUNTY

The only known mineral resources of this county are diatomaceous earth, various clays of excellent quality, and natural gas, which has been developed at Payette.

IDAHO ALUMINUM CORPORATION, LTD.

BIBLIOGRAPHY
See pages 6-7 for publisher's address, meaning of reference marks and abbreviations.


POWER COUNTY

BANNOCK APEX MINES, INC.

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Possibilities of petroleum in Power and Oneida counties, Idaho, by A. M. Piper: Idaho Bureau of Mines and Geology Pamphlet 12, 1924.**
Surface Plant, Sunshine Mining Company, Kellogg, Idaho. This property is the largest silver producer in the United States.
SHOSHONE COUNTY

County Seat: Wallace.  Area: 2597 sq. miles.  Population: 19,060. Principal Industries: Mining and lumbering. Transportation: Coeur d'Alene branch of the Union Pacific, Northern Pacific Railway, and the Chicago, Milwaukee, St. Paul & Pacific Railroad serve the county. Yellowstone Trail, a paved highway, and a well maintained system of county roads reach into all mining districts. Rivers: St. Joe River, North and South Fork of the Coeur d'Alene River are principal streams. Relief: The county lies on the west side of the Continental Divide and is mountainous with deep valleys and few level spots. Mineral Resources: The famous Coeur d'Alene Mining District is in the central part of the county. This district is a famous producer of lead-silver-zinc and copper. Other ores found are gold, antimony and tungsten.

History and Future

Mining in Shoshone County started with the discovery of gold on Prichard Creek in 1879. Although the chief excitement at this time centered in the gold placers near Murray, which proved very profitable, the major activity was transferred to the lead-silver mines on the South Fork after their discovery in 1885.

The gold district has continued to produce in a small way even to this day, but has been far overshadowed by the base metal mines which have developed until they produce approximately one-fourth of the lead and one-eighth of the silver of the United States.

The district contains the first, third and fifth largest lead producing mines in the United States, viz.: The Bunker Hill & Sullivan, Morning and Hecla mines respectively. The largest silver producer in the United States is the Sunshine Mine, also located in this district.

The introduction of flotation, making possible the separation of the complex lead-zinc ores, opened up a vast new field of operations and today the district ranks as one of the important zinc producers of the country.

The continued development of new properties and the large ore reserves of some of the present operations assure a future comparable only to the past fifty years of large scale production, which in the five years prior to the depression averaged approximately 30 million dollars annually.

Review of Year's Operations

Following is a chronological summary of the most important and outstanding events that took place in the Coeur d’Alene mining district during the year 1939.  (Courtesy the Wallace Miner, Wallace, Idaho.)

January

Idaho leads the nation in silver production, showing output for 1939, according to the U. S. bureau of mines, of about 17,199,600 fine ounces, valued at $11,674,880.

John P. Gray, noted mining lawyer, who started practice in Wallace, died at his home in Coeur d’Alene.

Atlas company ships 700 tons of ore to Golconda mill, resulting in 52 tons of concentrate product which netted $2194.32.

Thirty mining students of the South African Witwatersrand district visit the Coeur d’Alene district mines.

Zinc production reported down 21 per cent below normal.

February

Sunshine Mining company enters into contract with Silver Syndicate to develop Silver Syndicate with long crosscut tunnel from 1900 level of the Sunshine mine.

Silver Summit starts sinking shaft to 1000-foot level.

New shaft on Lincoln vein at Silver Dollar reaches depth of 700 feet.

Senator Key Pittman starts movement in congress to benefit silver and is appointed chairman of committee to investigate government's silver policy.
Congress modifies undistributed profits and capital gains and losses taxes in the revenue act of 1938.

Hecla company orders dividend of $100,000 payable March 15.

Sherman company holds annual meeting and reports net loss of $18,846.40 for the time the mine was in operation in 1938.

Clayton Lead-Silver Mines, with headquarters in Wallace and mine at Clayton, Idaho, reports net profits of $24,368 for year 1938.

Bill introduced in state legislature by Cyr and Wood of Kootenai county proposing to increase state mine tax from 3 to 5 per cent was killed on motion of Harry P. Pearson of Shoshone county, and the 7-hour mine labor bill introduced by Senator Phil Ryan of Shoshone county, proposing to reduce working hours from 8 to 7 was defeated by a vote of 32 to 10.

Coeur d'Alene Mines corporation started sinking 400 feet of new shaft from the 2000 to the 2400-foot level and started a raise on ore from the 2000 level.

Clearwater Concentrating company starts building custom mill at Elk City for treatment of gold ores from small mines and prospects.

Sunshine company reports rich silver vein passed from St. Regis to Revett formation between the 2700 and 2900 mine levels. Crosscut on the 3100 level revealed two silver veins about 50 feet apart. The north vein averaged 23 ounces silver over a width of 5.5 feet.

President R. M. Hardy of Sunshine announces that company has adopted an expansion policy in a search for new ore bodies and new mines.

March

Silver Dollar strikes vein of silver ore eight feet wide in shaft at a depth of 775 feet.

Sunshine company declares quarterly dividend of 40 cents a share, amounting to $595,528 and payable on March 30.

Tamarack & Custer Mining company reports net loss of $76,370 for year 1938.

Elmer Andrews, first administrator of wage-hour law, prepares to set up regional offices and enforce compliance with the measure.

Improvement in lead market with strong demand at $4.75 per hundred pounds.

At annual meeting Golconda company reported income of $11,179.32.

Dayrock company announces net profit of $5486.94 for year 1938 after deducting $8642.70 for depreciation and depletion.

Liberal King company on Pine creek reports opening important ore body on 200-foot level.

Federal company enlarges Page mill from 300 to 500 tons daily capacity.

Donald A. Callahan of Wallace appointed state comptroller.

Metaline Mining & Milling company closes mine and mill because of reciprocal trade treaty tariff cut in zinc.

Jack Waite company reports operating profit of $22,677.05. Mill closed temporarily because of snowslide dangers.

Federal company reports ore reserves in Morning mine sufficient for three years operations at capacity.

Sunshine company files annual statement showing net profit of $4,881,058.96 for year 1938.

Governor Bottolfsen appointed R. D. Leisk, manager of Sunshine, and Donald A. Callahan, president of Callahan Cons., to represent Idaho at governors' silver conference at Reno, Nev.

Bunker Hill & Sullivan pays 25c a share dividend.

April

Hecla company issues 1938 report showing profits of $718,715.

Polaris company reports ore mined and sold amounted to $973,986.

Government announces 20 per cent reduction in tariff on zinc under reciprocal trade agreement with Canada and other countries.

Coeur d'Alene Mines ships nine cars of silver ore to Hercules mill, netting $500 a car.

Lead prices dropped 10c and copper 1/2c on New York market.
Sunshine Cons. reports driving 2250 feet of drift from 1700-foot Sunshine mine level.

Atlas mine at Mullan opens new ore body in chlorite zone south of Osburn fault.

Merger Mines completes arrangements with Coeur d'Alene Mines to drive drift into Merger ground from 2000-foot shaft level.

Bunker Hill & Sullivan reports net profits for 1938 at $562,645, equal to 39 cents a share as compared with $1.94 a share in 1937.

Lucky Friday Mining company organized to sink shaft on rich silver vein in Mullan district.

May

Bunker Hill & Sullivan reports finding new ore body which has developed continuous ore for 850 feet in length. Report 10 years ore supply in sight.

Net profits of Coeur d'Alene mining district for year 1938 amounts to $7,024,223, according to statements filed with the county assessor.

Liberal King on Pine creek opens ore body on 600-foot level, according to reports.

Polaris company cuts deep ore zone on 2300-foot level.

Hecla company paid second dividend for year by distributing $100,000 among stockholders.

United States bureau of mines reports big slump in lead production due to unfavorable prices.

June

Government announces prospectors and mining companies must perform annual assessment work on mining claims.

Idaho bureau of mines and geology issues report on silver belt.

Old Mother Lode gold property in Murray sold at sheriff's sale.

Metropolitan company on Big Creek reports 526 feet of shaft work and 300 feet of drifting completed.

Lead market moved up 10c to $4.85 per 100 pounds.

July

Congress sets new price of 71.11 cents an ounce for silver as against the former price of 64.64c fixed by the president.

Sunshine mine closed for several days during July, awaiting decision on silver question, and resumed operations under the new silver price by advancing wages 25c per shift.

Silver production of Shoshone county, Coeur d'Alene mining district for 1938, according to United States bureau of mines mineral yearbook, was 17,325,379 ounces as compared with 18,457,726 for year 1937.

Mullan celebrated a three-day picnic and Kellogg a three-day Miners and Smeltermen's picnic.

First car of tungsten ore shipped from Ima mine at Mackay, Idaho, netted $60,000.

Atlas company purchased millsite east of Hunter mill at Mullan.

Sunshine announces net profit of $1,391,888 for first six months of 1939, equal to 93 cents a share.

Silver Summit company announces starting work on 1000 feet of new shaft, starting from the 700-foot level.

Federal Mining & Smelting company purchased new mineral ground near Grouse gulch compressor plant.

Lucky Friday company lets contract for 200 feet of shaft work.

Washington Water Power company builds $50,000 high tension electric power line into Murray district.

August

Bunker Hill & Sullivan pays second dividend for year, amounting to $327,000.

Sherman Lead company at Burke reopens mine and starts shipping the crude carbonate ore.
Sam Orino gets contract to build $200,000 highway improvement east of Mullan. Wallace gives same contractor job of improving east entrance of highway into Wallace.

Silver Dollar company leases Galena mill from Callahan company and immediately starts milling ore at 50 tons per day.

Jack Waite mine opens new high grade lead-silver ore body on 2000-foot level.

Sunshine announces a dividend of 40 cents a share, amounting to $595,428.40.

Federal company reports net earnings for first six months at $326,373.15.

Coeur d'Alene Mines increases ore shipments to Hercules mill to 60 tons per day.

Sunshine Exploration, Ltd., organized by Sunshine company for prospecting purposes.

Blackfoot business men organize a company to open up and continue the deep Cossack tunnel at Mackay, Idaho.

First mill run made by Silver Dollar company was on August 19, the concentrate product showing 556 ounces silver per ton.

Sherman Lead ships first two cars of carbonate ore to East Helena smelter.

Libertal King finds shoot of copper ore on 600 level.

Forest fires rage over northern Idaho.

Hecla announces loss of $15,185.54 for second quarter.

September

Polaris opens ore body on 2300 shaft level.

Mining boom hits district when nobody was looking during the Labor day holidays. Stocks jumped to highest prices since close of World war. Lead advanced 20c to $5.25 and zinc jumped 50c to $5.50.

Clayton Mines company reports net profit of $16,027.73 for first six months.

Star zinc-lead mine, owned jointly and equally by Bunker Hill and Hecla companies, resumed operations, employing 300 men and producing 750 tons daily.

Coeur d'Alene Mines opens vein of high grade silver-copper ore on the 2400-foot level.

First shipment of Silver Dollar concentrates to smelter netted $200 a ton.

Engineering company organized to sink 1000 feet in Silver Summit shaft.

October

Geological survey makes new survey of east end of silver belt, extending territory to Montana line.

Mountain Lion gold mine at Murray sold to Oregon purchasers.

Hercules company buys Ambergris mining property at Burke.

Aladdin company builds truck road to mine.

Sunshine transfers all employment service to state employment offices in Wallace and Kellogg.

Tamarack company announces construction of a new mill costing $75,000, located in the Burke canyon at the portal of Tamarack No. 7 tunnel.

Sunshine made a net profit of $2,276,996, equal to $1.52 a share, for the nine months ended September 30.

Star mine and mill reported working at capacity production.

Sunshine announces company will sink Jewell shaft 500 feet deeper, from the 3163 to the 3700 level.

November

Bunker Hill paid third quarterly dividend for year, amounting to $327,000.

Hecla company options Heleene gold mine at Norris, Mont.

Sunshine surrenders bond on Rio Grande copper property at Mountain City, Nev.

Bunker Hill announces building new smelter unit to treat silver-copper ores of silver belt at cost of half million dollars.

Radio station KWAL established in Wallace.

General Electric company enters mining field in Idaho by taking over tungsten mining property in Lemhi county.
Sunshine made its fourth dividend payment for the year by disbursing $595,527, or 40c a share. Total dividends paid by Sunshine this year amount to $2,382,114 and total dividends to date $17,984,960.

Federal Mining & Smelting company reports net income of $259,708.75 for the third quarter.

Silver Dollar finds ore shoot of high grade silver-copper ore eight feet wide on the 2100 level.

Federal company changes its stock issue from 50,000 shares of $10 par to 246,640 shares of $2 par.

Copper metal output of the Coeur d'Alene district for year 1939 is estimated at 4,816,400 pounds.

Hecla pays dividend of $150,000, or at the rate of 15c a share. Dividends paid this year total $350,000 and total to date is $23,105,000.

Federal starts sinking prospect shaft on property recently acquired at the mouth of Grouse gulch.

December

Sharp drop in zinc prices from $6.50 to $6 due to reciprocal trade treaty agreements with Canada and other foreign countries. Foreign zinc floods American market.

Southern Idaho company organized to develop Idaho phosphate deposits.
Federal company declares dividend of $1.50 a share on new common stock issue amounting to $369,960. Total Federal dividends to date $28,558,349.

Owners of the Minnie Moore at Bellevue, Idaho, report they have found lost segment of Minnie Moore vein.

Coeur d'Alene mining companies have during year paid shareholders $6,991,074.

Hecla starts sinking shaft at the Heleene gold property at Norris, Mont.

Federal company buys Fannie Gremm mining claim at Mullan for $50,000 on option extending over three-year period.

R. S. Handy, superintendent Bunker mills, announces building of truck-size milling plant for small mines and prospects.

Silver Cable mine east of Mullan is leased by new company incorporated under Idaho laws.

Local men start new detachable drill bit sharpening plant at Osburn.

Mackay paper reports opening of important copper ore deposits in the Cossack tunnel at Mackay, Idaho.

Hecla company issues quarterly report showing net profits for last quarter of 1939 amounting to $140,581.76.

Oscar Hershey, noted geologist and one of Bunker Hill staff, dies in Wilmington, Dela.

Polaris company starts crosscut drift for Chester vein from 2300 Polaris level and cut important showing of ore two feet wide at about 370 feet from starting point.

St. Elmo silver property resumes development work in lower tunnel.

State supreme court ends litigation between A. C. Frost and Coeur d'Alene Mines by deciding cases in favor of mining company.

Coeur d'Alene Hardware & Foundry company receives largest shipment of drill bits ever sent into district, 56,500 bits, weight 50,000 pounds.

Sunshine company starts suit in U. S. court asking for relief under fair labor standards act and a court decision relative to the company's standing as a concern doing interstate business.

Contractor halts work for winter on U. S. No. 10 highway east of Mullan.

Work also suspended for winter on east entrance highway in Wallace.

Coeur d'Alene Mines issues annual report showing net smelter returns of $106,738.83 from ore shipments for the year.

Silver Dollar company finds bonanza ore shoot on 1900 mine level. High grade ore assays 1402.7 ounces silver, 12 per cent copper and $3.50 gold, total value, $1029.75 a ton.

AETNA MINING & MILLING CO., LTD.

Office: Wallace. Remarks: "This company was dissolved on Aug. 31, 1938 and all assets transferred to the Hercules Mining Company, whose address is Day Building, Wallace, Idaho. This is the final report."
ALICE MINING CO.

ALPENA COPPER MINING CO., LTD.

AMAZON MANHATTAN MINING CO.

AMBERGRIS CONSOLIDATED MINING CO.

AMERICAN LEAD MINES, LTD.

AMERICAN MINING CO., LTD.

AMERICAN SILVER MINING COMPANY
Office: 312 Symons Bkl., Spokane, Wash. Officers: E. W. Conrad, Pres.-Mgr.; Ethel Batzle, Sec., both of Spokane, Wash. Inc.: Sept. 22, 1924, as Fort Wayne Mining Co.; name changed July 8, 1930, to Idaho Montana Mining & Oil Co.; name changed Jan. 27, 1936. Capital: 1,500,000 shares; par value 3 1/3 cents; July 8, 1930, increased to 2,000,000 shares; par value 50c; Jan. 27, 1936, reduced from $1,000,000 to $200,000 by reducing par value from 50c to 10c; Aug. 19, 1938, increased capital stock to $225,000 divided into 2,250,000 shares; par value 10c; Amendment filed Jan. 7, 1938, making capital stock nonassessable. Aug. 31, 1938, increased capital stock to 2,750,000 shares; shares issued, 1,688,765. Property: 13 1/2 unpatented claims, Evolution dist.; Osburn. Development: Principally by 1 tunnel which is 2950 ft. long. Plant: 100 h. p. electric compressor, rails, pipe, etc.; cookhouse, garage, powder house, bunk house and blacksmith shop. Ore: Silver and lead. Men Employed: Average, 3. Remarks: 135 ft. of development work during the year.

AMERICAN SMELTING AND REFINING CO.
500,000 shares 7% preferred; par value $100; 200,000 shares 6% second preferred; par value $100; 4,000,000 shares common; no par value; all 7% preferred issued; 2,191,669 shares common issued. **Property:** Property of Jack Waite Mining Co., 35 patented claims and 120 unpatented claims, Eagle dist.; Duthie, held under operating agreement. **Development:** Approximate total development, 30,099 ft. **Plant:** MINE: 2 Cda. hoists, one 35 h. p. and one 75 h. p.; all necessary mine buildings and equipment for a 300-ton per day operation. MILL: 500-ton, fine grinding, flotation concentrator. **Ore:** Lead, zinc and silver. **Men Employed:** Average, 66. **Remarks:** 1114 ft. of development work during the year.

**ANA CONDA COPPER MINING CO.**
Office: Anaconda, Mont. **Officers:** C. F. Kelley, Pres.; D. B. Hennessy, Sec., both of New York City. **Inc.:** Filed in Idaho, April 10, 1916. **Capital:** 12,000,000 shares, par value $50; 8,919,086 shares issued. **Property:** Sunset group; 6 patented claims, Beaver and Summit dists.; Wallace. **Development:** Principally by 1 tunnel 3785 ft. long and a vertical shaft 800 ft. deep with 4 intermediate levels; total development, approximately 10,672 ft. **Ore:** Lead-silver-zinc. **Remarks:** Idle.

**ASSOCIATED MINES CORPORATION, LTD.**
**Inc.:** Nov. 7, 1930. **Capital:** 3,000,000 shares; par value 10c. **Remarks:** "This company is not doing business in Idaho. Has been out of business for three years. Is now in receivership." This information furnished by Scott Calhoun, formerly vice-president.

**ATLANTIC MINING CO.**
Office: Wallace. **Officers:** Otto A. Olsson, Sec.-Mgr., Wallace. **Inc.:** June 11, 1897. **Capital:** 1,000,000 shares; par value $1; 725,300 shares issued. **Property:** Atlantic group; 7 unpatented claims, Beaver dist.; Prichard. **Development:** Principally by 1 tunnel 340 ft. long. **Ore:** Lead-silver. **Remarks:** Idle.

**ATLASS MINING CO.**
Office: Mullan. **Officers:** W. Earl Greenough, Pres.-Mgr.; Roger W. Greenough, Sec., both of Mullan. **Inc.:** March 4, 1924. **Capital:** 2,000,000 shares; par value $1; 1,474,850 shares issued. **Property:** Atlas group; 19 patented, 28 unpatented claims, Hunter dist.; Mullan. **Development:** Tunnels, drifts, crosscuts, 23,115 ft.; raises and winzes 934 ft. **Plant:** MINE: Electrically driven compressor and complete mining equipment. MILL: A 300-ton capacity ore bin located on the Atlas dump is connected with a 500-ton bin along side of the Hunter Mill by a 2000 ft. aerial tramway spanning the Coeur d'Alene River valley. The Hunter Mill, located on the NP railway has a daily capacity of about 350 tons. This mill may treat a limited tonnage from the Atlas property. **Remarks:** Considerable development work during the year.

**ATLAS X CO.**
Office: Mullan. **Officers:** James A. Wayne, Pres., Wallace; Roger W. Greenough, Sec., Mullan. **Inc.:** Nov. 24, 1906 as Carney Copper Co., Ltd.; name changed Jan. 7, 1928. **Capital:** 1,500,000 shares; par value $1; all shares issued. **Property:** 9 patented claims, Cda. dist.; Mullan. **Development:** By 3 tunnels: No. 1, 500 ft. long; No. 2, 1600 ft. long; No. 3, 1050 ft. long.

**AURORA MINING COMPANY, THE**
Office: 26 Leonard Bldg., Spokane, Wash. **Officers:** Henry N. Clerf, Pres., Ellensburg, Wash.; A. M. Laing, Sec., 26 Leonard Bldg., Spokane, Wash.; W. K. Stacy, Statutory Agent, Coeur d'Alene. **Inc.:** Sept. 14, 1933. **Capital:** 2,000,000 shares; par value 1c; Oct. 10, 1939, increased capital stock to 3,000,000 shares; 1,894,767 shares issued. **Property:** 40 unpatented claims and 89.92 acres adjoining, purchased by the company, Beaver Creek dist.; Wallace. **Development:** By 3 tunnels, the principal one being 1578 ft. long. **Plant:** 10x12 compressor; complete mining equipment and camp. **Ore:** Silver, lead and gold. **Remarks:** 400 ft. of development work during the year.
BELL MINING CO.

BELL OF THE WEST MINING CO.

BENTON MINING CO., LTD.

BETTY LOU MINING COMPANY

BIG CREEK APEX MINING CO.

BIG CREEK MINING CO., LTD.

BIG DIVIDE MINING CO., LTD.

BIG ELK MINING CO., LTD.

BISMARCK MINING CO.
Principally by 1 tunnel 1400 ft. long. **Plant**: Gas-driven compressor. **Ore**: Lead-silver. **Remarks**: “Some diamond drilling was done by a syndicate headed by Joseph McCarthy, Paulsen Building, Spokane, Wash.”

**BLACK BEAR MINES CO.**

Office: Wallace. **Officers**: Walter H. Hanson, Pres.; A. G. Kennedy, Sec., both of Wallace. **Inc.**: Feb. 24, 1917. **Capital**: 2,000,000 shares; par value 20c; 1,388,051 shares issued. **Property**: Black Bear group; 5 patented, 2 unpatented claims, Lelande dist.; Wallace. **Development**: Principally by 1 tunnel 2250 ft. long. **Plant**: 750 cu. ft. electrically driven compressor; complete mining equipment. **Ore**: Lead-zinc-silver. **Men Employed**: Watchman. **Remarks**: Idle.

**BLACK HAWK MINING & DEVELOPING CO., LTD.**

Office: Wallace. **Officers**: H. G. Washburn, Pres.-Mgr.; A. W. Hoover, Sec., both of Wallace. **Inc.**: Aug. 19, 1901. **Capital**: 1,500,000 shares; par value 10c; 1,332,352 shares issued. **Property**: Black Hawk group; 13 patented claims, Yreka dist.; Kellogg. **Development**: By 2 tunnels: Black Hawk, 2920 ft. long; Page, 2600 ft. long. **Ore**: Silver-lead-zinc. **Remarks**: 451 ft. of development work during the year. “Property leased to Federal Mining and Smelting Company and is developed and operated along with its Page Mine.”

**BLAINE & EMMETT MINING CO., LTD.**

Office: Kellogg. **Officers**: Merrill Heblethwaite, Pres.-Mgr., Murray; R. D. Skeman, Sec., Kellogg. **Inc.**: Dec. 20, 1909. **Capital**: 1,000,000 shares; par value $1; 469,079 shares issued. **Property**: Blaine & Emmett group; 5 unpatented claims, Eagle dist.; Prichard. **Development**: By 2 tunnels: No. 1, 700 ft. long; No. 2, 300 ft. long. **Ore**: Lead-zinc-silver. **Men Employed**: Average, 3. **Remarks**: Idle.

**BLUE EAGLE MINING COMPANY**

Office: Kellogg. **Officers**: W. L. Tuson, Sec.; W. J. Owens, Mgr., both of Kellogg. **Inc.**: Apr. 18, 1925. **Capital**: 1,500,000 shares; par value 1c; Dec. 8, 1928, increased to 3,000,000 shares; par value 10c; 1,045,657 shares issued. **Property**: Blue Eagle group; 15 unpatented claims, Yreka dist.; Kellogg. **Development**: Approximate total development, 1450 ft. **Plant**: Electrically driven 8x9 I-R compressor; complete mining equipment. **Ore**: Lead-zinc-silver. **Men Employed**: Average, 2. **Remarks**: 30 ft. of development work during the year.

**BLUE WING MINING CO., LTD.**

Office: Wallace. **Officers**: Irene Zanetti Haff, Pres.; James Zanetti, Sec., both of Wallace. **Inc.**: July 8, 1901. **Capital**: 1,000,000 shares; par value 10c; all shares issued. **Property**: Blue Wing group; 8 unpatented claims, Placer Center dist.; Wallace. **Development**: Approximate total development, 3000 ft. **Ore**: Lead, silver. **Men Employed**: Average, 3. **Plant**: Electrically driven compressor; complete mining equipment. **Remarks**: 100 ft. of development work during the year.

**BOBBY ANDERSON GROUP MINING CO.** (name changed to SIGNAL MINING COMPANY)

**BRANDON GOLD FIELDS INC.**


**BULLFROG SILVER LEAD MINING CO.**

Office: Box 241, Spokane, Wash. **Officers**: L. J. Oatman, Pres., Box 1137, Burke; Geo. F. Gaub, Sec., Box 241, Spokane, Wash. **Inc.**: May 17, 1930. **Capital**: 500,000 shares; par value 20c; 262,610 shares issued. **Property**: 
5 patented claims, Lelande dist.; Burke. Development: By 3 tunnels: No. 1, 97 ft. long; No. 2, 485 ft. long; No. 3, 80 ft. long. Remarks: Contemplate development program.

BULLION MINING CO., LTD.

BUNKER CHANCE MINING CO.

BUNKER HILL & SULLIVAN MINING & CONCENTRATING CO.
Office: Kellogg. Officers:Stanly A. Easton, Pres.-Mgr., Kellogg; J. W. Crosby, Sec., 1022 Crocker Bldg., San Francisco, Calif. Inc.: Originally incorporated in Oregon and filed in Idaho, Aug. 20, 1903; changed to a Delaware corporation and filed in Idaho, Apr. 16, 1924. Capital: 327,000 shares common; par value $10; May 4, 1937, reclassified common stock by decreasing par value to $2.50, and increasing number of shares to 1,308,000; 20,000 shares preferred; par value $100; 6,797 shares preferred, and all common shares issued. Property: Bunker Hill; 405 patented, 41 unpatented claims, Yreka dist.; Kellogg. Development: The principal adit is the Kellogg tunnel, which is 30,000 ft. long, in which are the two principal inclined shafts, one of which is known as the White Raise, and the other the main shaft, which is approximately 3133 ft. long, giving a vertical depth of 2400 ft. below the Kellogg tunnel level, and a 560 ft. winze-shaft on the 1900 ft. level, which open the ore bodies an additional depth of 400 ft. In the main shaft are 13 intermediate levels. Total development, approximately 68 miles. Plant: MINE: 2 electrically driven hoists; 2 electrically driven I-R compressors; 1 steam-driven Nordberg compressor. Trolley locomotive haulage in Kellogg tunnel; storage-battery locomotive haulage in intermediate levels. Complete and modern machine shop, blacksmith shop, and change house. MILL: 4 complete and modern concentrators, including flotation: Sweeny mill, capacity 300 tons, accommodates custom ores, particularly those from Pine Creek; West mill, capacity 1200 tons, treats output from the Bunker Hill mine; South mill, capacity 600 tons, treats output from Star Mine of Sullivan Mining Co.; Crescent mill on Big Creek, capacity 100 tons, treats output from Crescent and Alhambra mines. Ore: Lead-silver. Men Employed: In mines, mills and smelter, 799. Remarks: 6441 ft. of development work during the year.

BUNKER HILL SMELTER
Officers: A. F. Beasley, Supt., Kellogg.

BUTTE & COEUR D'ALENE DEVELOPMENT CO.

BUTTE & COEUR D'ALENE SILVER LEAD MINES, INC.

CALABRIA MINING CO.

CALEDONIA MINING CO.

CALLAHAN CONSOLIDATED MINES, INC.

CALLAHAN ZINC-LEAD CO.
Office: Wallace. Officers: Henry B. Van Sinderen, Pres., New York; Joseph T. Hall, Sec., Frank Eichelberger, Mgr., both of Wallace. Inc.: July 18, 1912, as Consolidated Interstate Mining Co.; name changed Mar. 25, 1921. Capital: 1,000,000 shares; par value $10; Oct. 2, 1935, reduced capital stock to 2,000,000 shares; par value $1; 1,802,409 shares issued. Men Employed: Average, 18. Remarks: "The Callahan Co. operated Interstate mine on company account from Jan. 1st to Feb. 8th 1938; Mine turned over to leasers who operated from Feb. 10th to June 3rd; closed and re-opened November 10th to December 9th then closed. Mine workings maintained by the company all year and being maintained at the present time by the company in addition to doing our regular assessment work on the unpatented claims."

CALLAHAN MINE
Property: Interstate-Callahan group; 81 patented, 2 unpatented claims, Beaver dist.; Interstate. Development: Principal development is main transportation tunnel, which is 5500 ft. long, and a three-compartment vertical shaft 2000 ft. deep; total development, approximately 10 miles. Plant: MINE: Two single-drum air-driven hoists and one 250 h. p. electrically driven double-drum hoist; three large I-R electrically driven compressors; trolley locomotive haulage in main tunnel; complete and modern blacksmith shop, machine shop, sawmill, mine equipment, camp and company buildings. Ore: Zinc-lead-silver. Remarks: "Last year we did the following work: 436 ft. of drifting, crosscutting and raising; 695 ft. of diamond drilling."

GALENA MINE
Property: Chicago-Boston, Killbuck, Vulcan, Argentine, Wallace and Silver Range groups; 31 patented, 67 unpatented claims, Lake Gulch, Placer Center dist.; Wallace. Development: By 33 tunnels, a 600 ft. vertical shaft, and an 800 ft. vertical winze in the 600 ft. level; total development, approximately 34,000 ft. Plant: MINE: One 150 h. p. Liderwood, one 200 h. p. Coeur d'Alene Hdw. electrically driven hoist; 3 I-R electrically driven com-
pressors, total capacity 1500 cu. ft.; complete equipment and mine camp. Mill: 150-ton flotation. Ore: Lead-silver. Remarks: "Last year we did the following work: 278.5 ft. of crosscutting; 947.0 ft. of diamond drilling; rebuilt 1 mile of new road washed out by the flood in the spring of 1938."

CARBONATE MINING & MILLING CO.

CENTRAL MINING CO.

CHESTER MINING CO., LTD.

CINCINNATI MINING CO.

CLEAR GRIT MINING CO., LTD.

THE CLEARWATER GOLD & COPPER MINING CO., LTD.

COEUR D'ALENE CHAMPION MINING CO.

COEUR D'ALENE CRESCENT MINING CO.

COEUR D'ALENE EXTENSION MINES, INC.
Office: Wallace. Officers: George J. Couper, Pres.; F. E. Scott, Sec., both of Wallace. Inc.: April 23, 1937. Capital: 3,000,000 shares; par value 1c;
260 MINING INDUSTRY OF IDAHO


COEUR D'ALENE LEAD CO.
Office: Mullan. Officers: James A. Wayne, Pres., Wallace; Roger W. Greenough, Sec.-Mgr., Mullan. Inc.: April 28, 1927. Capital: 4,000,000 shares; par value $1; 2,254,297 shares issued. Property: Coeur d'Alene Lead is a holding company; owns 500,000 shares of the capital stock of Atlas Mining Co.

COEUR D'ALENE METALS CO.

COEUR D'ALENE MINES CORPORATION

COEUR D'ALENE MINING CO.

COEUR D'ALENE SYNDICATE MINING CO.

CONSOLIDATED GOLD MINES, INC.

CONSOLIDATED INDEPENDENT CALUMET MINING CO.
Office: Wallace. Officers: John H. Nordquist, Pres.-Mgr.; A. G. Kennedy, Sec., both of Wallace. Inc.: Oct. 9, 1906, as Lucky Calumet Copper Mining
SHOSHONE COUNTY 261

Co., Ltd.; name changed Nov. 24, 1928. **Capital:** 1,500,000 shares; par value $1; 1,136,196 shares issued. **Property:** Lucky Calumet group; 13 patented, 2 unpatented claims, Hunter dist.; Mullan. **Development:** Principally by 2 tunnels; No. 1, 1,380 ft. long, No. 2, 1,800 ft. long. **Ore:** Lead-silver. **Remarks:** Idle.

**COPPER CHIEF MINING COMPANY**

**Office:** Wallace. **Officers:** D. E. Wickward, Pres.; James H. Taylor, Sec., both of Wallace. **Inc.:** Sept. 25, 1907. **Capital:** 1,000,000 shares; par value $1; 392,248 shares issued. **Property:** 7 patented claims, Cda. dist.; Wallace. **Remarks:** Idle.

**COPPER KING MINING & SMELTING CO., THE**

**Office:** Wallace. **Officers:** W. B. Heitfeld, Pres. (resigned), Spokane, Wash.; S. F. Heitfeld, Sec., Wallace. **Inc.:** Aug. 13, 1901. **Capital:** 125,100 shares; par value $1; 125,100 shares issued. **Property:** Copper King group; 18 patented claims, Lelande and Hunter dists.; Mullan. **Development:** Principally by 3 tunnels; No. 1, 200 ft. long; No. 2, 2000 ft. long; No. 3, 10,325 ft. long; total development, approximately 10,000 ft. **Plant:** Electrically driven compressor; complete mining equipment and camp. **Ore:** Lead-silver. **Remarks:** Idle.

**CRYSTAL LEAD MINES CO.**

**Office:** Wallace. **Officers:** Jerome J. Day, Pres.; S. F. Heitfeld, Sec.; Henry Lawrence Day, Mgr., all of Wallace. **Inc.:** Jan. 13, 1931. **Capital:** 1,500,000 shares; par value 10c; 1,498,996 shares issued. **Property:** 9 patented claims, Eagle dist.; Prichard. **Development:** By 3 tunnels; No. 1, 250 ft. long; No. 2, 1010 ft. long; No. 3, 822 ft. long. **Ore:** Lead-zinc-silver. **Remarks:** Idle.

**CUBA MINING CO.**

**Office:** Wallace. **Officers:** W. H. Hanson, Pres.; Herman Marquardt, Sec., both of Wallace. **Inc.:** Nov. 18, 1899. **Capital:** 1,000,000 shares; par value $1; all shares issued. **Property:** Cuba group; 2 patented claims, Placer Center dist.; Wallace. **Development:** 2 tunnels; No. 1, 500 ft. long; No. 2, 1100 ft. long. **Plant:** Electrically driven I-R compressor; complete mining equipment. **Ore:** Lead-silver. **Remarks:** Idle.

**CUSTER GULCH MINES CO.**

**Office:** Spokane, Wash. **Officers:** H. O. Ferring, Pres.-Mgr.; N. P. Ferring, Sec.; both of Spokane, Wash.; J. E. Ramsey, Statutory Agent, Kellogg. **Inc.:** April 1, 1936, as Pine Creek Queen, Inc.; name changed Feb. 22, 1937; name changed from Custer Gulch Mines, Inc., Jan. 19, 1938. **Capital:** 3,000,000 shares; par value 25c; Feb. 22, 1937, reduced capital stock from $750,000 to $500,000, divided into 300,000 shares pref. non-assessable and 200,000 shares common non-assessable; par value $1; shares issued, 32,859. **Property:** Lynch group; 18 unpatented claims, Yreka dist.; Kellogg, held under lease and bond. **Development:** Approximate total development, 4000 ft. **Plant:** 2 compressors, blacksmith shop, cookhouse and bunkhouse. **Ore:** Lead and silver. **Men Employed:** Average, 2. **Remarks:** 300 ft. of development work during the year.

**DAY DEVELOPMENT CO.**

**Office:** Wallace. **Officers:** Harry L. Day, Pres.; W. B. Heitfeld, Sec., (resigned), both of Wallace. **Inc.:** Filed in Idaho as Hercules Exploration Co. Nov. 27, 1928; name changed Nov. 25, 1930. **Capital:** 10,000 shares; par value $100; 518 shares issued.

**DAYROCK MINING CO.**

**Office:** Wallace. **Officers:** F. M. Rothrock, Pres., Spokane, Wash.; S. F. Heitfeld, Sec.; Henry L. Day, Mgr., both of Wallace. **Inc.:** Nov. 30, 1923, as Strattons Mines Co.; name changed Nov. 19, 1928. **Capital:** 2,000,000 shares; par value 10c; 1,747,150 shares issued. **Property:** Dayrock, Pan-handle, and Monarch-Bonanza groups; 40 patented, 22 unpatented claims, Placer Center dist.; Wallace. **Development:** Dayrock group; principally
by 1 tunnel 1612 ft. long, in which is an inclined shaft 460 ft. long, with 4 intermediate levels, which opens the vein to a vertical depth of 400 ft. Panhandle group: Principally by 1 tunnel 1562 ft. long, and an inclined shaft 360 ft. long, with 3 intermediate levels, which opens the vein to a vertical depth of 253 ft. Total development in both groups, more than 39,195 ft. Plant: Electrically driven hoist and 2 electrically driven compressors; complete mining equipment; storage-battery locomotive and haulage. Ore: Lead-silver. Remarks: 478 ft. of development work during the year.

**DELAWARE MINES CORPORATION**


**DICKENS-EAST MINING CO.**


**DOBSON PASS LEAD AND SILVER MINES CORP.**


**DOUGLAS MINING CO., LTD.**


**DULUTH MINING CO.**


**EAST ALAMEDA MINING CO., LTD.**


**EAST HECLA MINING CO., LTD.**


**EAST STANDARD MINING CO.**

ECHO MINING CO., LTD.

ELGIN & OGDEN MINING CO.

ENTERPRISE MINING CO.

FAR WEST GOLD-SILVER MINING CO.
(See Idaho County for officers and capital structure). Property: Eureka group of patented claims, 2 1/2 miles north of Wallace. Development: By 3 tunnels; No. 1, 400 ft. long; No. 2, 820 ft. long; No. 3, 500 ft. long.

FEDERAL MINING & SMELTING CO.
Office: Wallace. Officers: F. H. Brownell, Pres.; J. L. Martin, Sec., both of New York City; H. G. Washburn, Mgr., Wallace. Inc.: Filed in Idaho, Sept. 24, 1903. Capital: 200,000 shares preferred, 100,000 shares common; par value of each $100; June 6, 1934, decreased preferred to 30,000 shares, and common to 50,000 shares, par value of each $100; May 25, 1936, decreased par value on common to $10, 30,000 preferred, par value $100 and 50,000 shares common, par value $10; June 22, 1937, reduced capital from $3,500,000 to $2,203,200, divided into 17,032 preferred, par value $100 and 50,000 shares common, par value $10; June 10, 1939, reduced capital stock to $500,000, divided into 50,000 shares, par value $10; all outstanding preferred stock retired in May 1939) Dec. 11, 1939, reduced capital stock to $493,280, divided into 246,640 shares common, par value $2; 49,328 shares issued.

FRISCO GROUP
Property: 15 patented claims, Lelande dist.; Gem. Development: Principally by 4 tunnels; No. 1, 1000 ft. long; No. 2, 1500 ft. long; No. 3, 550 ft. long; No. 4, 1000 ft. long; and a vertical 4-compartment shaft 1650 ft. deep; total development, approximately 31,680 ft. Ore: Lead-zinc-silver. Remarks: Some work by lessees.

GLAMORGAN GROUP

GOVERNMENT GULCH GROUP
Property: Five-sixteenth interest in 1 patented claim, Yreka dist.; Kellogg. Development: Principally by 1 tunnel, which is 500 ft. long; total development, approximately 1700 ft. Ore: Lead-silver.

CON. BIEDERMAN GROUP

MACE GROUP
Property: 35 patented claims, Lelande dist.; Mace. Development: Principal development consists of No. 6 tunnel, 3600 ft. long; No. 3, Campbell, 3000 ft. long; and a 3-compartment vertical shaft 2400 ft. deep, with 22 intermediate levels; total development, approximately 18,000 ft. Plant: MILL:

BURKE GROUP
Property: One millsite, Lelande dist.; Burke. Plant: A small hydro-electric power plant.

MORNING GROUP
Property: 41 patented claims, Hunter dist.; Mullan. Development: The two principal tunnels are No. 5, 1600 ft. long, and No. 6, the main transportation tunnel, 9500 ft. long. The principal shaft, which is located in No. 6 tunnel, is a vertical, 4-compartment shaft, 3200 ft. deep, with 19 intermediate levels below No. 6 tunnel, which opens the vein to a depth of approximately 5220 ft. Total development, approximately 38½ miles. Plant: MINE: 1 double-reel hoist, arranged for electric drive by means of direct-current hoist motor 600 h. p. 450 r. p. m., through single reduction herringbone gear, driven by synchronous motor generator (motor 700 h. p.; generator 500 kw. direct current) 1200 r. p. m. 265 volts; one 600 h. p. electrically driven double-drum Nordberg hoist; one Nordberg single-drum geared hoist, driven by 300 h. p. electric motor; one water-driven 5200 cu. ft. Rix compressor; one Laidlaw-Dunn-Gordon 3200 cu. ft. compressor, two Ingersoll-Rand 2500 cu. ft. compressors, and one Prescott pump, 400 gal. capacity, on 2450 level, all electrically driven; complete mining equipment, machine shops, sawmill, company buildings and hotel. HAULAGE: 500-volt electric in main, or No. 6 tunnel: 250-volt electric and 10 storage-battery locomotives on intermediate levels. MILL: 1200-ton concentrator, fine grinding flotation; two ore-sorting plants; and complete modern change house. Ore: Lead-silver-zinc. Men Employed: Average, 587. Remarks: Work performed during the year: Raise, 14 ft., Sinking 449 ft., Drifting 1956, Crosscutting 1741 ft.

PAGE GROUP
Property: 86 patented claims, Yreka dist.; Kellogg. Development: By 10 tunnels, the principal one of which is the Curlew, 650 ft. long; and an inclined shaft 1882 ft. long, giving a vertical depth of 1446 ft., with 5 intermediate levels; total development, approximately 30,792 ft. Plant: MINE: A 100 h. p. hoist and a 75 h. p. double-drum hoist, both electrically driven; a 400 cu. ft., an 800 cu. ft. and a 2550 cu. ft. electrically driven compressor; 1 trolley locomotive and 3 storage-battery locomotives; complete and modern mine camp, equipment and buildings. MILL: 350 flotation concentrator. Ore: Lead-zinc-silver. Men Employed: Average, 139. Remarks: Additions to mill at a cost of $45,000.

FLYNN GROUP MINING CO.

FORMOSA LEAD MINING CO., LTD.

FOUR SQUARE GOLD SYNDICATE
GALENA MINING CO.

GEM STATE MINING CO.

GENERAL MINES CORPORATION
Office: 402 Empire State Bldg., Spokane, Wash. Officers: H. G. Loop, Pres.-Mgr.; E. I. Fisher, Sec., both of Spokane, Wash. Inc.: Nov. 23, 1925. Capital: 2,000,000 shares; par value 5c; Nov. 29, 1938, increased capital stock from $100,000 to $150,000, divided into 3,000,000 shares, par value 5c; 1,320,052 shares issued. Property: Big Eight group; 21 unpatented claims and 106 acres patented land, Yreka dist.; Kellogg. Development: Principally by 1 tunnel 4138 ft. long. Plant: Electrically driven G-D compressor; complete mining equipment. Ore: Gold-silver-lead. Men Employed: Average, 2. Remarks: Crosscutting and enlarging station preparatory to sinking shaft during the year. Will sink shaft 250 ft. during coming year and explore lower level.

GERTIE MINING CO.

GOLCONDA LEAD MINES

GOLD HUNTER MINES, INC.
Office: Mullan. Officers: Olive G. Keeley, Pres.; James W. Grogan, Sec., both of Chicago, Ill.; C. K. Cartwright, Mgr., Mullan. Inc.: Apr. 24, 1925; formerly Gold Hunter Mining & Smelting Co. Capital: 20,000 shares; par value $10; all shares issued. Property: Gold Hunter; 12 patented claims, Hunter dist.; Mullan. Development: Principal main haulage tunnel 7600 ft. long, from which level is a shaft 1500 ft. deep to the 1200 ft. level, in which there is another shaft 600 ft. deep; about 10 miles of underground workings. Plant: MINE: Complete and modern; electric hoist; two 3000 cu. ft. electrically driven compressors; pumps; machine and blacksmith shop; electric haulage. MILL: 500-ton concentrator, including flotation. Ore: Lead-silver. Men Employed: Average, 2. Remarks: "On July 3, 1930, mine closed by owners due to low metal prices. Leased in July 1933 to L. M. Norris and others who have steadily operated the property since then."

GOODENOUGH MINING CO.
Office: Box 302, Wallace. Officers: J. Fred Markwell, Sec., Wallace. Inc.: Apr. 6, 1922. Capital: 2,500,000 shares; par value 1c; all shares issued.
Property: Goodenough group; 13 patented, 7 unpatented claims, Lelande and Hunter dists.; Gem. Men Employed: Average, 3. Remarks: "During the past year some of the work was performed in making improvements and setting up a power line and in preparing the installation of machinery etc. for the purpose of carrying on further exploratory work toward the development of this property."

**GOLDEN CHEST MINING AND CONCENTRATING CO.**

**GOVERNMENT GULCH MINING CO.**

**GRANADA LEAD MINES, INC.**

**GREAT EASTERN MINING CO., LTD.**

**GREEN HILL CLEVELAND MINING CO.**

**HAPPY DAY MINING CO., LTD.**

**HECLA MINING CO.**
Office: Wallace. Officers: James F. McCarthy, Pres.-Mgr.; Leo J. Hoban, Sec., both of Wallace. Inc.: Sept. 26, 1898. Capital: 1,000,000 shares; par value 25c; all shares issued. Property: 48 patented claims, 10 unpatented, Lelande dist.; Burke. Development: Principally by a 4-compartment vertical shaft, which is 2800 ft. deep, and a 3-compartment vertical shaft from the 2000 ft. level, which is 800 ft. deep. Plant: MINE: 2 electrically driven I-R compressors, totaling 7500 cu. ft., housed in steel and concrete buildings; one of the largest, most complete and modern mine plants in the United States; 2 electrically driven hoists, the main one being driven by a 2100 h. p. motor. MILL: 900-ton concentrator, including flotation. Ore: Lead-silver. Men Employed: Average, 486. Development work...
SURFACE PLANT OF HECLA MINING CO.
during the year: Raising 1219.4 ft.; sinking 87.5; drifting 2403.2; cross-cutting 1019.1. Mill changed over to all flotation process in 1938.

HELMER SILVER MINES COMPANY

HERCULES MINING CO.

HERCULES GROUP
Property: Hercules group, 39 claims, Lelande and Placer Center dists.; Burke. Development: Principally by 5 tunnels: No. 1, 280 ft. long; No. 2, 4450 ft. long; No. 3, 4910 ft. long; No. 4, 10,250 ft. long; No. 5, 16,200 ft. long; and a 4-compartment vertical shaft 1300 ft. deep, with 8 intermediate levels; approximate total development, 85,831 ft. Plant: MINE: Special first motion double-reel Nordberg electric hoist, direct connected to 700 h. p. motor; one 22x16 I-R and one 29x21 I-R compressor, both electrically driven; electric trolley locomotive in main transportation tunnel and storage battery locomotives in intermediate levels; complete and modern mine equipment and shops. MILL: 600-ton concentrator, including flotation. See Idaho Thirty-first Ann. Rept. Min Industry, 1929, pp. 23-27, for complete description. Ore: Lead-silver. Men Employed: Average, 10. Remarks: Idle.

AETNA GROUP
3 claims surveyed for patent.

ANDREWS GROUP
3 claims surveyed for patent.

BASIN GROUP
5 patented claims.

HUMMING BIRD GROUP
Property: 19 patented claims, Lelande dist.; Burke. Development: Total development, approximately 16,106 ft. of tunnels, the principal of which are No. 4, 1253 ft. long, and No. 5, Hercules, 12,086 ft. long.

IDAHO & EASTERN GROUP

LACLEDE GROUP
9 patented claims.

MAHER-HEARN GROUP
Property: 38 patented claims, Lelande dist.; Burke. Development: Through 4500 ft. tunnel of Gertie Mining Co., at the end of which are more than 4000 ft. of tunnel and a 400 ft. vertical shaft. Plant: Electrically driven 1000 cu. ft. I-R compressor; air driven hoist; trolley electric locomotive haulage; complete and modern equipment. Ore: Lead-silver.

ROANOKE GROUP
7 patented claims.

HIDDEN TREASURE MINING CO.
HIGHLAND-SURPRISE CONSOLIDATED MINING CO.

HORNSILVER MINING & MILLING CO.

HORSESHOE MINING CO.

HUNDRED FOLD MINING COMPANY
Office: Coeur d'Alene. Officers: D. C. Phillips, N. 2521 Hamilton St.; M. D. Hughes, Sec., both of Spokane, Wash. Capital: 2,000,000 shares; par value 10c; 500,300 shares issued. Property: 20 patented and 6 unpatented claims, Lelande and Placer Center dists.; Gem; 13 of the claims held under lease and bond from Big Divide Mining Company, Wallace. Development: 2 main tunnels and several short tunnels and open cuts; No. 1 tunnel, 250 ft. long; No. 2 tunnel, 2000 ft. long. Ore: Silver, lead and gold. Remarks: Idle.

HYPOTHEEK MINING & MILLING CO.

IDAHO COPPER MINING CO., LTD.

IDAHO-MONTANA & ORLANDO CONSOLIDATED MINING CO.
Officers: Joseph Swan, Vice-Pres.; Carl Johnson, Sec., both of Wallace. Inc.: July 14, 1825. Capital: 1,500,000 shares; par value 10c; 1,039,002 shares issued. Property: 7 unpatented claims; (Little Eva, Bonanza, Orlando and Idaho, in State of Idaho; Montant, Rex. No. 1 and Rex No. 2 in State of Montana). Development: By 4 tunnels, the principal ones being: No. 1, 900 ft. long; No. 2, 700 ft. long. Ore: Lead, silver and antimony. Remarks: Assessment work only.

IDAHO MOTHER LODGE GOLD MINES INC.
foreclosed and property sold at sheriff's sale. Property to be acquired by the Consolidated Gold Mines Inc.)

IDAHO STAR MINING CO.
Office: E. 1302 Newark Ave., Spokane, Wash. Officers: R. T. Lawrence, Pres.; E. I. Fogelberg, Sec., both of Spokane, Wash. Inc.: Oct. 8, 1924. Capital: 1,500,000 shares; par value 10c; 1,296,435 shares issued. **Property:** 32 unpatented claims, St. Joe dist.; Adair. **Development:** By 1 tunnel 915 ft. long. **Plant:** Water-driven compressor. **Ore:** Gold-silver. **Remarks:** "2 men—10 days each—employed repairing dam and buildings."

IDORA MINING CO., LTD.
Office: Jamieson Blk., Spokane, Wash. Officers: James C. Broad, Pres.; C. E. Mallette, Sec.-Mgr., both of Spokane, Wash. Inc.: April 23, 1915. **Remarks:** "The Idora Mining Co. Ltd. has sold all property of every kind and description to the Consolidated Mines Corp and has no property of any kind except unpaid accounts and its charter; we are simply keeping the corporation alive for future use and to collect amounts due."

IMPERIAL MINING CO.
Office: Wallace. Officers: Henry Lawrence Day, Pres.; R. W. Anno, Sec., both of Wallace. Inc.: Nov. 21, 1906. Capital: 1,500,000 shares; par value $1; 732,538 shares issued. **Property:** Imperial group: 10 patented claims, Lelande dist.; Burke. **Development:** Principally by 2 tunnels: No. 1, 1000 ft. long; No. 2, 4000 ft. long. **Ore:** Lead-silver. **Remarks:** Idle.

INDEPENDENCE LEAD MINES CO.
Office: Wallace. Officers: H. B. Kingsbury, Pres.-Mgr.; Herman Marquardt, Sec., both of Wallace. Inc.: Filed in Idaho, Nov. 12, 1929. Capital: 4,000,000 shares; par value $1; 3,240,000 shares issued. **Property:** Independence group, 11 claims; American Commander group; 2 claims; West Hunter group, 13 claims; (16 claims are patented and 12 un patented) Hunter dist.; Mullan. **Development:** American Commander group: by 4 tunnels: No. 1, 100 ft. long; No. 2, 300 ft. long; No. 3, 1200 ft. long; No. 4, 6000 ft. long. Independence group: Principally by 4 tunnels: No. 1, 100 ft. long; No. 2, 300 ft. long; No. 3, 1200 ft. long; No. 4, 6000 ft. long, a vertical raise 313 ft. long connecting No. 3 and No. 4 tunnels, and a 350 ft. vertical shaft in No. 4 tunnel; approximate total development, 15,863 ft. **Plant:** One electrically driven compressor, complete mining equipment. **Ore:** Lead-silver. **Men Employed:** Average, 1. **Remarks:** Idle.

INDEPENDENCE MINING CO., LTD.

INLAND EMPIRE MINING & MILLING CO.
Office: 304 Title Bldg., Spokane, Wash. Officers: A. C. Schirmer, Pres.-Mgr.; Hibbing, Minn.; John H. Roche, Sec., Spokane, Wash. Inc.: June 18, 1910. Capital: 1,000,000 shares; par value $1; 685,574 shares issued. **Property:** Never Sweat; 1 patented claim and 2 unpatented claims; Lelande dist.; Burke. **Development:** By 2 tunnels: No. 1, 350 ft. long; No. 2, 400 ft. long; and an inclined shaft 300 ft. deep. **Plant:** Electrically driven compressor and complete mining equipment. **Ore:** Lead-silver. **Remarks:** Idle.

INSPIRATION LEAD CO., INC.
Officers: W. J. Stratton, Pres.; W. W. Smith, Sec.-Mgr., both of Spokane, Wash. Inc.: Aug. 14, 1929. Capital: 10,000,000 shares; par value 10c; 3,259,623 shares issued. **Property:** Moe and Troy groups; 4 patented, 30 unpatented claims; Moe group held under lease and bond; Hunter dist.; Mullan. **Development:** By 3 tunnels: No. 1, 500 ft. long; No. 2, 1100 ft. long; No. 3, 2400 ft. long. **Plant:** 14x12 I-R compressor and hoist, both
MINING INDUSTRY OF IDAHO

INTERNATIONAL MINES, LTD.

IONE MINING CO.

IVANHOE MINING CO., LTD.

JACK WAITE MINING CO.

JIM BLAINE SILVER SYNDICATE, LTD.

JUNO MINES CORP.

KENNAN MINING CO.

KING OF PINE CREEK MINING CO.

LACLEDE MINING CO., LTD.
"This company was dissolved on March 27, 1939 and all assets transferred to the Hercules Mining Company, whose address is Day Building, Wallace, Idaho." This information reported by S. F. Heitfeld, Wallace, who was Secretary.

LANGSTON SILVER-LEAD MINING CO.
Office: Wallace. Officers: W. V. Stansfield, Pres.-Mgr.; Alpha H. Hogan, Sec., both of Wallace. Inc.: June 14, 1916. Capital: 1,000,000 shares; par value $1; 250,000 shares issued.
value 25c; all shares issued. **Property:** 10 patented, 4 unpatented claims, Placer Center dist.; Wallace. **Development:** By 8 tunnels, the principal one being 1250 ft. **Plant:** 10x12 Sullivan gas-driven compressor; complete prospecting equipment. **Ore:** Lead-silver. **Remarks:** Idle.

**LEAD BLOSSOM MINING & MILLING CO.**
*Office:* Wallace. *Officers:* Walter H. Hanson, Pres.; Herman Marquardt, Sec., both of Wallace. *Inc.:* June 5, 1922, as Iron Blossom Mining & Milling Co., name changed Nov. 2, 1922. *Capital:* 1,500,000 shares; par value 25c; all shares issued. **Property:** Iron Blossom group; 13 patented claims, Yreka dist.; Wardner. **Development:** By 2 tunnels: No. 1, 300 ft. long; No. 2, 600 ft. long; and an inclined shaft 360 ft. long. **Ore:** Lead-silver. **Remarks:** Idle.

**LEROY GOLD & COPPER CO., LTD.**
*Office:* Wallace. *Officers:* G. F. Damm, Pres.; C. E. Clarke, Sec., both of Wallace. *Inc.:* Aug. 2, 1897. *Capital:* 1,000,000 shares; par value $1; all shares issued. **Property:** Leroy group; 5 patented claims, unorganized dist.; Adair. **Ore:** Copper-gold. **Remarks:** Idle.

**LIBERAL KING MINING CO.**
*Office:* Wallace. *Officers:* C. J. Whittemore, Pres., Seattle, Wash.; H. J. Hull, Sec., Wallace. *Inc.:* June 12, 1928. *Capital:* May 24, 1933, increased capital from 1,500,000 shares common to 3,000,000 shares; par value 10c; 2,353,089 shares issued. **Property:** Silverado group: 31 unpatented, 2 patented claims, Evolution dist.; Osburn; some of the claims under contract of purchase from Edgar R. Kogelschatz, Detroit, Michigan. (All but 6 claims have been leased to the Silver Dollar Mining Company for 99 years.) **Development:** Principally by 1 tunnel, 7800 ft. long and an inclined shaft 570 ft. long, giving a vertical depth of 550 ft. with 4 intermediate levels. **Plant:** MINE: 500 cu. ft. electrically driven compressor; complete mining equipment. MILL: 50-ton concentrator, including flotation. **Ore:** Lead-silver. **Men Employed:** Average, 12. **Remarks:** Development work during the year: Sinking, 616 ft.; Drifting, 1035 ft.; Crosscutting, 5109 ft. Additions made: 1-200 gal. per min. Worthington 600 ft. head electric pump; 4600 ft. 3 phase No. 6 submarine cable 2300 volt; 1600 ft. 3 in. air line; 1500 ft. 12 in. vent pipe; 1100 ft. % in. hoist cable. 2-50 K. V. A. General Electric transformers.

**LINCOLN MINING CO.**
*Office:* Wallace. *Officers:* James Hamilton, Vice-Pres. & Mgr., Wallace; Toimi Lehtola, Sec., Kellogg. *Inc.:* July 9, 1923. *Capital:* 1,500,000 shares; par value 10c; May 7, 1928, increased to 2,000,000 shares common; par value 10c; 30,000 shares preferred; par value $10; 1,191,541 shares common, 2875 shares preferred issued. **Property:** Silverado group: 31 unpatented, 2 patented claims, Evolution dist.; Osburn; some of the claims under contract of purchase from Edgar R. Kogelschatz, Detroit, Michigan. (All but 6 claims have been leased to the Silver Dollar Mining Company for 99 years.) **Development:** Principally by 1 tunnel, 7800 ft. long and an inclined shaft 570 ft. long, giving a vertical depth of 550 ft. with 4 intermediate levels. **Plant:** MINE: 500 cu. ft. electrically driven compressor; complete mining equipment. MILL: 50-ton concentrator, including flotation. **Ore:** Lead-silver. **Men Employed:** Average, 3. **Remarks:** 400 ft. of development work during the year; "all but six claims have been leased to the Silver Dollar Mining Company for 99 years. They have sunk 1000 ft. of shaft and done considerable crosscutting and drifting which will be contained in their report."

**LINFOR COPPER CO.**
*Office:* 745 Peyton Bldg., Spokane, Wash. *Officers:* W. A. Beaudry, Pres.; R. P. Woodworth, Sec., both of Spokane, Wash. *Inc.:* July 28, 1919. *Capital:* 1,500,000 shares; par value 10c; 500,000 shares issued. **Property:** 2 patented and 3 unpatented claims, unorganized dist.; Linfor. **Ore:** Copper-silver. **Remarks:** Idle.

**LOG CABIN MINING & MILLING CO., LTD.**
*Office:* Wallace. *Officers:* O. H. Linn, Pres.; Otto A. Olsson, Sec., both of Wallace. *Inc.:* Nov. 21, 1906. *Capital:* 1,000,000 shares; par value $1; 500,000 shares issued. **Property:** Log Cabin group; 4 unpatented claims,
MINING INDUSTRY OF IDAHO


LOMBARDY MINING & MILLING CO.

LON CHANEY MINING & MILLING CO.

LUCKY BOY MINING & CONCENTRATING CO., LTD.
Office: Mullan. Officers: S. E. Shatto, Pres., Mullan. Inc.: Jan. 12, 1907. Capital: 1,000,000 shares; par value $1; 598,373 shares issued. Property: Lucky Boy group; 31 unpatented claims, Hunter dist.; Mullan. Development: By 11 tunnels, the principal of which is 2600 ft. long. Ore: Lead-silver. Remarks: "Have been on the claims since April 1936 and have given my entire attention to the work of developing the property", S. E. Shatto, President.

MAINE-STANDARD MINING CO., LTD.

MAJESTIC MINING CO., LTD.

MARSH MINES CONSOLIDATED

MERGER MINES CORPORATION
Office: 644-645 Peyton Bldg., Spokane, Wash. Officers: Morris Pearson, Pres.; J. M. Wirbon, Sec., both of Spokane, Wash. Inc.: Filed in Idaho, March 3, 1931. Capital: 3,000,000 shares; par value $1; Nov. 4, 1936, reduced capital stock from $3,000,000 to $490,000 divided into 3,000,000 shares common; par value 10c and 100,000 shares preferred stock, par value $1; shares issued, common 2,102,868; shares of preferred issued, none. Property: Bear Top group; 9 patented claims, Summit dist.; Murray; Merger Silver or Aetna group near Osburn. Development: Bear top group: Approximate total development, 4800 ft.; Merger Silver or Aetna; by 3 tunnels: No. 1, 800 ft. long; No. 2, 1500 ft. long and No. 3, 200 ft. long. Plant: 3 I-R hoists, 2 compressors, complete mining equipment. Ore: Lead. Men Employed:
7. Remarks: "In April, 1939, a contract was entered into by Merger Mines Corporation and Coeur d'Alene Mines Corporation whereby the Coeur d'Alene Mines is to drive a 2400 ft. tunnel to the Merger property drifting from the 2000 ft. shaft level of the Coeur d'Alene Mines. Work began May 1, 1939." Assessments levied: Oct. 14, 1938, 1\(\frac{1}{2}\)c per share; Mar. 20, 1939, 1\(\frac{1}{4}\)c per share.

MILITARY MINING & MILLING CO., LTD.

MIDLAND MINING COMPANY

MINERAL FARM MINING CO., LTD.

MINERAL MOUNTAIN MINING & MILLING CO.

MINERAL POINT MINING CO.
Office: Wallace. Officers: H. E. Worstell, Pres.; Martin Nicholson, Sec., both of Wallace. Inc.: July 7, 1904. Capital: 1,200,000 shares; par value $1; 686,168 shares issued. Remarks: "Entire holdings of mining claims have been sold to Coeur d'Alene Mines Corporation and corporation is being dissolved."

MOE MINING COMPANY
Office: Wallace. Officers: Jonas Rugland, Pres.; Martin Nicholson, Sec., both of Wallace. Inc.: Apr. 8, 1922. Capital: 1,000,000 shares; par value 10c; amount issued, not known. Remarks: "Property has been sold and company is now in process of liquidation."

MOHAWK MINING CO.

MONARCH METALS CO.
Office: P. O. Box 357, Wallace. Officers: M. W. Neary, Pres., 862 33d Ave., San Francisco, Calif.; Allen G. Kennedy, Sec.-Mgr., Wallace. Inc.: Sept. 16,
WALLACE, IDAHO — 1888


MOONLIGHT MINING CO.

MOUNTAIN CON MINING CO., INC.

MOUNTAIN QUEEN MINING CO., LTD.

MULLAN MINING CO.

MURRAY HILL MINING CO.
$1; all shares issued. Remarks: "Murray Hill Mining Co. has sold all property of every kind and is kept in good standing for future use alone; it has no other assets at the present time."

NABOB SILVER LEAD CO.

NATIONAL COPPER MINING CO., LTD.

NEVADA-STEWART MINING CO.

NEW HOPE MINING CO., LTD.
NEW JERSEY CONSOLIDATED MINES CO.

Officers: W. J. Stratton, Pres.; W. W. Smith, Sec., both of Spokane, Wash.
Inc.: June 20, 1928. Capital: 5,000,000 shares; par value 10c; 1,291,478 shares issued.

KING OF PINE CREEK GROUP

Property: King of Pine Creek group; 6 patented, 3 unpatented claims and 160 acres patented land, held under lease and option from King of Pine Creek Mining Co., Yreka dist.; Kellogg. Development: By 2 tunnels: No. 1, 380 ft. long; No. 2, 350 ft. long, and a vertical shaft 300 ft. deep. Plant: Hoist and 2 I-R compressors, all electrically driven; complete mining equipment. Ore: Lead-zinc-silver.

NEW JERSEY GROUP

Property: New Jersey group; 6 patented claims, held under lease and option from Dubois Mining Co., Big Creek, Yreka dist.; Kellogg. Development: Principally by 1 tunnel 1500 ft. long.

NIAGARA PLACER MINING CO.


NINE MILE MINING CO.


NORTH BUNKER HILL MINING CO., LTD.


NORTH FORK DEVELOPMENT CO.


NORTH STAR MINING COMPANY


NORTH STAR MINING & DEVELOPMENT CO.


NORTHERN LIGHT MINING & MILLING CO.

SHOSHONE COUNTY

5c; 1,321,393 shares issued. **Property:** Northern Light; 1 patented claim, Pine Creek, Yreka dist.; Kellogg. **Remarks:** Idle.

**OOM PAUL CONSOLIDATED MINING CO.**  
**Office:** Wallace. **Officers:** James F. McCarthy, Pres.-Mgr.; L. E. Hanley, Sec., both of Wallace. **Inc.:** April 29, 1907. **Capital:** 1,600,000 shares; par value $1; 1,399,812 shares issued. **Property:** Oom Paul group; 10 patented claims, Lelande dist.; Burke. **Development:** More than 5000 ft. of workings. **Plant:** Compressor and complete mining equipment. **Ore:** Lead-silver. **Remarks:** Idle.

**PAPUREL & GRAHAM MOUNTAIN MINING CO.**  
**Office:** Kellogg. **Officers:** Gabriel Marco, Pres.; Bruno Orlandini, Sec.-Mgr., both of Kellogg. **Inc.:** Sept. 2, 1924. **Capital:** 1,500,000 shares; par value 10c; 1,225,800 shares issued. **Property:** 18 unpatented claims, Yreka dist.; Kellogg. **Development:** Approximate total development, 1300 ft. **Ore:** Gold, silver and lead. **Men Employed:** Average, 2. **Remarks:** Some surface work by stockholders.

**PARAMOUNT MINES CORPORATION**  
**Office:** 808 Sherwood Bldg., Spokane, Wash. **Officers:** Thomas Egan, Pres.-Mgr., St. Maries; G. W. Sommer, Sec., Spokane, Wash. **Inc.:** Sept. 24, 1929. **Capital:** 5,000,000 shares; par value 10c; 3,069,488 shares issued. **Property:** 4 1/2 patented and 7 unpatented claims, Yreka dist.; Kellogg. **Development:** Principally by 1 tunnel, 1200 ft. long. **Ore:** Silver. **Remarks:** Idle.

**PARK COPPER & GOLD MINING CO., LTD.**  
**Office:** Wallace. **Officers:** N. J. Stockbridge, Sec., Wallace. **Inc.:** Aug. 25, 1899. **Capital:** 1,500,000 shares; par value 10c; 1,373,316 shares issued. **Property:** 6 patented claims, Stevens Peak, Hunter dist.; Mullan. **Ore:** Copper. **Remarks:** Idle.

**PEARSON MINING CO.**  
**Office:** Wallace. **Officers:** Harry P. Pearson, Pres.-Mgr.; Martin Nicholson, Sec., both of Wallace. **Inc.:** April 26, 1920. **Capital:** 500,000 shares; par value $1; 338,841 shares issued. **Property:** “Company has sold property.” **Plant:** I-R compressor; complete mining equipment and camp. **Ore:** Copper-gold. **Remarks:** Idle.

**PINE CREEK LEAD-ZINC MINING CO.**  
**Office:** 419 1st Ave., S., Seattle, Wash. **Officers:** Peter Davis, Pres.; H. G. Beales, Sec., both of Seattle, Wash. **Inc.:** Nov. 8, 1929. **Capital:** 1,000,000 shares; par value 10c; Jan. 11, 1939 increased capital stock from $100,000 to $200,000 divided into 1,000,000 shares common, par value 10c and 100,000 shares preferred, par value $1; 561,021 shares common and 67,610 shares preferred issued. **Property:** Little Pittsburgh group; 4 patented, 3 unpatented claims, Pine Creek, Yreka dist.; Kellogg; undivided % interest owned outright. **Development:** By 3 tunnels: No. 1, 220 ft. long; No. 2, 800 ft. long; No. 3, 1600 ft. long. **Plant:** MINE: Electrically driven 10-drill I-R compressor, complete mining equipment and camp. MILL: 250-ton fine-grinding flotation concentrator. **Ore:** Lead-zinc-silver. **Men Employed:** Watchman. **Remarks:** Idle.

**PIONEER GOLD MINING & DEVELOPMENT CO.**  
**Office:** Wallace. **Officers:** Julius P. Hall, Pres.; A. A. Amonson, Sec., both of Wallace. **Inc.:** Sept. 8, 1931. **Capital:** 1,000,000 shares; par value 25c; 131,750 shares issued. **Property:** 2 unpatented claims, Summit dist.; Murray. **Development:** By 3 tunnels: No. 1, 400 ft. long; No. 2, 60 ft. long; No. 3, 300 ft. long. **Ore:** Lead-silver. **Remarks:** Idle.

**PIONEER MINING CO., LTD.**  
**Office:** Wallace. **Officers:** S. H. Linn, Pres.; Herman Marquardt, Sec., both of Wallace. **Inc.:** Nov. 22, 1916. **Capital:** 1,500,000 shares; par value 25c; all shares issued. **Property:** Pioneer group; 12 unpatented claims, Beaver dist.; Wallace. **Ore:** Lead-silver. **Remarks:** Idle.
PLAINVIEW MINING CO., INC.

POLARIS MINING COMPANY

PONTIAC MINING CO.
Remarks: "The Pontiac Mining Co. was taken over by the Midland Mining Co. in June 1937." This information reported by H. C. Stapleton. Charter forfeited Dec. 1, 1939.

PROCTOR KNOTT MINING COMPANY

PROGRESS GOLD MINING CO.
amount issued, not known. Remarks: “This corporation is non-productive and non-operative; claims lost through litigation and nothing has been done for several years, F. E. Damrell, Secretary-Treasurer.”

**PURITAN MINING CO., LTD.**


**RAINBOW MINING & MILLING CO., LTD.**

(For Capital Structure See Benewah & Kootenai counties.) Property: Rainbow No. 1 group; 22 patented claims; Evolution dist. Development: 5845 ft. of tunnels; 500 ft. diamond drilling. Ore: Silver-lead-zinc-copper.

**RAMONA MINING CO.**


**RAY JEFFERSON MINING CO.**


**REINDEER-QUEEN MINING CO.**


**RHODE ISLAND MINING CO., LTD.**


**RIVERSIDE COPPER MINING CO., LTD.**


**ROB ROY MINING CO.**


**RUTH CONSOLIDATED MINING & MILLING CO.**

7 patented claims, Placer Center dist.; Wallace. **Development:** By 2 tunnels: No. 1, 1440 ft. long; No. 2, 1915 ft. long. **Plant:** Electrically driven Laidlaw-Dunn-Gordon compressor; complete mining equipment. **Ore:** Lead-silver. **Remarks:** Idle.

**ST. ELMO SILVER MINES CORPORATION**
**Office:** Wallace. **Officers:** Mildred Gribble, Sec., Wallace. **Inc.:** Sept. 23, 1935. **Capital:** 1,500,000 shares; par value 10c; all shares issued. **Property:** St. Elmo claim, Evolution dist. **Development:** Principally by 2 tunnels: No. 1, 1000 ft. long; No. 2, 300 ft. long. **Ore:** Lead and silver. **Remarks:** Idle.

**ST. JOE LEAD & SILVER MINES CO.**
**Office:** 1307 Old Nat'l Bank Bldg., Spokane, Wash. **Officers:** Charles Oster, Pres.-Mgr., 111 Broadway, New York; Therrett Towles, Sec., Spokane, Wash. **Inc.:** July 6, 1928. **Capital:** 1,000,000 shares; par value 25c; 740,000 shares issued. **Property:** St. Joe Group; 9 unpatented claims, Evolution dist.; Osburn. **Development:** By 4 tunnels: No. 1, 800 ft.; No. 2, 900 ft.; No. 3, 700 ft.; No. 4, 870 ft. **Ore:** Lead-silver. **Remarks:** Idle.

**SAMSON MINING & DEVELOPMENT CO., LTD.**
**Office:** Wardner. **Officers:** D. W. Raines, Pres., Spokane, Wash.; R. L. Brainard, Sec., Wardner. **Inc.:** Aug. 15, 1904. **Capital:** 1,000,000 shares; par value $1; 900,000 shares issued. **Property:** Samson group, 8 unpatented claims, Eagle dist.; Prichard. **Development:** Principally by 1 tunnel 1100 ft. long. **Ore:** Lead-silver. **Remarks:** Idle.

**SHERMAN LEAD CO.**
**Office:** Wallace. **Officers:** Jerome J. Day, Pres.; S. F. Heitfeld, Sec., both of Wallace. **Inc.:** Nov. 4, 1918. **Capital:** 3,500,000 shares; par value 25c; Aug. 27, 1928, increased to 3,675,000 shares, par value 25c; all shares issued. **Property:** Sherman and Oreano groups; 9 patented claims, Lelande dist.; Burke. **Development:** Total development, more than 34,722 ft., consisting principally of Sherman No. 5 tunnel, 5943 ft. long; Sherman No. 6 tunnel, 2000 ft. long; Oreano No. 2 tunnel, 7441 ft. long; and two 1070 ft. inclined raises connecting Sherman No. 6 tunnel and Oreano No. 2 tunnel, in which are 8 intermediate levels. **Plant:** 2 electrically driven hoists, trolley locomotive haulage, and all mining equipment furnished by Hercules Mining Co. **Ore:** Lead-silver. **Remarks:** Development during the year: Raising 28 ft., crosscutting 21 ft.

**SIGNAL MINING COMPANY**
**Office:** Kellogg. **Officers:** T. R. Mason, Pres., Kellogg; Ben H. Miles, Sec., Spokane, Wash. **Inc.:** June 16, 1906 as Bobby Anderson Group Mining
Company; name changed Oct. 30, 1939. **Capital:** 1,500,000 shares; par value $1; March 25, 1929, increased to 2,000,000 shares; par value $1; Feb. 28, 1938, reduced capital stock from $2,000,000 to $20,000.00, divided into 2,000,000 shares @ 1c; 775,231 shares issued. **Property:** Bobby Anderson group; 2 patented and 14 unpatented claims, Yreka dist.; Kellogg. **Development:** Principally by 1 tunnel 1300 ft. long and an inclined shaft 100 ft. long. **Plant:** Electrically driven compressor and hoist; complete mining equipment and camp. **Ore:** Lead-zinc-silver. **Remarks:** Report not filed for 1939.

**SILVER BAR MINING COMPANY**
*Office:* Bonners Ferry. *Officers:* Victoria W. Clark, Sec., Bonners Ferry. *Inc.:* Sept. 7, 1935. Charter forfeited 1936. **Capital:** 2,500,000 shares; par value 1c; 964,647 shares issued. **Property:** 3 unpatented claims and 1 patented claim, Yreka dist.; Kellogg. **Development:** Principally by 1 tunnel, 1050 ft. long. **Remarks:** Idle.

**SILVER CIRCLE MINING CO.**
*Office:* Murray. *Officers:* Michael Lorenzi, Pres., Wallace; L. W. Defenbach, Sec.-Mgr., Murray. *Inc.:* May 3, 1937. **Capital:** 3,000,000 shares; par value 10c; 1,600,000 shares issued. **Property:** 6 unpatented claims, Summit of Cda. dist.; Murray. **Ore:** Silver, lead-silver. **Remarks:** Idle.

**SILVER CRESCENT, INC.**
*Office:* 1301 1st Ave., Spokane, Wash. *Officers:* Guy E. Riegel, Pres.; Robert Pence, Sec., both of Spokane, Wash. *Inc.:* Dec. 12, 1936. **Capital:** 1,500,000 shares; par value 10c; 1,293,000 shares issued. **Property:** 56 unpatented claims, Yreka and Evolution dists.; Kellogg. **Development:** Approximate total development, 11,700 ft. **Plant:** Complete mining equipment. **MILL:** 150 ton, crusher, rolls, ball mill and flotation units. **Ore:** Silver, lead, zinc. **Men Employed:** Average, 27. **Remarks:** Report not filed for 1939.

**SILVER DALE & BIG HILL MINING CO.**
*Office:* Kellogg. *Officers:* E. G. Johnson, Pres.; W. A. Tuson, Sec., both of Kellogg. *Inc.:* Sept. 10, 1917. **Capital:** 1,000,000 shares; par value 1c; increased Oct. 25, 1927, to 25c; 497,049 shares issued. **Property:** 24 unpatented claims, Big Creek, Yreka dist.; Kellogg. **Development:** Water-driven compressor; complete mining equipment. **Plant:** Water-driven compressor; complete mining equipment. **Development:** Principally by 1 tunnel 2788 ft. long. **Ore:** Lead-silver.

**SILVER DOLLAR MINING CO.**
*Office:* Spokane, Wash. *Officers:* C. O. Dunlop, Pres.-Mgr.; W. T. Anderson, Sec., both of Spokane, Wash. *Inc.:* Feb. 6, 1929 as Stratton Silver Summit, Inc.; name changed June 6, 1934. **Capital:** 10,000,000 shares; par value 10c; Nov. 25, 1934, reduced capital stock from $1,000,000 to $175,000 divided into 1,000,000 shares common, Class A stock and 750,000 shares preferred, par value remaining 10c; 995,366 Common, Class A and 311,466 shares preferred issued. **Property:** 32 unpatented claims, Evolution dist.; Osburn, some of which are held under 99 year lease. **Development:** Principally by 1 tunnel 8000 ft. long; approximate total development, 12,455 ft. **Plant:** 530 cu. ft. I-R compressor, electrically driven; 75 h. p. Electric Coeur d'Alene hoist; complete mining equipment. **Ore:** Lead-silver. **Men Em-
employed: Average, 23. Remarks: Development during the year: Sinking 900 ft.; Drifting 370 ft.; Crosscutting 260 ft. "As of August 1st company has leased Galena Mill of Callahan Zinc Lead Co. Mine is in production as of August 15, 1939."

SILVER LODE MINING & MILLING CO.

SILVER REEF MINES, INC.

SILVER STANDARD MINING CO.

SILVER STRIKE MINING COMPANY

SILVER SUMMIT MINING CO.

SILVER SYNDICATE, INC.
Office: Wallace. Officers: Walter Palmer, Pres.-Mgr., Kellogg; Donald Rogers, Sec., Wallace. Inc.: July 29, 1915, as West Hunter Mining Co., Ltd. July 15, 1935, name changed. Capital: 1,500,000 shares; par value 10c; July 15, 1935, capital stock increased to 2,500,000 shares; par value 10c; 1,500,000 shares issued; Amendment Mar. 31, 1938 making stock non-assessable. Property: 14 unpatented claims, Hunter dist.; Mullan. Development: Approximate total development, 8567 ft. Plant: 6x10 air hoist. Ore: Lead-silver. Remarks: "Silver Syndicate ground is now being explored by the Sunshine Mining Company. They are driving a crosscut north from their inclined shaft on the 1900 level. The Sunshine Mining Company has an option on the control of the Silver Syndicate stock and is taking stock in payment for doing development work until ore is produced."
SISTER MINING & MILLING CO., LTD.

SMUGGLER CONSOLIDATED MINING CO.

SNOWSHOE MINING CO.

SONORA MINING & MILLING CO.

SPOKANE TUNNEL MINING CO.

SQUARE DEAL MINING & MILLING CO., LTD.

STANLEY MINING CO.

STERLING MINING CO., LTD.

SUCCESS MINING CO., LTD.
MINING INDUSTRY OF IDAHO

par value $1; 1,408,737 shares issued. **Property**: Success group; 9 patented claims, Placer Center dist.; Wallace. **Development**: Principally by 3 tunnels: No. 1, 1320 ft. long; No. 2, 4585 ft. long; No. 3, 3360 ft. long; and an inclined shaft 1070 ft. deep, with 8 intermediate levels, total development approximately 25,700 ft. **Plant**: MINE: Electrically driven double-drum hoist; 2 electrically driven compressors; complete mining equipment. MILL: 300-ton concentrator, including flotation and magnetic separation. **Ore**: Lead-zinc-silver. **Remarks**: Idle.

SULLIVAN MINING CO.


SUNRISE MINE CO.

**Office**: 519 Waverly Place, Spokane, Wash. **Officers**: C. Fred Kratzer, Sec., Spokane, Wash. **Inc.**: Sept. 17, 1928. **Capital**: 1,500,000 shares; par value 10c; 1,143,646 shares issued. **Property**: 9 patented, 8 unpatented claims, Summit dist.; Wallace. **Development**: By 3 tunnels, the longest being 1900 ft. **Ore**: Lead-zinc-silver. **Remarks**: Annual assessment work only.

ELECTROLYTIC ZINC PLANT OF SULLIVAN MINING CO.
SHOSHONE COUNTY

SUNSHINE CONSOLIDATED, INC.
Office: Kellogg. Officers: George P. Hardgrove, Pres., Seattle, Wash.; W. T. Simons, Sec., Kellogg; W. M. Yeaman, Mgr., Yakima, Wash. Inc.: April 21, 1934. Capital: 3,000,000 shares; par value 25c; 2,860,000 shares issued. Property: 11 patented and 71 unpatented claims, Yreka and Evolution dists.; Kellogg. Development: By 2 tunnels, the principal one being 2500 ft. long; approximate total development, 5000 ft. Ore: Silver-lead. Remarks: "The property is being explored by drifting and diamond drilling from the westward extension of the 1700 level of the Sunshine Mine. The drifting was done under agreement by the Sunshine Mining Company."

SUNSHINE MINING CO.
Office: Kellogg. Officers: R. M. Hardy, Pres.; C. M. Hull, Sec., both of Yakima, Wash.; R. D. Leisk, Mgr., Kellogg. Inc.: Jan. 3, 1921. Capital: 1,500,000 shares; par value 10c; 1,488,821 shares issued. Property: Yankee group; 15 patented claims and 3 unpatented claims, Big Creek, Yreka dist.; Kellogg. Development: By 5 tunnels, the principal of which is 2000 ft., and 2 shafts, the principal vertical shaft, 3295 feet deep and an inclined shaft 2356 ft. in depth; approximate total development, 101,-791.3 ft. Plant: MINE: 3 Worthington compressors, 2 hoists, all electrically driven; complete mining equipment, buildings and camp; MILL: 1000-ton concentrator, including fine grinding and flotation. Ore: Silver. Men Employed: Average, 620. Remarks: Development during the year: Sinking 684.1 ft.; drifting 8903.9 ft.; crosscutting 2536.8 ft. and raising 4930.8 ft. "In addition to the above listed property, the Sunshine owns jointly with the Polaris Mining Company the following unpatented claims: L. B. M. Lode, I. X. L. Lode, Sis Bowen, V. L. Lode, X. Lode, O. K. Lode, Elk, Eleventh Hour, Emma Jane, Hecla No. 2, Morning Star, Mary Milliron."

SUNSHINE MINING CO., LTD.

SUNSHINE PREMIER MINING CO.
Office: 728 Sprague Ave., Spokane, Wash. Officers: James E. White, Pres., Spokane, Wash.; F. C. Keane, Sec., Wallace. Inc.: Not incorporated in Idaho. Capital: 3,500,000 shares; par value 10c; 1,103,892 shares issued. (Shares of this company were issued in lieu of two shares of United Mines and Metals Corporation for one share of Sunshine Premier and no stock has yet been sold in this new company until it is registered with the S. E. C.) Property: 3 patented claims, Hunter dist., Mullan.

TAMARACK & CUSTER CONSOLIDATED MINING CO.
Office: Wallace. Officers: Jerome J. Day, Pres.; Paul B. Jessup, Sec., both of Wallace. Inc.: Aug. 6, 1812. Capital: 5,000,000 shares; par value $1; all shares issued. Property: Tamarack & Custer; 78 patented claims, Lelande and Placer Center dists.; Gem. Development: Length of the principal tunnels: No. 1, 490 ft. long; No. 2, 3350 ft. long; No. 3, 2630 ft. long; No. 4, 10,119 ft. long; No. 5, 12,227 ft. long; No. 6, 8916 ft. long and No. 7, 11,557 ft. long. The principal vertical shafts are: 622 ft., 187 ft. and 463 ft. deep. The principal inclined shaft is 605 ft. long and gains a vertical depth of 600 ft. Total development, approximately 82,461 ft. Plant: MINE: 100 h. p. electrically driven hoist; three 1300 cu. ft. electrically driven compressors; storage-battery haulage on intermediate levels and trolley-locomotive haulage on main levels; complete mining equipment; modern and complete machine shop; modern hotel, change
MILL OF HERCULES MINING CO., WALLACE, IDAHO
house, and camp. Ore: Lead-zinc-silver. Remarks: “Development work during the year: 431 ft. of tunneling; 157 ft. of crosscutting; 274 ft. of drifting and 205 ft. of raising.”

**TEDDY MINING & MILLING CO., LTD.**

**THOMAS MINES, INC.**

**TRADE DOLLAR MINING CO., LTD.**

**TREASURE VAULT MINING CO., LTD.**

**UNITED AMERICAN MINES CO., LTD.**

**UNITED METALS CO.**

**VENDETTA CHIEF MINING COMPANY**

**VERDE-MAY MINING CO., LTD.**

VICTOR MINING CO.

VIENNA-INTERNATIONAL MINING & MILLING CO.

VINDICATOR MINING CO.

WALLACE IDAHO LEAD MINES, INC.

WALLACE MINING COMPANY

WALLACE SILVER-LEAD MINES COMPANY

WALL STREET MINING CO.

WEST BELL MINING CO., LTD.

WEST HECLA MINING CO.
SHOSHONE COUNTY

Capital: 1,500,000 shares; par value $1; 1,450,000 shares issued. Property: 3 patented claims, Lelande dist.; Burke. Development: Principally by 1 tunnel 1650 ft. long. Ore: Lead-silver. Remarks: “Corporation no longer in existence.”

WEST STAR MINING COMPANY

WESTERN PACIFIC MINING CO.
Office: Wallace. Officers: J. Fred Markwell, Sec., Wallace. Inc.: April 6, 1922. Capital: 2,500,000 shares; par value 1c; 1,250,000 shares issued. Property: South Side group; 10 patented and 4 unpatented claims, Lelande dist.; Wallace. Ore: Lead-silver. Men Employed: Average, 2. Remarks: “During the past year some of the work performed was in construction of a road, making improvements, erecting a power pole line and making other preparations for the installation of machinery in furthering the exploration of the property.”

WESTERN UNION MINING CO.

WILLOW CREEK MINING CO.

WOLVERINE MINING COMPANY, LTD.

WONDERFUL MINING CO., LTD.

WYOMING MINING & MILLING CO., LTD.

YAKIMA-SHOSHONE MINING CO.
Office: Miller Bldg., Yakima, Wash. Officers: E. A. Bannister, Pres.; Sidney Livesey, Sec., both of Yakima, Wash. Inc.: Oct. 11, 1928. Capital: 1,500,000 shares; par value 10c; increased on April 2, 1930, to 2,000,000
shares; 1,290,000 shares issued. **Property:** 2 patented and 11 unpatented claims, Evolution dist.; Osburn. **Development:** Principally by 1 tunnel 1000 ft. long; approximate total development, 3200 ft. **Plant:** 1 electric hoist; compressor; 3 dump cars, etc.; compressor house and bunk house. **Ore:** Lead-silver. **Remarks:** Report not filed for 1939.

**YREKA MINING COMPANY**

**Officers:** Dennis P. Woods, Pres.; Fred J. Cunningham, Sec., both of Spokane, Wash. **Inc.:** July 1, 1937. **Capital:** 3,000,000 shares; par value 1c; 1,505,000 shares issued. **Property:** 7 unpatented claims, Yreka dist.; Kellogg. **Development:** Principally by 1 tunnel 500 ft. long; approximate total development 2800 ft. **Ore:** Silver and lead. **Remarks:** Idle.

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MINING INDUSTRY OF IDAHO


MILL AT JACK WAITE MINE
County Seat: Driggs. Area: 463 sq. miles. Population: 3573. Principal Industries: Agriculture, livestock and mining. Transportation: Ashton-Victor branch of the Union Pacific. Teton State highway and an excellent system of county roads. Mineral Resources: Coal, phosphate rock, natural gas, limestone and asbestos. There are excellent possibilities for the discovery of petroleum. This is one of the few counties in the State that has beds of commercial coal.

Review of Year's Operations

The Bituminous Coal Producers Board for District Number Nineteen, L. W. Mitchell, secretary-treasurer, 201-202 Hynds Building, Cheyenne, Wyoming, advises this department, under date of October 12, 1939, that active mines producing coal within the state of Idaho are as follows: Black Diamond No. 2, operated by John Thomson; Black Diamond No. 3, operated by Henry Mikesell, both of Tetonia; Superior Coal Mining Company, operated by A. E. Nickell; Bell Cup Mine, operated by Van Leuvin and Laink, and Pintar Coal Company, all of Driggs.

In Mr. L. W. Mitchell's correspondence, he further states: 'Might I also advise that the Pintar Coal Co., has just executed and acknowledged Form No. 1, 'Acceptance of the Bituminous Coal Code', and in doing so, under the provisions of the Act, will be required to pay a tax of one cent (1c) per ton. All of the operators above named, who have so far not accepted the Bituminous Coal Code, should be contacted by the Bureau of Internal Revenue, with the end in view of enforcing the provisions of the Act, whereby such producers not accepting the code, will be required to pay 19½% of the total selling price of the coal they produce and sell.'

Van Leuvin and Laink employed a crew of eight men on a lease from the Teton Coal Company. Considerable tonnage of attractive fuel that was very popular in household stoves and other heating equipment was mined from the Black Bear vein and hauled to the consumer by truck. Purchase of coal was made at the tipple.

You will note that only one company, The Superior Coal Mining Company, sent in a report to this department for the year 1939 as required by sections 25-1616, 25-1619-20 Idaho Code Annotated, of all corporations, domestic or foreign, and associations engaged in mining and mining operations within the state of Idaho.

The following memorandum contains some very interesting data concerning the Teton Basin Coal Field: "Dr. Robert H. Bradford, Dean of Mineralogy of the University of Utah, stated by analysis that the Teton coal carried a higher percentage of fixed carbon than the typical Wyoming and Utah coals, approaching a step nearer the composition of anthracites.

<table>
<thead>
<tr>
<th>Seam</th>
<th>Moisture</th>
<th>Ash</th>
<th>Volatile Matter</th>
<th>Fixed Carbon</th>
<th>B. T. U.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown Bear</td>
<td>2.32</td>
<td>2.5</td>
<td>40.75</td>
<td>54.43</td>
<td>14,260</td>
</tr>
<tr>
<td>Progressive</td>
<td>2.55</td>
<td>3.0</td>
<td>40.00</td>
<td>51.60</td>
<td>13,700</td>
</tr>
</tbody>
</table>

Lewis C. Karrick, Fuel Engineer for the U. S. Department of the Interior, visited this coal field in May 1939, took a sample of the Brown Bear seam, made an assay of this coal for the yield of oil, and advises as the result of this assay to endeavor to expand into this coal-treating enterprise."

"Result of test: (per ton treated)

33.2 gallons of crude oil from which can be refined:
10 gallons of gasoline
10 gallons of Diesel oil
5 gallons of road oil

1,380 pounds of semi coke, a very attractive smokeless fuel
2,500 cubic feet of gas with a heating value of approximately 1,000 B. T. U. per cubic foot."
SUPERIOR COAL MINING CO.
Officers: Roy L. Black, Pres., Pocatello; Peter Corbatelli, Sec., Shelley. Inc.: Dec. 24, 1924. Capital: 1,000,000 shares; par value $1; 127,467 shares issued.
Property: Assignment of prospecting permits and applications for lease on 1400 acres; Horseshoe dist.; Sam. Development: By 8 short tunnels, the longest being 520 ft., all of which are drifts on coal veins; and an inclined shaft 158 ft. long. Plant: Steam-driven hoist. Mineral Sought: Coal. Remarks: Some development and exploration work during the year.

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TWIN FALLS COUNTY


MINERAL RECOVERIES, INC.

VALLEY COUNTY

County Seat: Cascade. Area: 3779 sq. miles. Population: 3488. Principal Industries: Agriculture, stock raising, lumbering and mining. Transportation: State Highway up Payette River, the McCall-Warren-Edwardsburg-Yellow Pine-Landmark-Cascade Loop and Cascade-Bear Valley road, as well as numerous forest service roads and trails. The only railroad is the McCall branch of the Union Pacific. Relief: The county, as a rule, is high and rugged with few level spaces along the many rivers. The Payette Lakes, the largest in southern Idaho, occur at the head of the Payette River, occupying the upper end of the only large valley in the county. Mineral Resources: Gold, lead, silver, zinc, mercury, copper, tungsten, molybdenum and monazite. On account of the very difficult problem of transportation the mineral resources of this county have received scant development. Until recent years, only the placer and free lode gold could be successfully handled.
The building of roads by the forest service has been accompanied by a cor-
responding development in mining and this county is fast becoming one of the
foremost mining districts of the state.

It has great possibilities and presents may opportunities to the prospector,
operator and investor.

Review of Year's Operations

Antimony Gold Ores Company, J. J. Oberbillig, president-manager; Charles
V. Genoway, secretary, both of Boise, developed their holdings with a crew of
five men. 255 ft. of development work was reported during the year.

Bradley Mining Company employed an average crew of 29 men. Develop-
ment work during the year includes: a raise 75 ft.; drifting 297 ft.; crosscutting
43 ft., and 372 ft. of tunnels. This work was reported to have been completed
during the fiscal year which ends May 31, 1939. Later in the year considerable
work was accomplished on the surface and the capacity of the mill enlarged.
Ore is transported from the open pits to the concentrating plant by truck.
Values are in gold, silver and antimony.

Copper Camp Mining Company report assessment work only. The prop-
erty consists of 36 claims in the Edwardsburg district. Mrs. Annie Napier
Edwards is secretary and Wm. A. Edwards, manager, both of Edwardsburg
(via Cascade).

Copper Cliffs Mining Company completed some development work during
the year on eight unpatented claims in the Yellow Pine district. Values are
in copper and gold.

Idaho Minerals Company completed 235 ft. of development work during
the year with a crew of four men. The property consists of 37 unpatented
claims in the Yellow Pine district.

The mining districts of Valley County are tapped by unimproved dirt
roads and pack trails. Landing fields are located at Cascade, Idaho Minerals
Company, Yellow Pine, Stibnite and Edwardsburg.

The Lucky Lad Mining Company, located on Pistol Creek, developed its
holdings to some extent. Other activity in the vicinity of the Lucky Lad was
performed by Kimball and Jensen, James Leahy, Harold Seaward and Cleve
Warham. Indications point to another producing community in this area
which has been held back for years by inadequate transportation facilities.
This area embraces the Artillery Dome and Seaward districts.

Guy H. Herbert, Jr., reports an interesting strike on Burnt Log Creek
about eight miles air line from Pistol Creek. Herbert's claims are known as

Red Metals Consolidated, Inc. completed 50 ft. of development work
during the year; completed road to camp and erected new bunkhouse and
cookhouse. They expect to continue development and put the 25-ton mill in
operation. The property includes 10 unpatented claims in the Yellow Pine
district. Values are in gold and silver.

Smith Creek Hydraulic Mining Company, Inc. report assessment work
only.

Daniel C. McRea and son developed a property near Edwardsburg. These
men formerly operated the Sunnyside mine, located on Thunder Mountain,
before leasing the Sunnyside property to Spokane interests.

Assessment work was performed by many claimholders in the Thunder
Mountain district.

The U. S. Geological Survey has been making a study in Valley County of
antimony ores and other strategic minerals. It is reported that as a result
of this project and the findings of other engineering parties some large deals
are now pending in the area around Sugar, Meadow and Johnson creeks.

A forty-five page geologic study, indicating future possibilities in Valley
County, is one of the latest publications released by the Idaho Bureau of
Mines in cooperation with the U. S. Geological Survey. It is Pamphlet No. 44,
“Geology and Ore deposits near Edwardsburg and Thunder Mountain, Idaho,”
by P. J. Shenon and C. P. Ross. Prospectors as well as engineers will find its
technical contents valuable. It is probably the most important contribution thus far to mining in this area.

AMALGAMATED RED METALS MINES CO.

ANTIMONY GOLD ORES COMPANY
Office: 256 Sonna Bldg., Boise. Officers: J. J. Oberbillig, Pres.-Mgr.; Charles V. Genoway, Sec., both of Boise. Inc.: Feb. 11, 1935. Capital: 3,500,000 shares; par value 10c; all shares issued. Property: Sugar Creek group; 38 unpatented claims, Yellow Pine dist.; Stibnite. Plant: Modern living quarters to accommodate 12 men. Ore: Gold, silver and antimony. Men Employed: Average, 5. Remarks: 255 ft. of development work during the year. "Besides the Sugar Creek group the Antimony Gold Ores Company owns 320 acres of placer mining ground on Monumental Creek which extends from Lake Roosevelt, a distance of 3½ miles down the creek. Besides this placer ground the company owns 42 claims on the continuation of the Johnson Creek Fault zone. This property is located 12 miles south from Yellow Pine up Johnson Creek and on the west side of Johnson creek in the Yellow Pine mining district, Valley County, Idaho. Here the company is developing the south extension of the Johnson Creek Mineral zone. At present the tunnel has been driven a distance of 255 ft."

BRADLEY MINING CO.
ployed: Average, 29. Remarks: Development work during the year: Raise 75 ft.; drifting 297 ft.; crosscutting 43 ft., 372 ft. of tunnels.

COPPER CAMP MINING CO.

COPPER CLIFFS MINING CO.

DEADWOOD MINING CO., LTD.

GOLD FORK MINING CO.

HALL INTERSTATE MINING CO.

HOLCOMB CO., LTD.

IDAHO MINERALS COMPANY

INDEPENDENCE MINES & POWER CO.

LUCKY LAD MINING COMPANY
Office: Nampa. Officers: Geo. O. A. Kellogg, Pres.-Mgr.; Windsor J. Lloyd, Sec., both of Nampa. Inc.: Nov. 29, 1935. Capital: 100,000 shares; par value $1; all shares issued. Property: Lucky Boy group; 18 claims,

RAPID CREEK MINING CO., LTD.

RED METALS CONSOLIDATED, INC.

SMITH CREEK HYDRAULIC MINING CO., INC.

SOUTH SALMON PLACER MINING CO., LTD.

UNITED MERCURY MINES CO.

YELLOW PINE CO.
Office: 922 Crocker Bldg., San Francisco, Calif. Officers: Worthen Bradley, Pres., E. A. Griffen, Sec., both of San Francisco, Calif.; Lloyd C. White, Mgr., Stibnite. Inc.: Filed in Idaho, May 25, 1928. Capital: 200,000 shares; par value $1; 62,605 shares issued. Property: Meadow Creek mine; 9 patented and 518 unpatented claims, Yellow Pine dist.; Stibnite. Development: By 6 tunnels, the principal one being 7364 ft.; approximate total development to date, 24,447 ft. Plant: MINE: Meadow Creek Camp: 12x10 I-R compressor and Ottumwa hoist, both electrically driven; steel sharpener; oil furnaces; sawmill; complete mining equipment and camp. Monday Camp: One 300 cu. ft. 12x10 I-R compressor; one 620 cu. ft. Imperial type I-R compressor, Roots positive blower; all electrically driven; steel sharpeners; oil furnaces; storage battery locomotive haulage; complete mining equipment and machine shop; complete and modern mine and camp buildings. MILL: 200-ton fine grinding flotation followed by cyanidation. POWER: South Meadow Creek hydroelectric plant, 75 kw., driven by Pelton water wheel under a 520 ft. head, water delivered through an 11,000 ft. 28 in. redwood pipe and a 1620 ft. 24 in. steel penstock; 5 miles of transmission lines. Ore: Mercury, gold-silver-antimony. Remarks: Report not filed for
1939. However, this property is held under option by the Bradley Mining Co. from the United Mercury Mines Co.

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WASHINGTON COUNTY

County Seat: Weiser. Area: 1,479 sq. miles. Population: 7,962. Principal Industries: Agriculture, stock raising and mining. Transportation: North and South Highway, Oregon Trail and well maintained county roads. The railroads serving the county are: The Union Pacific main line and Huntington-Robinette branch and the Pacific and Idaho Northern. Rivers: Snake River forms western boundary and Weiser River flows southwesterly through the center of the county. Mineral Resources: Silver, copper, gold, lead, zinc, manganese, diatomaceous earth, pyrites, gypsum, clay, garnets and natural gas. History and future: Nearly all of the mineral resources occur in the mountain ranges that lie east of the Snake River. The principal district is known as the Mineral District and at one time had two blast furnaces in operation and was a large producer of silver. The district has been dormant for many years, however, and has almost reverted to its primitive condition. Near-
ly all of the ores are high-grade silver-copper ores, rather complex, but can be handled by modern flotation methods.

This district is one well worthy the attention of the operator and investor.

Review of Year's Operations

IDAHO ALMADEN

Quicksilver production in Idaho began during the summer of 1939 with the operations of the Idaho Almaden Mines Co., about 17 miles east of Weiser, Idaho.

The company is composed of L. K. Requa, Santa Barbara mining engineer, president and general manager; Allan Hoover and Herbert Hoover, Jr., sons of the former president, vice-presidents; and Mrs. Requa, secretary. Despite the fact that the Idaho Almaden property is sometimes spoken of locally as "Hoover's Mine," Herbert Hoover has no interest in the company.

The prospect was discovered in 1936 by Harry Brown, who staked 17 claims in 1937. It was investigated and leased by Mr. Requa in 1938. After considerable preliminary work, construction of the reduction plant was started in April of this year, being put in production about six weeks later.

Geology and Ore Occurrence

The Idaho Almaden property is situated in an area where the predominating formation consists of lake beds of the Payette formation. The beds for the most part consist of coarse and fine grained sandstone with a minor amount of sandy shale.

These beds in the general region are flat, or nearly so, but in the area of the property they have been intersected by two systems of faulting. One system trends slightly west of north and the other strikes nearly east and west. Within the limits of the north-south system the sedimentary beds have been greatly disturbed and mineralized. This mineralization consists mostly of the deposition of opalite, which can be found for at least one mile in a north-south direction and for one-half mile east and west.

Numerous sheets and stocks of a fine-grained whitish rhyolite occurs in a number of places in the opalized lake beds.

The ore occurs in the opalite and is associated with fault junctions. As with most cinnabar deposits, the structure of the ore body is obscure and will have to be worked out by considerable exploration. For the present it has been assumed that it is a flat-lying bedded deposit of up to 40 ft. in thickness, which has been proved for an area 250 ft. long and 100 ft. wide.

The outcrop of the ore occupied an area with a diameter of not more than 50 ft. and had escaped detection due to the fact that opalite cinnabar ores fade on exposure to sunlight to a dull blue black color. The red cinnabar color can be seen only by breaking the rock. The remainder of the ore was covered by a calcareous sinter that resembles sandy shale. This cap rock is barren.

The ore mineral is entirely cinnabar, but occurs in both the amorphous and crystalline form. The latter can be panned but the former cannot.

The cinnabar occurs in several different gangues, the most common being banded opalite, but it also occurs in a soft white kaolin, in sandstone and with quartz.

It is perhaps significant that the report of the Idaho inspector of mines for the year 1938 contains no reference to the prospect, nor does the accompanying minerals map of Idaho indicate any known occurrences of quicksilver mineralization in the vicinity of Weiser. The characteristics of the ore deposit resemble rather closely those lying to the west and southwest in Oregon.

Mining Operation

The deposit lends itself readily to open pit mining and is so being operated. The opalite ore is hard, but breaks easily, and a crew of nine muckers and one miner keep the 50-ton plant supplied with ore. Powder consumption is low, averaging 6 lb. to the ton of ore mined.
The ore body is being mined in 10-ft. slices. The top of the bench is drilled with 6-ft. down holes, and 6-ft. lifter holes are drilled along the bottom of the bench. Drilling is done with light jack hammers of both Gardner Denver and Ingersoll-Rand make. Drill steel is ¾-in. hexagonal with Timken detachable rockbits. At times in the soft streaks auger steel is used with good results.

The property is equipped with two Gardner Denver portable compressors, one of which is sufficient to supply the air for drilling, while the other is held in reserve.

Ore is mucked by hand into 20-cu. ft. mine cars and trammed by hand 300 ft. to the mill ore bin.

The reduction plant handles 50 tons per day on a three-shift basis, a single shift in the mine serving to keep the furnace at capacity.

In the early months of the mine's operation, very little of sorting of ore was done, but Mr. Requa expects that sorting eventually will be undertaken to some extent.
Reduction Plant

The Idaho Almaden plant is equipped with a 50-ton Gould Improved rotary furnace and condensing system, manufactured by the Mutual Engineering Co., South San Francisco. The plant was designed by H. W. Gould Co., and installation was supervised by Gordon I. Gould. The plant is powered with Sterling motors.

As the mine is rather remote from power lines, it was decided to generate power at the plant. This is done with a “Caterpillar” D-4400 diesel connected to a General Electric 25 k. v. s. generator. This takes care of the total connected load of 30-hp. As not over 22-hp. is actually used in operating the plant, there is a considerable safety factor.

Ore from the coarse ore bin passes over a 1½-in. grizzly, over-size going to a 8 by 12 Joshua Hendy jaw crusher. All fine ore feeds to a 14-in. conveyor belt to be elevated to a 30-ton steel ore bin.

An 8-in. shaking feeder introduces ore to the furnace. The kiln is 3 ft. in diameter by 48 ft. long lined with special fire brick and driven by a 3-hp. motor at 1.5 r. p. m. It is fired with 18-degree fuel oil feed to the lower end of the furnace under air pressure, giving 1500 degrees temperature at point of combustion. Movement of the ore through the kiln is counter to the air current.

Vaporized quicksilver passes off through a duct at the upper end of the furnace, goes through a Sirroco dust collector and into the condensing system, which consists of 14 steel pipes of 10-gauge material, 16 in. diameter by 24 ft. high. The Idaho Almaden ore has but light sulphur content, so 10-gauge condenser pipe should prove adequate.

After passing through the condenser system, gases pass through two redwood stave settling tanks and then to the stack, which is also of wood stave construction.

Condensed quicksilver is caught in rubber buckets placed in waterseal hoppers under the condenser pipes. As considerable soot comes over into the condenser, the accumulated mud has to be hoed down on an iron table. Lime is added to dry up the water and facilitate separation of the metal, which collects in an iron pot, from which it is removed for weighing and bottling.

Seventeen men are employed in the mine and reduction plant. The camp consists of several residences, a bunkhouse and a school.

Above article courtesy of: Mining World, October 1939 issue, Miller Freeman Publications, Seattle, Washington.

Pioneer Drilling Corporation report that a test hole was drilled by contract to a depth of 498½ ft. The hole is cased and sealed for protection pending resumption of drilling. The property consists of deeded land held under lease. Mineral sought is natural gas or petroleum. Fred H. Merritt is president-manager and F. L. Merritt, secretary, both of Weiser.

The Submarine Gold Mining Company, with an average crew of 10 men, operated a patented dredge which enables men to go down in the bottom of the river bed to search for the coarser gold. This company has a lease on the Snake River for approximately 16 miles on the Idaho side near Robinette, in addition to about 26 miles of the river on the Oregon side.

Mining and milling of ore has been started at the Blue Dog mine on Munroe Creek about six miles from Weiser by R. A. Griffis, C. M. Woods and Cecil S. Wood. The operators bought a half interest in the mine and leased the other half from Wm. Van Sice and Carl Morton. They installed a small pilot plant and have been operating since the middle of October.

IDAHO ALMADEN MINES COMPANY

at 30 and 50 ft.; approximate total development, 630 ft. **Plant:** MINE: Air tugger hoist, 2 Gardner Denver compressors; complete mining equipment. MILL: 50-ton Gould 3' x 48' rotary furnace and condensing system. **Ore:** Quicksilver. **Men Employed:** Average, 21. **Remarks:** Development work during the year: Sinking 550 ft.; crosscutting 80 ft. Plant built during the year.

**PIONEER DRILLING CORPORATION**

Office: Box 464, Weiser. **Officers:** Fred H. Merritt, Pres.-Mgr.; F. L. Merritt, Sec., both of Weiser. **Inc.:** Mar. 9, 1938. **Capital:** 50,000 shares; par value $1; 8,835 shares issued. **Property:** Deeded land held under lease. **Mineral Sought:** Natural gas or petroleum. **Remarks:** “The test was drilled by contract to depth of 4981/2 ft. Hole is cased and sealed for protection pending resumption of drilling.”

**SUBMARINE GOLD MINING COMPANY, THE**

Office: Boise. **Officers:** Carl A. Oliason, Pres., Meridian; Donald A. Starks, Sec., Route 4, Boise. **Inc.:** April 1, 1937. **Capital:** 100,000 shares; par value $1; 97,439 shares issued. **Property:** Lease from the states of Idaho and Oregon on the Oregon and Idaho side of the Snake River. **Plant:** MINE: 1 hoist, air compressor, diesel and Palmer Generator; complete housing facilities. “Patented dredge which enables men to go down on the bottom of the river bed to search for the coarser gold.” **Ore:** Gold. **Men Employed:** Average, 10. **Remarks:** “This company has a lease on the Oregon side of the river for approximately 26 miles and on the Idaho side for approximately 16 miles. At the lower end of this lease the company has constructed a barge which is not yet in operation.”

**BIBLIOGRAPHY**

See pages 6-7 for publisher’s address, meaning of reference marks and abbreviations.


<table>
<thead>
<tr>
<th>NAME</th>
<th>OFFICER</th>
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<td>J. L. Mercer, Inc.</td>
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<td>Yakima, Wash.</td>
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<td>Box 1966, Boise, Idaho</td>
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<td>Moose Gold Mining Co.</td>
<td>A. T. Slawson, Vice-Pres.</td>
<td>P. O. Box 1191, Wallace, Idaho</td>
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<tr>
<td>Mountain City Dev. Co., Inc.</td>
<td>Fred J. Babcock, Inc.</td>
<td>727 Garland, Pocatello, Idaho</td>
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<td>Owyhee Processing Co., Inc.</td>
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<td>Snake River Mining Co.</td>
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<td>120 Broadway, New York City,</td>
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<td>Paul B. Cannon, Pres.</td>
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<td>Yuba Mines, Inc.</td>
<td>Eusebio Aguirre, Inc.</td>
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## CORPORATIONS NOT OWNING PROPERTY IN IDAHO

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<thead>
<tr>
<th>NAME</th>
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<tr>
<td>Afterthought Mines Corp.</td>
<td>Rom Warburton, Asst. Sec.</td>
<td>818 Kearns Bldg., Salt Lake City, Utah</td>
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<td></td>
<td>Jerry Graber, Sec.-Treas.</td>
<td>Wallace, Idaho</td>
</tr>
<tr>
<td>Aladdin Gold M. &amp; M. Co.</td>
<td>A. F. Dohrman, Sec.</td>
<td>25 Broadway, New York City, N. Y.</td>
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<tr>
<td>Anaconda Sales Co.</td>
<td>Peter C. Warwick, Jr.</td>
<td>907 W. Grace St., Richmond, Va.</td>
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<td>Belmont Copper Corp.</td>
<td>Walter G. Bell, Attorney</td>
<td>Boise, Idaho</td>
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<td>Blackbird Mines Co., Inc.</td>
<td>DeWitt Van Evera, Pres.</td>
<td>417 Beason Bldg., Salt Lake City, Utah</td>
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<td>Calbar Company</td>
<td>Martin Nicholson, Inc.</td>
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<td>J. W. Gwinn, Asst.</td>
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<td>Maggie Creek M. Co.</td>
<td>F. J. Wettrick, Attorney</td>
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<td>Metals Extraction Corp.</td>
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<td>Mountain Sheep M. Co.</td>
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<td>St. Joseph Lead Co.</td>
<td>G. I. Brigden, Comptroller</td>
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MINE PRODUCTION OF GOLD, SILVER, COPPER, LEAD AND ZINC IN IDAHO IN 1938—FINAL ANNUAL FIGURES

U. S. BUREAU OF MINES REPORT

by

T. H. MILLER and PAUL LUFF

The total value of the metal output from mines in Idaho in 1938 decreased $8,812,081, or 23 per cent, from that in 1937. The value of the lead output declined $3,757,614; silver, $2,872,397; zinc, $2,818,990; and copper, $120,900. The value of the gold output increased $757,820. The decreases in average sales prices of lead, silver, and zinc in 1938 caused curtailment or suspension of operations at the large zinc-lead properties in the Coeur d'Alene region, the chief metal-producing area in Idaho; however, the output of zinc-lead ore from the Warm Springs district in Blaine County increased 51 per cent. Production of gold in Idaho in 1938 (103,513 fine ounces) was the largest since 1896, owing to increased output from both lode mines and placers, and that of silver (18,993,676 fine ounces) was only 3 per cent less than the record output of 1937; but the output of zinc declined 19 per cent and that of lead 11 per cent.

All tonnage figures are short tons and "dry weight"; that is, they do not include moisture.

The value of metal production herein reported has been calculated at the following prices.

Prices of gold, silver, copper, lead, and zinc, 1934-38

<table>
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<tr>
<th>Year</th>
<th>Gold 1</th>
<th>Silver 2</th>
<th>Copper 3</th>
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<th>Zinc 3</th>
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<tr>
<td></td>
<td>Per fine ounce</td>
<td>Per fine ounce</td>
<td>Per pound</td>
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<tr>
<td>1934</td>
<td>$34.95</td>
<td>$0.646+</td>
<td>$0.080</td>
<td>$0.037</td>
<td>$0.048</td>
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<td>1935</td>
<td>$35.00</td>
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<td>.044</td>
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<td>1936</td>
<td>$35.00</td>
<td>.7745</td>
<td>.092</td>
<td>.046</td>
<td>.050</td>
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<tr>
<td>1937</td>
<td>$35.00</td>
<td>.7735</td>
<td>.121</td>
<td>.059</td>
<td>.065</td>
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<tr>
<td>1938</td>
<td>$35.00</td>
<td>.646+</td>
<td>.098</td>
<td>.046</td>
<td>.048</td>
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3 Yearly average weighted price of all grades of primary metal sold by producers.
4 $0.6464646.

Gold.—The output of recoverable gold in Idaho was 26 per cent greater in 1938 than in 1937 and was the largest since 1896 when it was 112,409 ounces. Gold output from lode mines increased 20 per cent and that from placers 33 per cent; most of the gain in gold from placers came from dragline operations. About 52 per cent of the State total gold output in 1938 came from placer operations; 30 per cent of the total lode and placer was recovered by connected-bucket dredges and 17 per cent by dragline dredges. Nine floating (bucket) dredges treated a total of 6,693,700 cubic yards of gravel and recovered 31,234 ounces of gold, an increase of 2,272 ounces over 1937; and 19 dragline dredges treated a total of 2,173,000 yards of gravel and recovered 17,448 ounces of gold, an increase of 10,589 ounces. Of the total placer gold, 82 per cent came from the Boise Basin, Warren, Carson, Newsome, and West View (Gem County) district. Of the total placer gold, 82 per cent came from the Boise Basin, Warren, Carson, Newsome, and West View (Gem County) district. Of the total placer gold, 82 per cent came from the Boise Basin, Warren, Carson, Newsome, and West View (Gem County) district.
MINING INDUSTRY

The average sales prices of both lead and zinc dropped rapidly during the first half of 1938, and although prices strengthened somewhat during the latter half of the year the yearly averages were considerably lower than in 1937; lead was off 1.3 cents a pound and zinc 1.7 cents. These declines, combined with the reduction in the silver price to 64.6 cents an ounce, resulted in curtailment in output of silver, lead, and zinc by virtually all the large mines in the Coeur d'Alene region. Production of zinc in Idaho decreased 19 per cent in quantity and 40 per cent in value; lead, 11 and 31 per cent, respectively; and silver, 3 and 19 per cent, respectively. The decreases in output of metals in the Coeur d'Alene region were offset in part by a large increase in output of zinc-lead ore from Blaine County and by increases in gold from both lode mines and placers.

METALLURGIC INDUSTRY

Of the 1,999,147 tons of ore (including old tailings) produced in 1938 in Idaho, 186,163 tons (9 per cent) were treated at amalgamation and cyanidation mills, 1,779,815 tons (89 per cent) were treated at concentration plants, and 33,169 tons (2 per cent) were shipped for smelting.

The ore treated at amalgamation and cyanidation mills comprised 12,490 tons treated at straight amalgamation plants, yielding 2,458 ounces of gold and 730 ounces of silver; 59,987 tons treated at combined amalgamation and concentration plants, yielding 11,001 ounces of gold and 5,581 ounces of silver in amalgamation bullion and 616 tons of concentrates; and 113,686 tons treated at straight cyanidation plants. The ore treated at the cyanidation plants contained 4,270 ounces of gold and 3,109 ounces of silver, indicating cyanide extractions of 67 per cent of the gold and 60 per cent of the silver; the plants used 106,676 pounds of sodium cyanide (91-per cent grade), 13,808 pounds of zinc dust, and 600,725 pounds of lime.

The ore treated at concentration plants comprised 93,911 tons of gold ore, 13,105 tons of gold-silver ore, 437,366 tons of silver ore, 252,687 tons of lead ore, and 982,746 tons of zinc-lead ore.

ADA COUNTY

The metal output of Ada County increased slightly in 1938; most of it was gold recovered from the New Deal & Hot Shot and Gold Flour placers on Snake River near Grand View and from gold ore treated by amalgamation and concentration at the Adelmann Bros. mine in the Black Hornet district. Placer operations were reported also in the Boise and Highland districts, and gold ore was shipped for smelting from a property on Blacks Creek.

ADAMS COUNTY

The value of the metal output of Adams County decreased from $149,869 in 1937 to $12,241 in 1938 owing to suspension of operations late in 1937 at the 25-ton cyanidation plant at the Placer Basin mine in the Seven Devils district; the Placer Basin Co. worked the mine in 1937 but ceased operations at the end of the year and dismantled the cyanide plant. The mine was operated 4 months in 1938, and 4 cars of gold ore were shipped to a smelter. The remainder of the county output in 1938 was chiefly copper ore from the River Queen, Lockwood, and Helena properties in the Seven Devils district.

BLAINE COUNTY

The value of the metal output of Blaine County increased from $1,842,899 in 1937 to $2,11,107 in 1938, owing almost entirely to increased output of zinc-lead ore from the Triumph and North Star mines in the Warm Springs district operated by Snyder Mines, Inc. In 1938 the company shipped 103,746 tons of zinc-lead ore to flotation plants at Bauer and Tooele, Utah, compared with about 68,000 tons in 1937; in addition, 2,380 tons of siliceous ore from the Triumph mine were shipped in 1938 for smelting. Aside from the four chief districts in the Coeur d'Alene region, the Warm Springs district was by far the most important producing area in Idaho. The Triumph mine ranked second in output of zinc in Idaho in 1938, fourth in lead, and sixth in silver.
REVIEW BY COUNTIES AND DISTRICTS

Mine production of gold, silver, copper, lead, and zinc in Idaho in 1938, by counties and districts, in terms of recovered metals

<table>
<thead>
<tr>
<th>County and district</th>
<th>Mines producing</th>
<th>Ore</th>
<th>Gold</th>
<th>Silver (lode and placer)</th>
<th>Copper</th>
<th>Lead</th>
<th>Zinc</th>
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<td>Lode Placer</td>
<td>Short tons</td>
<td>Fine ounces</td>
<td>Fine ounces</td>
<td>Pounds</td>
<td>Pounds</td>
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<tr>
<td>Ada County:</td>
<td>Lode Placer</td>
<td>Short tons</td>
<td>Fine ounces</td>
<td>Fine ounces</td>
<td>Pounds</td>
<td>Pounds</td>
<td></td>
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<tr>
<td>Black Hornet</td>
<td>2</td>
<td>585</td>
<td>141</td>
<td>17</td>
<td>31</td>
<td>4,951</td>
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<td>Blacks Creek</td>
<td>3</td>
<td>39</td>
<td>35</td>
<td>15</td>
<td>1,798</td>
<td>1,884</td>
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<td>Highland (Boise River)</td>
<td>4</td>
<td>56</td>
<td>14</td>
<td>65</td>
<td>1,969</td>
<td>1,927</td>
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<td>Snake River</td>
<td>3</td>
<td>335</td>
<td>17</td>
<td>60</td>
<td>11,736</td>
<td></td>
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| Adams County:                            | Lode Placer     | Short tons | Fine ounces | Fine ounces | Pounds | Pounds |
| Rock Flat                                | 5               | 227       | 274          | 20           | 17,745 |
| Seven Devils                             |                |           |              | 3            |        |

| Blaine County:                           | Lode Placer     | Short tons | Fine ounces | Fine ounces | Pounds | Pounds |            |
| Mineral Hill                             | 16              | 1,646     | 576          | 3,813        | 1,989  | 4,239  |
| Sawtooth                                 | 2               | 145       | 163          | 24,356       | 4,826  | 7,741  |
| Warm Springs                             | 5               | 106,131   | 4,308        | 104,959      | 14,740,543 | 24,140,000 | 2,679,997 |

| Boise County:                            | Lode Placer     | Short tons | Fine ounces | Fine ounces | Pounds | Pounds |            |
| Boise Basin                              | 23              | 30,792    | 5,062        | 46,694       | 1,908  | 127,891 |
| Eight Mile Creek                         | 1               | 30        | 35           | 17           |        | 1,166  |
| Grimes Pass                              | 4               | 719       | 280          | 1,304        | 2,704  | 1,674  |
| North Fork                                | 1               | 48        | 19           | 1,046        | 133    | 1,092  |
| South Fork of Payette River              | 4               | 202       | 142          | 19           | 1,546  | 5,092  |
| Summit Flat                              | 1               | 19        | 9            | 68           | 20     | 561    |
| West View                                |                |           |              | 3            |        |

| Bonner County:                           | Lode Placer     | Short tons | Fine ounces | Fine ounces | Pounds | Pounds |            |
| Lakeview                                 | 1               | 304       | 56           | 4,291        | 2,847  | 55,606  |
| Pend d'Oreille                           | 8               | 12,690    | 9            | 58,606       | 1,796  | 1,296,180 | 41,792 | 9,581 |
| Bonneville County :Mt. Pisgah            | 4               | 10        | 9            | 115          |        | 4,340  |

| Boundary County:                         | Lode Placer     | Short tons | Fine ounces | Fine ounces | Pounds | Pounds |            |
| Moyie Yakh                               | 2               | 201       | 34           | 386          | 71     | 8,848  |
| Port Hill                                | 1               | 4,000     |              | 18,829       | 3,347  | 522,043 |
| Butte County:                            | Lode Placer     | Short tons | Fine ounces | Fine ounces | Pounds | Pounds |            |
| Dome                                     | 1               | 98        | 1            | 283          | 92     | 60,826  |
| Lava Creek                               | 2               | 1,037     | 140          | 20,015       | 714    | 17,928  |

| Camas County:                            | Lode Placer     | Short tons | Fine ounces | Fine ounces | Pounds | Pounds |            |
| Little Smoky                             | 4               | 724       | 156          | 241          | 1,069  | 1,796  |
| Skeleton Creek                           | 1               | 13        | 45           | 17           |        | 8,130  |
| Clearwater County:                       | Lode Placer     | Short tons | Fine ounces | Fine ounces | Pounds | Pounds |            |
| Burnt Creek                              | 4               | 18        |              |              |        | 630    |
| Clearwater River                         | 4               | 15        |              |              |        | 352    |
| Moose Creek and Independence Creek       | 7               | 35        |              |              |        | 1,227  |
| North Fork of Clearwater River           | 5               | 34        |              |              |        | 1,192  |
| Pierce                                   | 2               | 21        |              |              |        | 35,032 |

MINING INDUSTRY OF IDAHO
Boise, Warm Springs, Yellow Pine, Ten Mile, Ramey Ridge, Mineral Hill, and Orogrande districts and the Coeur d’Alene region. Increases in gold were recorded in the Middle Boise, Warm Springs, Mineral Hill, Ramey Ridge, and Ten Mile districts, but decreases in the Seven Devils and Yellow Pine districts. Siliceous gold ore and old tailings yielded 39 per cent of the total gold in 1938.

The Fisher-Baumhoff Co., operating two bucket dredges near Centerville, was again the largest gold producer in Idaho. It was followed by the Moores Creek Dredging Co. at Idaho City; the Golden Anchor mine at Burgdorf; the Warren Dredging Co. at Warren; Newsome Creek Placers near Golden; the Jordan Creek dredge at De Lamar; the Triumph (Snyder Mines, Inc.) mine near Hailey; Ralph Davis, Inc. (Dredge), at Montour; the Yellow Pine Co. at Stibnite; the Mayflower mine at Placerville; and the Boise-Rochester property at Atlanta.

Silver.—The output of recoverable silver in Idaho was 18,993,676 fine ounces in 1938, a decrease of 3 per cent from the record output of 1937. Virtually all the large producers of silver in the Coeur d’Alene region reported decreases except the Polaris mine which reported a substantial gain. There was also a substantial increase in silver output from the Warm Springs district. The Coeur d’Alene region produced 91 per cent of the State total silver in 1938; the remainder came chiefly from the Warm Springs, Bayhorse, Blue Wing, Pend d’Oreille, Boise Basin, Carson, and Middle Boise districts. Silver ore yielded 72 per cent of the State total silver, zinc-lead ore 19 per cent, and lead ore 8 per cent. Production of silver from silver ore decreased 519,213 ounces and that from lead ore also decreased, but the output from zinc-lead ore increased 469,709 ounces.

The Sunshine mine, largest producer of silver in the United States, decreased its output from 12,152,000 ounces in 1937 to 11,352,154 ounces in 1938. Eight mines—the Sunshine, Polaris, Bunker Hill, Hecla, Triumph, Morning, Crescent, and Page—produced 94 per cent of the silver output of the State in 1938. All these mines, except the Triumph, are in the Coeur d’Alene region.

Copper.—The output of recoverable copper in Idaho was 4,278,000 pounds in 1938, a decrease of 4 per cent from 1937. Mines in the Coeur d’Alene region produced 88 per cent of the total (nearly 72 per cent from silver ore, 12 per cent from zinc-lead ore, 4 per cent from lead ore, and a little from gold ore); 5 per cent came from gold ore from the McDevitt and Ramey Ridge districts. The Sunshine mine produced more than half the State total copper in 1938; most of the remainder came from the Polaris, Bunker Hill, Copper Queen, and Morning mines.

Lead.—The output of recoverable lead in Idaho was 184,354,000 pounds in 1938, a decrease of 11 per cent from 1937. More than 89 per cent of the total came from the Coeur d’Alene region and 8 per cent from the Warm Springs district; considerable lead was produced also in the Bayhorse, Pend d’Oreille, Port Hill, and Texas districts. Zinc-lead material from the Coeur d’Alene region and the Warm Springs district yielded 75 per cent of the State total lead in 1938; lead ore, chiefly from the Coeur d’Alene region, yielded 23 per cent. Lead recovered from lead ore decreased 20,895,011 pounds and that from zinc-lead material 2,611,776 pounds. The combined lead output of the three largest producers—Bunker Hill, Hecla, and Morning—was 134,740,600 pounds, or 73 per cent of the State total; other large producers of lead were the Triumph, Page, Star, Sherman, Gold Hunter, Blackhawk, Clayton, and Jack Waite properties.

Zinc.—The output of recoverable zinc in Idaho was 88,060,000 pounds in 1938, or 19 per cent less than the record output of 1937. The decrease was due entirely to curtailment of operations at zinc-lead mines in the Coeur d’Alene region, as the output of zinc from the Warm Springs district increased from 13,918,000 pounds in 1937 to 24,140,000 pounds in 1938. More than 72 per cent of the State total zinc in 1938 came from the Coeur d’Alene region and nearly all the remainder from the Warm Springs district. Three mines—the Morning, Triumph, and Bunker Hill—produced 77 per cent of the State total, and the rest came chiefly from the Star, Frisco, Page, and Hecla mines. Zinc-lead ore and old tailings yielded 99 per cent of the total and lead ore the remainder.
## MINING INDUSTRY OF IDAHO

### MINE PRODUCTION BY COUNTIES

Mine production of gold, silver, copper, lead, and zinc in Idaho in 1938, by counties, in terms of recovered metals

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Mine Production of gold, silver, copper, lead, and zinc in Idaho in 1938, by counties and districts, in terms of recovered metals—

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1 Includes counties and districts with production valued at less than $350.
Other producers in Blaine County in 1938 included the Jupiter & Garfield property in the Little Wood River district; the Treasure Vault, Bellevue, Red Elephant, Gold Bottom, Red Leaf, Happy Day, Daisy, Champlain, and Red Rock mines in the Mineral Hill district; and the Vienna mine in the Sawtooth district.

**BOISE COUNTY**

Boise Basin district (Centerville, Placerville, Idaho City, Pioneerville, Quartzburg).—The Boise Basin district continued in 1938 to be the chief gold-producing area in Idaho. Four floating bucket dredges treated 4,236,665 cubic yards of gravel in 1938 and recovered 18,549 ounces of gold, compared with 17,438 ounces in 1937. The Fisher-Baumhoff Co., which operated two bucket dredges (one equipped with seventy-two 7½-cubic foot buckets and the other with eighty 6-cubic foot buckets) near Centerville, was again the largest producer of gold in the State. Other large producers included the Moores Creek Dredging Co. operating a dredge equipped with seventy-two 7½-cubic foot buckets at Idaho City, the Grimes Co. operating a dredge equipped with seventy-two 3½-cubic foot buckets at Pioneerville, and the Lord & Bishop Co. operating a 3-cubic yard dragline and floating washing plant on Fall Creek. Considerable gold was recovered by hydraulic mining at the Leary-Brogan, Gold Hill, Packer, and Morning Star properties. The lode output of the district in 1938 was chiefly gold ore from the Mayflower and Gold Hill & Iowa properties. The Texas-Owyhee Mining & Development Co. operated the Mayflower mine near Placerville continuously and treated 19,712 tons of gold ore by flotation concentration. Talache Mines, Inc., operated the Gold Hill & Iowa mine the first 5 months of the year and treated 9,985 tons of gold ore by amalgamation, a decided decrease from the 31,563 tons treated in 1937; the mine was closed in May 1938 and the staff transferred to the company mine at Atlanta, Elmore County. The Come Back Mining Co. operated its mine at Pioneerville throughout 1938 and shipped high-grade gold-silver ore to a smelter. Most of the remainder of the district lode output was gold ore from the Hay Fork, Mountain Chief, Enterprise-Baby, and Mascot mines. Other producing lode mines in Boise County in 1938 included the Birthday mine on Eight Mile Creek; the Grandview, Homestake, Koon Dog, and K. C. mines near Grimes Pass; the Packer John property in the North Fork district; the Golden Cycle and Jessie mines in the Summit Flat district; and the Comeback mine in the West View district. The marked decrease in output from the Summit Flat district was due to suspension of operations by the Golden Cycle Mining Corporation late in 1937.

**BONNER COUNTY**

Most of the output from Bonner County in 1938 was lead-silver ore, concentrated by flotation, from the Hope (Elsie K.) and Whitedelf properties in the Pend d'Oreille district. The output of ore from the Hope mine was less than half that in 1937, but the output from the Whitedelf increased. Rich silver ore from the Brown Bear, Katherine, Nameloc, and Talache mines, all also in the Pend d'Oreille district, was shipped to a smelter. The output from the Lakeview district decreased decidedly as the Keep Cool mill was not operated; the entire output was mill cleanings from former operations.

**BONNEVILLE COUNTY**

The metal output of Bonneville County in 1938 was chiefly placer gold recovered by hydraulic and sluicing operations at the McCoy Creek, Rosanna, and James properties in the Mt. Pisgah district.

**BOUNDARY COUNTY**

Virtually all the output of Boundary County in 1938 was lead-silver ore from the Idaho Continental mine in the Port Hill district; several thousand tons of ore were treated in a 50-ton flotation plant.

**BUTTE COUNTY**

The output from Butte County in 1938 was crude ore shipped for smelting and comprised silver ore from the Hornsilver and Hub mines in the Lava Creek district and lead ore from the Great Western mine in the Dome district.
CAMAS COUNTY

The increase in output of gold in Camas County in 1938 resulted from operation by the Baumhoff-Fisher Co. of a bucket dredge, equipped with sixty 4-cubic foot buckets, on Little Smoky Creek, and from production of gold ore at the Five Points mine north of Fairfield in the Little Smoky district.

CLEARWATER COUNTY

The output of gold from Clearwater County decreased 1,098 ounces in 1938 owing to suspension of operations at the bucket dredge (64 buckets of 4 cubic feet capacity) on Rhodes Creek, operated in 1937 by Gold Dredging, Inc., and at the dragline and washing plant on Quartz Creek, operated in 1937 by Jett-Ross Mines, Inc. The chief production in the county in 1938 was gold ore from the Silver Creek mine in the Pierce district, where the Silver Creek Gold Mining Co. completed a 50-ton cyanide plant and treated 5,803 tons of gold ore during the latter half of the year. The largest producer of placer gold in the county was the Gold Creek Placer Co., operating a dragline dredge on Orofino Creek in the Pierce district; the dredge operated only a few months.

CUSTER COUNTY

In 1938, as usual, the Bayhorse district was the chief producing area in Custer County, but the value of the district metal output decreased $84,648 from 1937 owing to the decrease in silver from the Ramshorn property that more than offset an increase in silver from the Clayton mine. The Clayton mine and 100-ton flotation mill were operated the entire year by Clayton Silver Mines, and about 39,000 tons of lead ore were milled compared with 28,700 tons in 1937; lead concentrates rich in silver were shipped to Utah for smelting. Silver in crude ore shipped from the Ramshorn mine for smelting decreased nearly 61,000 ounces in 1938. Other producing lode mines in Custer County in 1938 included the White Knob, Bluebird, Ausich, and Horseshoe in the Alder Creek district; the Copper Basin in the Copper Basin district; the Homestake near Stanley; and the Snowdrift, Peak, New Light, and Sunbeam in the Yankee Fork district. Most of the placer output of the county came from Stanley Creek Placers near Stanley and the Gold Bar property in the Yankee Fork district.

ELMORE COUNTY

The value of the metal output from the Middle Boise (Atlanta) district increased from $94,546 in 1937 to $231,439 in 1938. Virtually the entire production came from two properties—the Boise-Rochester mine operated by Talache Mines, Inc., and the Atlanta property operated by the Last Chance Mining Co. Each company treated about 8,000 tons of gold ore by amalgamation and concentration, and each shipped several hundred tons of rich gold ore for smelting. Other producing lode mines in Elmore County in 1938 included the White Knob, Bluebird, Ausich, and Horseshoe in the Alder Creek district; the Copper Basin in the Copper Basin district; the Homestake near Stanley; and the Snowdrift, Peak, New Light, and Sunbeam in the Yankee Fork district. The Feather River Placer Mining Co. installed experimental equipment at a placer in the Bear Creek district and treated 21,000 cubic yards of gravel. The Northwest Gold Mining Co. treated 56,000 cubic yards of gravel from the Rose placer on Snake River near King Hill; the company operated a gas-powered shovel and a special screening and washing plant.

GEM COUNTY

Production of gold in Gem County increased from 759 ounces in 1937 to 4,049 ounces in 1938. Ralph Davis, Inc., the chief producer, operated a dragline and floating washing plant at the Gatfield & Montour property in the West View district. Nearly all the output from lode mines was high-grade gold-silver ore from the Lulu and Black Rock claims.

IDAHO COUNTY

Camp Howard (Salmon River) district (White Bird).—Gold recovered from placer operations in the Camp Howard district increased considerably in 1938. Most of it came from a dragline operation at the Large Bar; other producers included the Pine Bar, Klondyke, Horseshoe Bend Bar, and Olney placers.
Dixie district.—The %-cubic-yard dragline dredge at Dixie Placers was idle in 1938, resulting in a decrease in gold production in the Dixie district. Most of the district output was gold ore from the Mammoth mine, concentrated by flotation, and placer gold recovered by dragline dredges at the Salmon River Placer and Alpha properties.

Elk City district.—Production of gold in the Elk City district increased more than 1,000 ounces in 1938 owing to operation of a 1½-cubic-yard dragline and washer at the Mar-Witter property by the American River Mining Co. The company was organized early in the year and became a large producer of gold. Other fairly large producers of placer gold were the Little Million, Columbus, Deadwood, and Gold Hill properties. The Mount Vernon Co. operated its dredge, equipped with sixty-six 2-cubic-foot buckets, a short time at the Deadwood claim and then moved it to a property on upper Crooked River in the Orogrande district. The chief producers of lode gold were the Grangeville and Madre d'Oro mines.

Florence district.—Nearly the entire output of the Florence district in 1938 was placer gold; the largest producer was the Meadow Creek claim, operated by a dragline dredge.

Marshall Lake district (Burgdorf).—The most important metal production in the Marshall Lake district in 1938 was gold recovered from gold ore at the Golden Anchor mine. The Golden Anchor Mining Co. operated the mine the entire year and treated 10,432 tons of ore in a 50-ton amalgamation and flotation plant; it was the largest producer of lode gold in the State, but its output was less than in 1937. Placer operators in the district recovered 222 fine ounces of gold in 1938; the chief producers were the Laughing Water, Idaho Klondike, Golden Rule, and Mary Jane claims.

Newsome district.—The output of gold in the Newsome district was 4,743 ounces in 1938, compared with 832 ounces in 1937. The large gain resulted from steady operation of the dragline and washing plant on Newsome Creek by Ferris & Marchbank (Newsome Creek Mining Co.); the dredge treated 634,933 cubic yards of gravel from April 5 to November 30 and ranked fifth in the State as a gold producer.

Orogrande district.—Production of gold from lode mines in the Orogrande district decreased in 1938 but that from placers increased. The Orogrande-Frisco Gold Mines, Inc., continued to be the largest producer of gold in the district; it treated 105,983 tons of low-grade gold ore in a 500-ton cyanide plant and recovered 1,917 fine ounces of gold and 1,076 fine ounces of silver. The district output of placer gold (397 ounces) was recovered chiefly by bucket dredging by the Mount Vernon Mining Co. (capacity of dredge given under Elk City district) and sluicing operations at the Baker Gulch property.

Ramey Ridge district.—The value of the metal output of the Ramey Ridge district increased to $99,708 in 1938 owing to the large gain in output of gold ore from the Snow Shoe mine north of Big Creek. The Pierce Metals Development Co. operated the mine throughout the year and treated 5,238 tons of ore in a 25-ton concentration plant; the entire plant was destroyed by fire in January 1939. Nearly all the remainder of the district output was gold ore from the Hand property, treated by amalgamation.

Robbins (Buffalo Hump) district.—The operation of the St. Louis mine by lessees resulted in a large increase in production of gold in the Robbins district in 1938; several thousand tons of gold ore from the mine were treated by concentration at a custom mill at Elk City. The remainder of the district output was chiefly old tailings (gold) from the Jumbo dump, treated by cyanidation.

Salmon River (Riggins and French Creek) district.—Placer operations at Riggins and French Creek recovered 229 fine ounces of gold and 48 fine ounces of silver in 1938; the chief producer was the Morland Gold Corporation, operating the Shorts Bar at Riggins with hydraulic and sluicing equipment.

Ten Mile district (Golden).—The value of the metal output of the Ten Mile district increased from $56,001 in 1937 to $137,145 in 1938 owing to gains in output of gold from the Lone Pine and Blackbird lode mines and the Lena B-Komo placer. The Lone Pine mine was operated throughout the year and
was again the largest producer in the district; about 8,000 tons of ore were treated by amalgamation and concentration. The Clearwater Mining Co. was organized early in the year to operate the Blackbird property, and from February 1 to December 22 about 5,000 tons of ore were treated by amalgamation and concentration. Dragline dredging operations at the Lena B-Komo placer were conducted from April 20 to August 7 by the Western Gold Corporation; the company treated 186,494 cubic yards of gravel and recovered 698 fine ounces of gold and 136 fine ounces of silver. The 2-cubic yard dragline and washing plant were moved in August to a property in Oregon. Most of the remainder of the district output was gold ore from the Shamrock, Red Wing, and Gold King mines.

Warren district.—The value of the metal output of the Warren district increased from $248,027 in 1937 to $300,889 in 1938; the chief production was placer gold recovered by two bucket dredges. The Warren Dredging Co. operated its dredge, equipped with seventy-five 3½-cubic foot buckets, nearly all of 1938 and treated 1,015,000 cubic yards of gravel; the company ranked fourth in Idaho as a gold producer. A dredge of the same size as the Warren dredge was operated by the Baumhoff-Fisher Co.; it treated 608,000 cubic yards of gravel from April 20 to November 11 and recovered 2,022 fine ounces of gold and 722 fine ounces of silver. Production of gold from lode mines in the district came chiefly from the Rescue and Little Giant (Unity) properties.

JEROME COUNTY

The metal output of Jerome County in 1938 was placer gold and silver recovered by various operators along the banks of Snake River near Jerome and Murtaugh.

LEMHI COUNTY

Blue Wing district.—In 1938, as in 1937, the entire output of the Blue Wing district was tungsten ore, containing appreciable silver, copper, and lead, from the Ima mine at May. The capacity of the mill was enlarged to treat 150 tons of ore a day, and a new Diesel compressor plant was installed; 26,823 tons of ore were treated by flotation and magnetic separation.

Boyle and Carmen Creeks district.—The Gibbonsville Mining & Exploration Co. constructed a 150-ton flotation plant at the Silver Star mine in 1938 and treated 2,778 tons of low-grade gold-silver ore.

Eldorado district.—No metal was produced in the Eldorado district in 1938, as the Ranger property, a large producer of gold in 1937, was not productive.

Eureka district.—Most of the output from the Eureka district in 1938 was gold ore from the Queen of the Hills mine, treated by amalgamation, and gold ore from the Starlight mine, shipped for smelting.

Gibbonsville district.—Most of the output from lode mines in the Gibbonsville district in 1938 was gold ore from the Twin Brothers mine, treated by concentration; nearly all the placer production was recovered by hydraulic and sluicing operations at the Sundown property by North Fork Placers.

McDevitt district.—All the output of the McDevitt district in 1938 was gold ore and old tailings from the Copper Queen property, treated by concentration; the Tendoy Copper Queen Syndicate operated the mine throughout the year and in December completed the construction of a new 50-ton flotation plant.

Mackinaw district.—Virtually the entire output from lode mines in the Mackinaw district in 1938 was gold ore from the Shoo Fly mine, treated by amalgamation and concentration. The chief placer producers were the K. G. W., Beaver Creek, and Richardson claims.

Mineral Hill district.—Production of gold in the Mineral Hill district was 2,238 ounces in 1938 compared with 245 ounces in 1937. The large gain was due to operation of the Grunter mine and to the increase in output of gold ore from the Gold Hill mine, both at Shoup. The Grunter mine was acquired in January by Gold Producers, Inc., and 6,725 tons of gold ore were treated during the year in the 50-ton flotation mill, formerly used to treat ore from mines at Gibbonsville but moved to Shoup in August; the mine was the largest producer
of gold in Lemhi County in 1938. The Gold Hill mine and 100-ton flotation mill were leased in July by I. D. Theriault, and 3,650 tons of gold ore were treated by amalgamation and concentration.

Pratt and Sandy Creeks district.—The large increase in output of gold ore from the Goldstone mine on Pratt Creek resulted in a gain in the district gold production in 1938. The mine was operated the entire year by the Goldstone Mining Co., and several thousand tons of ore were treated by concentration. Gold ore was produced also from the Gem, Mendota, and Gray Eagle mines.

Texas district.—The value of the metal output of the Texas district decreased from $111,373 in 1937 to $33,398 in 1938 owing to the decline in shipments of lead-silver ore from the Silver Moon and Latest Out mines.

Yellow Jacket district.—Most of the output from the Yellow Jacket district in 1938 was gold ore from the Yellow Jacket mine, treated by concentration. The mine was operated under lease by the Treasure Gold Mining Co.; late in the year it was taken over by the Condor Gold Mining Co., controlled by the International Smelting & Refining Co.

NEZ PERCE COUNTY

The entire metal output of Nez Perce County in 1938 was placer gold and silver recovered by various operators along the banks of Salmon and Snake Rivers.

OWYHEE COUNTY

Carson district (Silver City, De Lamar).—There were large increases in production of gold in the Carson district in 1938 from both lode and placer properties; the chief output was placer gold recovered by two dredges near De Lamar. Jordan Creek Placers operated its dredge, equipped with sixty-two 3-cubic foot buckets, nearly all the year and treated 605,510 cubic yards of gravel; it was again the largest producer of gold in Owyhee County. Considerable gold was recovered also on Jordan Creek by De Lamar Placers, which operated a dragline and washing plant from March 23 to December 14 and treated 560,000 cubic yards of gravel. The increase in output of lode gold and silver resulted from milling operations at the Trade Dollar and Golden Sunday mines and the De Lamar old tailing dumps; the largest production was derived by concentration of several thousand tons of old tailings from the De Lamar dumps.

Snake River district.—Placer gold recovered from Snake River bars near Grand View decreased in 1938 owing to suspension of operations at the dragline dredge of the Triangle Construction Co. The chief producers were the Dollar claim near Hammett and the Murphy and Hightower claims at Grand View.

POWER COUNTY

Production of gold in Power County was small in 1938, as the dragline dredge, which operated at Bonanza Bar on Snake River in 1937, was idle in 1938.

SHOSHONE COUNTY

COEUR D'ALENE REGION

The value of the metal output of the Coeur d'Alene region decreased 31 per cent in 1938. Most of the loss was in lead and zinc production and was due chiefly to suspension of operations at the Morning mine of the Federal Mining & Smelting Co. for 3 months during the summer and to closing of the Star mine of the Sullivan Mining Co. in July. The output of silver also decreased considerably owing to marked decreases at both the Sunshine and Crescent mines. The closing of the lead smelter at East Helena, Mont., for several months in the summer and fall resulted in shut-downs at several Coeur d'Alene properties, and declining prices of lead and zinc caused curtailment by nearly all the large producers of zinc-lead ore. About 58 per cent of the material produced in Shoshone County in 1938 was zinc-lead ore, 27 per cent silver ore, and 14 per cent lead ore. The following table gives production of
gold, silver, copper, lead, and zinc in the Coeur d'Alene region in 1937 and 1938 and the total for 1884 to 1938.

Mine production of gold, silver, copper, lead, and zinc in the Coeur d'Alene region, Shoshone County, 1937-38, and total, 1884-1938, in terms of recovered metals.

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<th>Silver (lode and placer)</th>
<th>Copper</th>
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1 Figures not available.
2 Short tons.

Beaver district.—The value of the metal output of the Beaver district declined from $344,534 in 1937 to $34,701 in 1938, owing chiefly to the large decrease in output of zinc-lead ore and old tailings from the Interstate-Callahan property, where operations were suspended in February after 3,900 tons of zinc-lead ore had been mined; the ore was treated in the Galena mill near Wallace.

Coeur d'Alene district.—Placer gold continued in 1938 to be the chief metal produced in the Coeur d'Alene district, but the output was less than in 1937; most of it was recovered by drift mining at the Beehive Bar, Grove Walker, and Old Dunn claims.

Eagle district.—Production of silver, lead, and zinc in the Eagle district in 1938 was about double that in 1937 owing to increase in output of zinc-lead ore and lead ore from the Jack Waite mine, the only producer. The property lies in both Shoshone County, Idaho, and Sanders County, Mont.; the output from the Idaho section of the mine comprised 7,795 tons of zinc-lead ore treated in the mill at Duthie and 221 tons of rich lead ore shipped for smelting.

Evolution district.—The value ($8,741,743) of the metal production of the Evolution district in 1938 was larger than that of any district in Idaho, although it was $1,789,309 less than in 1937. The chief production, as in 1937, was silver ore from the Sunshine and Polaris properties. The Sunshine Mining Co. was again the largest producer of silver in the United States; the company operated its 1,100-ton flotation mill continuously and treated 321,605 tons of silver ore, or 65,805 tons more than in 1937, but the output of silver declined from 12,152,000 ounces in 1937 to 11,352,154 ounces in 1938 as the silver content of the ore decreased. Development in 1938 comprised 8,695 feet of drifting, 2,198 feet of diamond drilling, 4,446 feet of raising, 3,038 feet of crosscutting, and 454 feet of sinking. The Polaris Mining Co. operated its 200-ton flotation mill throughout the year and treated 64,405 tons of silver ore, or about double the quantity in 1937; the company ranked third in Idaho in production of silver. The remainder of the district output comprised 1,220 tons of silver ore from the Mineral Point mine and 180 tons of ore from the St. Elmo property.

Hunter district (Mullan).—The value of the metal output of the Hunter district declined from $7,691,893 in 1937 to $4,246,649 in 1938; production of silver decreased 337,099 ounces, lead 15,639,814 pounds, and zinc 15,260,683 pounds. These losses were due to decreases in output of ore from the four chief producers—the Morning, Star, Gold Hunter, and Golconda mines. The Morning mine, the largest producer of zinc in the State, was closed from June 25 to September 21, and the Star mine, a large producer of zinc and lead, was closed in July. The output of the Morning mine comprised 262,329 tons of zinc-lead-silver ore concentrated by flotation (compared with 350,609
TWIN FALLS COUNTY

The entire output of Twin Falls County in 1938 was placer gold and silver recovered by various operators along the banks of Snake River near Twin Falls, Kimberly, and Hansen.
VALLEY COUNTY

Deadwood Basin district.—Nearly all the output of the Deadwood Basin district in 1938 was lead-silver ore from the Lost Pilgrim mine and gold ore from the W. J. L. claim. The Lost Pilgrim mine had been idle since 1932.

Pistol Creek district.—The Lucky Boy mine near Landmark was the only producer in the Pistol Creek district in 1938; 348 tons of lead ore rich in gold and silver were shipped to a smelter in Utah.

Thunder Mountain district.—Most of the output from the Thunder Mountain district in 1938 was gold ore from the Sunnyside mine operated by the Thunder Mountain Mining & Milling Co.; about 3,600 tons of gold ore were treated by amalgamation and concentration.

Yellow Pine district.—The Meadow Creek property near Stibnite was operated by the Yellow Pine Co. until August 1, 1938, and the remainder of the year by the Bradley Mining Co.; all assets of the Yellow Pine Co. were acquired by the Bradley Mining Co. the first of August. The 200-ton flotation mill was operated throughout the year on ore containing chiefly gold, antimony, and silver, but production of gold and silver was much less than in 1937.

WASHINGTON COUNTY

The output from mines in Washington County in 1938 was virtually the same as in 1937, as shipments of silver ore containing lead and copper were maintained from the Silver Still property near Mineral.

The above information (in more detail), for sale in pamphlet form by the Superintendent of Documents, Washington, D. C.—Price 5 cents.
Metal mines in Idaho produced (in terms of recoverable metals) gold, silver, copper, lead, and zinc valued at about $30,166,000 in 1939, according to estimates by the Salt Lake City office of the Bureau of Mines, United States Department of the Interior; the value of the 1938 output was $29,028,103, indicating an increase of 4 per cent in 1939. The output of gold increased nearly 10,500 ounces, copper 472,000 pounds, and zinc 5,090,000 pounds; but the output of silver declined 1,794,000 ounces and lead 2,954,000 pounds. The output of gold in 1939 was larger than in any year since 1895, when it was 125,517 ounces. Most of the increase in value in 1939 was in zinc and lead and resulted from higher metal prices.

The average sales price per pound of copper increased from $0.098 in 1938 to $0.104 in 1939, lead from $0.046 to $0.050, and zinc from $0.048 to $0.053; the average price per ounce paid for silver increased from $0.646+ in 1938 to $0.678+ in 1939; and the price of gold remained unchanged at $35 per ounce.

The output of gold in Idaho was about 114,000 fine ounces valued at $3,990,000 in 1939 compared with 103,513 ounces valued at $3,622,955 in 1938, an increase of 10 per cent. Gold from placer operations totaled about 49,000 ounces, a decrease from 54,079 ounces in 1938. Eight connected-bucket dredges recovered about 29,000 ounces of gold in 1939 and dragline operations about 14,000 ounces; in 1938, nine connected-bucket dredges produced 31,234 ounces and dragline excavators 17,448 ounces. Four bucket dredges working in the Boise Basin district, Boise County, in 1939 recovered more than one-third of the State output of placer gold; most of the remainder was recovered by bucket dredges operating at Warren, Pierce, and near Elk City, and by dragline dredges operating near Golden, De Lamar, Silver City, and Elk City. The large Yuba dredge which operated at De Lamar from July 25, 1935, to November 15, 1938, was moved to a property in Oregon, and the dragline dredge at Montour, which produced nearly 4,000 ounces of gold in 1938, ceased operations at the Montour property in December, 1938. The production of gold from lode mines was about 65,000 ounces in 1939 compared with 49,434 ounces in 1938. About 83 per cent of the total gold from lode mines came from the Middle Boise (Atlanta), Marshall Lake (Burgdorff), Warm Springs, Yellow Pine, Coeur d'Alene, Mineral Hill (Shoup), Carson, and Boise Basin districts. There were substantial increases in gold production from the Middle Boise, Marshall Lake, Warm Springs, and Yellow Pine districts, but a large decrease from the West View (Montour) districts. The largest producers of gold in Idaho in 1939 were the Fisher & Baumhoff dredges at Centerville, Golden Anchor mine at Burgdorff, Boise-Rochester property at Atlanta, Triumph mine near Ketchum, Warren Dredging Co. at Warren, Yellow Pine mine at Stibnite, Ferris & Marchbank dragline on Newsome Creek, Idaho-Canadian Dredging Co. (formerly Moores Creek Dredging Co.) near Idaho City, Consolidated Gold Mines, Inc., near Murray, De Lamar Milling Corporation at De Lamar, and Gold Producers, Inc., at Shoup.

The output of silver in Idaho was about 17,199,600 fine ounces valued at $11,674,880 in 1939 compared with 18,993,676 ounces valued at $12,278,740 in 1938, a decrease of 9 per cent in quantity and 5 per cent in value. The Sunshine Mining Co. was again the largest silver producer in the United States, although its output declined from 11,352,154 ounces in 1938 to about 9,333,000 ounces in 1939. Large decreases in silver output were reported also by the Polaris Mining Co. and the Hecla Mining Co., but substantial increases by the Federal Mining & Smelting Co., Coeur d'Alene Mines Corporation, and Snyder Mines, Inc. Following the Sunshine, other large producers of silver in Idaho in 1939 were the Bunker Hill & Sullivan, Polaris, Triumph, Morning, Hecla, Crescent, Page, Coeur d'Alene, Clayton, and Gold Hunter mines, all in the Coeur d'Alene region except the Triumph and Clayton properties.
The copper output of Idaho was about 4,750,000 pounds valued at $494,000 in 1939 compared with 4,278,000 pounds valued at $419,244 in 1938. More than half of the State total in 1939 was recovered from silver ore from the Sunshine property; the rest came largely from silver ore from the Coeur d'Alene and Polaris mines and zinc-lead ore from the Hecla, Bunker Hill & Sullivan, Morning, and Triumph mines.

Lead production in Idaho was about 181,400,000 pounds valued at $9,070,000 in 1939 compared with 184,354,000 pounds valued at $8,480,284 in 1938, and zinc about 93,150,000 pounds valued at $4,936,950 compared with 88,060,000 pounds valued at $4,226,880. The output of lead decreased 2 per cent in quantity but increased 7 per cent in value, due to the higher average sales price, and zinc increased 6 per cent in quantity and 17 per cent in value. There was a notable increase in output of lead at the Morning mine of the Federal Mining & Smelting Co., but large decreases were reported by the Hecla Mining Co., Snyder Mines, Inc., and Bunker Hill & Sullivan Mining & Concentrating Co. The Morning mine was the largest lead producer in Idaho in 1939, followed by the Bunker Hill & Sullivan, Hecla, Page, Triumph, Blackhawk, Star, Idaho Continental, and Gold Hunter mines. These nine properties produced 92 per cent of the State total. The Morning mine at Mullan was by far the largest producer of zinc in Idaho in 1939. The property was operated throughout the year and its output of zinc increased more than 8,000,000 pounds. Substantial increases were reported also from the Hecla, Bunker Hill & Sullivan, and Star mines, but a decrease of more than 10,000,000 pounds was reported at the Triumph mine near Ketchum. Nearly 95 per cent of the zinc produced in Idaho in 1939 came from the Morning, Bunker Hill & Sullivan, Triumph, Star, Hecla, Page, and Frisco mines, named in order of output.

About 2,050,000 tons of ore were produced in Idaho in 1939 compared with 1,999,147 tons in 1938. About 79 per cent of the total in 1939 came from 40 mines in the Coeur d'Alene region; the remainder was mostly gold ore from Valley, Elmore, Idaho, Lemhi, and Boise Counties; silver ore from Blaine and Owyhee Counties, lead-silver ore from Custer, Boundary, and Bonner Counties, and zinc-lead ore from Blaine County.

An increase is indicated in the number of lode mines producing in Idaho in 1939, but a decrease in the number of placers. There were 305 lode mines and 463 placers producing in 1938, a total of 768 mines.

In 1939 mines in the Coeur d'Alene region, Shoshone County, produced 88 per cent of the State silver output, 86 per cent of the copper, 90 per cent of the lead, and 85 per cent of the zinc. The rest of the silver, copper, and lead came largely from the Warm Springs district in Blaine County, the Bay Horse district in Custer County, the Port Hill district in Boundary County, and the Pend d'Oreille district in Bonner County; and nearly all the rest of the zinc came from the Warm Springs district. The production of silver and lead from the Coeur d'Alene region was much less than in 1938, but the production of gold, copper, and zinc was greater. Silver decreased from 17,325,579 to 15,165,000 ounces and lead from 164,547,979 to 162,875,000 pounds; zinc increased from 63,874,125 to 79,500,000 pounds, copper from 3,765,795 to 4,100,000 pounds, and gold from 4,053 to 5,550 ounces. The total output of ore and old tailings from the region was about 1,615,000 tons in 1939 compared with 1,514,278 tons in 1938; more than 70 per cent in 1939 was zinc-lead ore and old tailings and 10 per cent of the remainder was silver ore. The Mining of the Federal Mining & Smelting Co. increased its output of zinc-lead-silver ore more than 40 per cent. The Star mine, a large producer of zinc-lead ore, was reopened in September. The lead smelter and refinery at Kellogg, owned by the Bunker Hill & Sullivan Mining & Concentrating Co., and the electrolytic zinc plant at Silver King, operated by the Sullivan Mining Co., were operated throughout the year at a higher rate than in 1938. At the end of the year a new plant was under construction at the Bunker Hill smelter; it is designed to treat the rich silver concentrates (tetrahedrite) from the Sunshine, Polaris, and Crescent mills.

Following the Coeur d'Alene region, the Warm Springs district near Ketchum, Blaine County, was the most important producing area in Idaho in 1939. Its output was virtually all zinc-lead ore and gold-silver ore from property
operated by Snyder Mines, Inc.; the ore was shipped to Bauer and Tooele (Utah) for reduction. In 1939 approximately 111,500 tons of ore were produced in the district, and yielded 8,600 ounces of gold, 1,175,000 ounces of silver, 100,000 pounds of copper, 11,000,000 pounds of lead, and 13,600,000 pounds of zinc; in 1938, 106,131 tons of ore yielded 4,308 ounces of gold, 1,054,746 ounces of silver, 104,859 pounds of copper, 14,740,543 pounds of lead, and 24,140,000 pounds of zinc.

Final State, county, and district annual figures and further operating details by districts will appear in Minerals Yearbook, 1940.


INSPECTORS OF MINES

WILLIAM S. HASKINS ................................................................. 1893-1894
E. H. DEWEY ............................................................................. 1895-1896
BENJAMIN F. HASTINGS ............................................................. 1897-1898
JAY A. CZIZEK ........................................................................... 1899-1900
MARTIN JACOBS ......................................................................... 1901-1902
ROBERT N. BELL ........................................................................ 1903-1904
ROBERT N. BELL ........................................................................ 1905-1906
ROBERT N. BELL ........................................................................ 1907-1908
F. CUSHING MOORE .................................................................. 1909-1910
ROBERT N. BELL ........................................................................ 1911-1912
ROBERT N. BELL ........................................................................ 1913-1914
ROBERT N. BELL ........................................................................ 1915-1916
ROBERT N. BELL ........................................................................ 1917-1918
ROBERT N. BELL ........................................................................ 1919-1920
STEWART CAMPBELL .................................................................. 1921-1922
STEWART CAMPBELL .................................................................. 1923-1924
STEWART CAMPBELL .................................................................. 1925-1926
STEWART CAMPBELL .................................................................. 1927-1928
STEWART CAMPBELL .................................................................. 1929-1930
STEWART CAMPBELL .................................................................. 1931-1932
W. H. SIMONS ............................................................................ 1933-1934
ARTHUR CAMPBELL .................................................................... 1935-1936
ARTHUR CAMPBELL .................................................................... 1937-1938
ARTHUR CAMPBELL .................................................................... 1939-1940

DEPARTMENT, INSPECTOR OF MINES
APPROPRIATION BIENNIAL 1939-1940

Salaries ........................................................................................ A-1 $ 9,120.00
A-2 900.00
Services Other Than Personal ....................................................... 6,850.00
Supplies ....................................................................................... 300.00
Equipment .................................................................................... 200.00
Fixed Charges .............................................................................. 75.00

Total .............................................................................................. $17,445.00
### Monthly Average Prices of Metals
#### 1936-1937-1938-1939

#### Silver

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<thead>
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<th>1938</th>
<th>1939</th>
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<td>44.750</td>
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<td>44.750</td>
<td>42.750</td>
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<td>44.750</td>
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<td>34.956</td>
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Quotations cents per oz. troy, 999 fine.

#### Lead

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<th>1938</th>
<th>1939</th>
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</thead>
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<td>6.175</td>
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<td>6.000</td>
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</tr>
<tr>
<td>July</td>
<td>4.600</td>
<td>6.000</td>
<td>4.882</td>
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<tr>
<td>August</td>
<td>4.600</td>
<td>6.452</td>
<td>4.900</td>
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<tr>
<td>September</td>
<td>4.600</td>
<td>6.400</td>
<td>4.998</td>
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<tr>
<td>October</td>
<td>4.631</td>
<td>5.740</td>
<td>5.100</td>
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<tr>
<td>November</td>
<td>5.114</td>
<td>5.033</td>
<td>5.091</td>
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<tr>
<td>December</td>
<td>5.945</td>
<td>4.850</td>
<td>4.860</td>
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</table>

Quotations, cents per pound.

#### Zinc

<table>
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<th>1939</th>
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<tr>
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<td>6.465</td>
<td>4.813</td>
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</tr>
<tr>
<td>March</td>
<td>4.900</td>
<td>7.381</td>
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<td>4.900</td>
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<td>May</td>
<td>4.900</td>
<td>6.750</td>
<td>4.042</td>
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<tr>
<td>June</td>
<td>4.880</td>
<td>6.750</td>
<td>4.131</td>
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<tr>
<td>July</td>
<td>4.783</td>
<td>6.923</td>
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<td>August</td>
<td>4.800</td>
<td>7.192</td>
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<td>September</td>
<td>4.850</td>
<td>7.190</td>
<td>4.846</td>
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<tr>
<td>October</td>
<td>4.850</td>
<td>6.085</td>
<td>5.012</td>
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<tr>
<td>November</td>
<td>4.974</td>
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<tr>
<td>December</td>
<td>5.160</td>
<td>5.150</td>
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<td>5.980</td>
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Quotations, cents per pound.

#### Copper

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<th>1938</th>
<th>1939</th>
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<td>9.169</td>
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<td>9.275</td>
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<tr>
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<td>10.161</td>
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<tr>
<td>December</td>
<td>10.454</td>
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Quotations, cents per pound.
COEUR D’ALENE MINES DIVIDEND RECORD
FOR 1939

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<th>Company</th>
<th>1939</th>
<th>1938</th>
<th>Grand Total</th>
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<tr>
<td>Bunker Hill &amp; Sullivan M. &amp; C. Co.</td>
<td>$981,000</td>
<td>$54,776</td>
<td>$53,250,439</td>
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<td>Dayrock</td>
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<td>271,438</td>
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<tr>
<td>Federal M. &amp; S. Co. (pfd.)</td>
<td>208,000</td>
<td>79,000</td>
<td>28,558,349</td>
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<td>Hecla Mining Co.</td>
<td>350,000</td>
<td>300,000</td>
<td>23,105,000</td>
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<tr>
<td>Jack Waite</td>
<td></td>
<td>41,316</td>
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<tr>
<td>Polaris</td>
<td></td>
<td></td>
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<tr>
<td>Sherman</td>
<td></td>
<td></td>
<td>80,850</td>
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<tr>
<td>Sunshine Mining Co.</td>
<td>2,382,114</td>
<td>3,275,406</td>
<td>17,984,960</td>
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<tr>
<td>Sidney Mining Co.</td>
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<td>108,750</td>
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<tr>
<td>Sullivan Mining Co.</td>
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<td></td>
<td>174,482</td>
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<tr>
<td>Tamarack</td>
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<td>1,242,123</td>
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$3,970,498  $125,097,707

DIVIDENDS PAID BY MINING COMPANIES OF
THE COEUR D’ALENE MINING DISTRICT

(1886 TO 1939)

Bunker Hill & Sullivan ........................................... $53,250,439
Big Creek Leasing Co. ........................................... 5,000
Black Cloud .......................................................... 71,889
Caledonia ............................................................ 4,851,492
Consolidated Interstate-Callahan ......................... 7,721,689
Crown Point ......................................................... 102,000
Dayrock ............................................................... 271,438
Douglas ................................................................. 38,407
Federal Mining & Smelting Co. (all holdings) ............ 28,558,349
Golconda ................................................................ 80,000
Gold Hunter ......................................................... 521,974
Green Hill-Cleveland ............................................. 2,951,877
Hecla ..................................................................... 23,105,000
Hercules ................................................................. 21,543,622
Humming Bird ......................................................... 34,096
Jack Waite ............................................................. 41,316
Marsh Mining Co. .................................................. 40,000
Ontario .................................................................... 394,877
Polaris Mining Co. ................................................ 280,000
Sidney (company and leasing company) .................... 173,685
Sherman Lead .......................................................... 80,850
Snowstorm .............................................................. 1,457,647
Star ....................................................................... 250,000
Stewart ................................................................... 2,692,747
Sullivan Mining Co. ................................................ 174,482
Success ................................................................. 1,267,894
Sunshine ................................................................ 17,984,960
Tamarack ............................................................... 1,242,123
Tuscumbia ............................................................... 18,226
Yukon Gold Dredge (Murray) .................................... 500,000
Leasers and companies not listed (estimated) .......... 500,000

GRAND TOTAL ......................................................... $170,205,179

The amount estimated for leasers and companies not listed is placed at a conservative figure rather than otherwise. The list does not include records of personal and partnership profits in small operations, principally in placer mining in the Murray district.
THE IMPORTANCE OF MINING IN IDAHO

The great diversity of mineral wealth within the state establishes Idaho as one of the principal mining states of the Union. It also makes mining the second most important industry in the state.

Minerals enter into practically every phase of our civilization and furnish the raw material for an amazing proportion of our industry. Among the industries by-product to minerals are: Motion pictures, tableware, cooking utensils, automobiles, batteries, railroad rails and coaches, wire, roofing and building materials, printing, chemicals, plumbing, ink, paints—in fact every phase of human existence, human necessity, comfort or luxury.

Every year the mining industry of Idaho diverts thousands of dollars from the rich ore deposits into the pockets of labor, business, and contributes to the cost of government.

In an effort to give the general public an idea of the importance of mining, in respect to the economic structure of our state, we submit the following data covering four of the largest producers of mineral in Idaho:

BUNKER HILL & SULLIVAN MINING AND CONCENTRATING COMPANY
Kellogg, Idaho

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<th>Average number of employees in Idaho</th>
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<td></td>
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</tr>
<tr>
<td>Wages and salaries</td>
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<td>Electric Power purchased</td>
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<tr>
<td>Supplies and equipment</td>
<td>1,572,945.14 2,000,000.00</td>
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<td>Forest products purchased within</td>
<td></td>
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<tr>
<td>State of Idaho</td>
<td>78,500.00</td>
</tr>
<tr>
<td>Freight paid</td>
<td>1,394,832.64</td>
</tr>
<tr>
<td>Idaho State and County taxes</td>
<td>542,888.72</td>
</tr>
<tr>
<td>Taxes paid State and Federal Agencies</td>
<td>850,000.00</td>
</tr>
<tr>
<td>Insurance—fire, liability, etc</td>
<td>19,534.18</td>
</tr>
<tr>
<td>Workmen's Compensation, Accident</td>
<td>43,042.63</td>
</tr>
<tr>
<td>Awards, Death Benefits</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>$6,416,195.51 $5,350,000.00</td>
</tr>
<tr>
<td>Average earnings of employees</td>
<td>$1,418.49</td>
</tr>
<tr>
<td>State and County taxes paid per man employed</td>
<td>311.29</td>
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</tbody>
</table>

FEDERAL MINING AND SMELTING COMPANY
Producers of Silver, Lead and Zinc

<table>
<thead>
<tr>
<th>Mines at Mullan and Page, Idaho</th>
<th>General Offices, Wallace, Idaho</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average number of employees in Idaho</td>
<td>774</td>
</tr>
<tr>
<td>Total payroll in Idaho</td>
<td>$1,240,000.00 $1,700,000.00</td>
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<tr>
<td>Electric power purchased</td>
<td>170,000.00 210,000.00</td>
</tr>
<tr>
<td>Supplies and equipment</td>
<td>517,000.00 650,000.00</td>
</tr>
<tr>
<td>Idaho State and County taxes</td>
<td>204,000.00 190,000.00</td>
</tr>
<tr>
<td>U. S. Government taxes</td>
<td>180,000.00</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$2,131,000.00 $2,930,000.00</td>
</tr>
<tr>
<td>Average earnings of each employee</td>
<td>$1,600.00</td>
</tr>
<tr>
<td>Taxes paid per man employed</td>
<td>263.00</td>
</tr>
</tbody>
</table>

In addition to the above, leasers' operations at the Morning Mine employ approximately 150 men additional. Leasers disburse approximately $300,000 payroll, $100,000 supplies; and pay $25,000 taxes.
IMPORTANCE OF MINING IN IDAHO

HECLA MINING COMPANY
Burke, Idaho

Average number of employees in Idaho .................................................. 515

<table>
<thead>
<tr>
<th>Year</th>
<th>Wages and salaries</th>
<th>Forest products purchased within</th>
<th>Electric power purchased</th>
<th>Freight</th>
<th>Paid to Idaho smelters</th>
<th>Supplies, Insurance, Workmen's Compensation and Miscellaneous</th>
<th>State taxes</th>
<th>Federal taxes</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1937</td>
<td>$1,091,000.00</td>
<td>$110,000.00</td>
<td>$92,000.00</td>
<td>$82,000.00</td>
<td>$452,000.00</td>
<td>$437,000.00</td>
<td>$173,000.00</td>
<td>$185,000.00</td>
<td>$2,622,000.00</td>
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<tr>
<td>1938</td>
<td>$ 973,000.00</td>
<td>$ 82,000.00</td>
<td>$91,000.00</td>
<td>$59,000.00</td>
<td>$375,000.00</td>
<td>$455,000.00</td>
<td>$ 59,000.00</td>
<td>$ 76,000.00</td>
<td>$2,170,000.00</td>
</tr>
</tbody>
</table>

TOTAL ...................................................... $2,622,000.00 $2,170,000.00

SUNSHINE MINING COMPANY
Kellogg, Idaho

Average number of employees in Idaho .................................................. 600

<table>
<thead>
<tr>
<th>Year</th>
<th>Employment</th>
<th>Wages</th>
<th>Materials, etc</th>
<th>Taxes</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1938</td>
<td>180,000 man days</td>
<td>$1,220,000.00</td>
<td>$900,000.00</td>
<td>$1,160,000.00</td>
<td>$3,280,000.00</td>
</tr>
<tr>
<td>1939</td>
<td>170,000 man days</td>
<td>$1,166,000.00</td>
<td>$790,000.00</td>
<td>$915,000.00</td>
<td>$2,871,000.00</td>
</tr>
</tbody>
</table>

TOTAL ...................................................... $3,280,000.00 $2,871,000.00

Idaho leads the nation in the production of silver. The Sunshine Mining Company is the largest producer of silver in the United States. Silver money and silver mining mean more employment and better business.

ANACONDA COPPER MINE
Conda, Idaho
MINE VENTILATION

MODERN AIR SYSTEM FOR SUNSHINE MINE

Conforming with its progressive policy of modern mine management, combining with efficiency the comfort, health and safety of its employees, the Sunshine Mining company, owning the largest and richest silver mine in the United States, has installed at a cost of approximately $100,000, an entirely new ventilation system which is now nearing completion at the Sunshine mine on Big Creek. In the past the mine has been using a centrifugal type fan of approximately 30,000 cubic feet per minute output, which was installed on the 500 level. This fan drew air down the Jewell shaft, east along the lower levels and up through the stoping area, exhausting up the incline shaft and Price raise to the No. 4 tunnel. Used in conjunction with this fan were numerous small blower type fans to ventilate the less accessible drifts and crosscuts.

The former system was dependent on old stope raises for air passages. These old raises in stope areas were extremely difficult to maintain, and being of a limited cross-sectional area, several of them had to be kept open between each level. To eliminate this constant source of expense and trouble and to provide large airways of sufficient area to permit the passage of a large volume of air with minimum friction, a new system of raises was begun. These new raises have a free area inside of timber of approximately 60 square feet and are being driven far enough away from the vein and stopes to be uninfluenced by those operations. For this reason it is expected that these new raises will require a minimum of attention. Of the 3000 feet of raising and the 1200 feet of crosscutting required to complete the system to the 2500 level, all but 750 feet of the former and 140 feet of the latter are finished to date. This remaining work should be completed by April 1940. These raises, when complete, are equipped with steel safety ladders, thus affording a continuous emergency exit from the lower levels.
The fan selected for the job and installed at the No. 4 tunnel, is an Aero­dyne 8-60, an eight-bladed, 5-foot diameter fan, equipped with a 50-horsepower motor. This unit, of the latest design and aluminum construction, is a very efficient fan and has, in the preliminary tests run thus far, produced in excess of 70,000 cubic feet of air per minute. By increasing the size of the motor driving the fan and changing the pitch setting of the aeroplane-type propellors, the volume of air moved can be raised to 100,000 cubic feet per minute.

It requires 240 steel ladders or 2400 feet to equip the raises. These ladders are being made at the Coeur d'Alene Hardware & Foundry plant in Wallace. They are of sturdy design and are built in the form of a skeleton tube with circular steel bands supporting the ladder, and when in place will form a perfect steel tube which serves the dual purpose of an airway and an emergency manway.

**Courtesy, The Wallace Miner, Wallace, Idaho.**
<table>
<thead>
<tr>
<th>Approximation, Inspector of Mines—1939-1940</th>
<th>327</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessments Work, United States</td>
<td>154</td>
</tr>
<tr>
<td>Abbe County</td>
<td>309</td>
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<tr>
<td>Adair Min. Co.</td>
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<tr>
<td>Addit Min. Co.</td>
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<tr>
<td>Aetna Group</td>
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<tr>
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</tr>
<tr>
<td>Aetna M. &amp; M. Co., Ltd.</td>
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<tr>
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<tr>
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<tr>
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<tr>
<td>Alpena Copper Min. Co., Ltd.</td>
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<tr>
<td>Anex Gold Min. Co.</td>
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<td>American Dollar M. &amp; M. Co.</td>
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<tr>
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<td>American S. &amp; R. Co.</td>
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<td>Atlas Min. Co.</td>
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<td>Aztec M. &amp; M. Co.</td>
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<td>Big Elk Min. Co., Ltd.</td>
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<td>Big Five Min. Co.</td>
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</tr>
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<td>213</td>
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<td>232</td>
</tr>
<tr>
<td>Building Stone</td>
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</tr>
<tr>
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<tr>
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</tr>
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</tr>
<tr>
<td>Burke Group</td>
<td>265</td>
</tr>
<tr>
<td>Butte &amp; Coeur d'Alene Dev. Co.</td>
<td>256</td>
</tr>
<tr>
<td>Butte &amp; Cda. Silver-Lead</td>
<td>256</td>
</tr>
<tr>
<td>Mines, Inc.</td>
<td>256</td>
</tr>
<tr>
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</tr>
<tr>
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<td>308</td>
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<td>Calabria Min. Co.</td>
<td>258</td>
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</tr>
<tr>
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<td>------</td>
</tr>
<tr>
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</tr>
<tr>
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<td>258</td>
</tr>
<tr>
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<td>213</td>
</tr>
<tr>
<td>Callahan Zinc-Lead Co.</td>
<td>258</td>
</tr>
<tr>
<td>Camas County</td>
<td>182</td>
</tr>
<tr>
<td>Camp Bird Min. &amp; D. Co.</td>
<td>172</td>
</tr>
<tr>
<td>Camp Howard Dist.</td>
<td>318</td>
</tr>
<tr>
<td>Canyon County</td>
<td>185</td>
</tr>
<tr>
<td>Carbonate M. &amp; M. Co.</td>
<td>259</td>
</tr>
<tr>
<td>Caribou County</td>
<td>259</td>
</tr>
<tr>
<td>Caribou Min. Co., Ltd</td>
<td>224</td>
</tr>
<tr>
<td>Carolina Claims, Inc.</td>
<td>172</td>
</tr>
<tr>
<td>Carson Dist.</td>
<td>321</td>
</tr>
<tr>
<td>Casing M. &amp; M. Co.</td>
<td>308</td>
</tr>
<tr>
<td>Cassia County</td>
<td>187</td>
</tr>
<tr>
<td>Cassidy Gold M. &amp; M. Co., Ltd</td>
<td>227</td>
</tr>
<tr>
<td>Catherine Min. Co., No. 1</td>
<td>195</td>
</tr>
<tr>
<td>Centennial Claims, Inc</td>
<td>173</td>
</tr>
<tr>
<td>Central Min. Co.</td>
<td>259</td>
</tr>
<tr>
<td>Challenger Co., The</td>
<td>308</td>
</tr>
<tr>
<td>Challenger Mines Co.</td>
<td>308</td>
</tr>
<tr>
<td>Challenger Trust Co.</td>
<td>161</td>
</tr>
<tr>
<td>Chester Min. Co., Ltd</td>
<td>259</td>
</tr>
<tr>
<td>Cincinnati Min. Co.</td>
<td>259</td>
</tr>
<tr>
<td>Clancy Min. Co.</td>
<td>178</td>
</tr>
<tr>
<td>Clark County</td>
<td>189</td>
</tr>
<tr>
<td>Clay</td>
<td>107</td>
</tr>
<tr>
<td>Clayton Silver Mines Co.</td>
<td>195</td>
</tr>
<tr>
<td>Clear Grit Min. Co., Ltd</td>
<td>259</td>
</tr>
<tr>
<td>Clear Water Dyke Min. Co.</td>
<td>308</td>
</tr>
<tr>
<td>Clearwater County</td>
<td>189</td>
</tr>
<tr>
<td>Clearwater G. &amp; C. Min. Co., The</td>
<td>259</td>
</tr>
<tr>
<td>Clearwater Exp. Co. (A Trust)</td>
<td>213</td>
</tr>
<tr>
<td>Clearwater Min. Co.</td>
<td>213</td>
</tr>
<tr>
<td>Cloverleaf Metals Co.</td>
<td>168</td>
</tr>
<tr>
<td>Coal</td>
<td>39, 108</td>
</tr>
<tr>
<td>Cobalt</td>
<td>109</td>
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<tr>
<td>Coeur d'Alene Champion Min. Co.</td>
<td>259</td>
</tr>
<tr>
<td>Coeur d'Alene Crescent M. Co.</td>
<td>259</td>
</tr>
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<td>Coeur d'Alene Dist.</td>
<td>322</td>
</tr>
<tr>
<td>Coeur d'Alene Dividend Record</td>
<td>1886-1939 329</td>
</tr>
<tr>
<td>Coeur d'Alene Extension Mines, Inc.</td>
<td>259</td>
</tr>
<tr>
<td>Coeur d'Alene Lead Co.</td>
<td>260</td>
</tr>
<tr>
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<td>260</td>
</tr>
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<td>260</td>
</tr>
<tr>
<td>Coeur d'Alene Min. Co.</td>
<td>260</td>
</tr>
<tr>
<td>Coeur d'Alene Region</td>
<td>321, 322</td>
</tr>
<tr>
<td>Coeur d'Alene Spokane Min. Co.</td>
<td>224</td>
</tr>
<tr>
<td>Coeur d'Alene Syn. Min. Co.</td>
<td>220</td>
</tr>
<tr>
<td>Columbia Mines Corp.</td>
<td>227</td>
</tr>
<tr>
<td>Come-Back Min. Co.</td>
<td>168</td>
</tr>
<tr>
<td>Community Gas and Oil, Inc.</td>
<td>308</td>
</tr>
<tr>
<td>Cons. Independent Calumet Min. Co.</td>
<td>260</td>
</tr>
<tr>
<td>Cons. Mines Syn.</td>
<td>168, 183, 201, 213</td>
</tr>
<tr>
<td>Cons. Rapid River M. &amp; M. Co., Ltd</td>
<td>213</td>
</tr>
<tr>
<td>Contents, Table of</td>
<td>4, 5</td>
</tr>
<tr>
<td>Continental Mines, Inc.</td>
<td>232</td>
</tr>
<tr>
<td>Copper</td>
<td>109, 311</td>
</tr>
<tr>
<td>Copper, The Prospects For</td>
<td>18</td>
</tr>
<tr>
<td>Copper Basin Cons. Mines Corp.</td>
<td>195</td>
</tr>
<tr>
<td>Copper Camp Min. Co.</td>
<td>301</td>
</tr>
<tr>
<td>Copper Chief Min. Co.</td>
<td>261</td>
</tr>
<tr>
<td>Copper Cliffs Min. Co.</td>
<td>301</td>
</tr>
<tr>
<td>Copper King M. &amp; S. Co., The</td>
<td>261</td>
</tr>
<tr>
<td>Copper Queen Min. Co., Inc.</td>
<td>214</td>
</tr>
<tr>
<td>Cordova Min. Co.</td>
<td>199</td>
</tr>
<tr>
<td>Cosmopolitan Min. Co., Ltd</td>
<td>241</td>
</tr>
<tr>
<td>Crackerjack Gold Min. Co.</td>
<td>151</td>
</tr>
<tr>
<td>Crawford Gold Strike</td>
<td>190</td>
</tr>
<tr>
<td>Crescent Gold Co.</td>
<td>168</td>
</tr>
<tr>
<td>Crooks Corral Mines, Ltd</td>
<td>214</td>
</tr>
<tr>
<td>Crown Cons. Mines, Inc.</td>
<td>308</td>
</tr>
<tr>
<td>Crystal Lead Mines Co.</td>
<td>261</td>
</tr>
<tr>
<td>Crystal Lime Co.</td>
<td>190</td>
</tr>
<tr>
<td>Crystal Spring Min. Co.</td>
<td>224</td>
</tr>
<tr>
<td>Cuba Min. Co.</td>
<td>261</td>
</tr>
<tr>
<td>Custer Cons. Mines, Inc</td>
<td>308</td>
</tr>
<tr>
<td>Custer County</td>
<td>192, 318</td>
</tr>
<tr>
<td>Custer Gulch Mines Co.</td>
<td>261</td>
</tr>
<tr>
<td>Cut Bank Refining Co.</td>
<td>308</td>
</tr>
<tr>
<td>Czizek, J. A.—Obituary</td>
<td>66</td>
</tr>
<tr>
<td>Daly Mines, Inc.</td>
<td>241</td>
</tr>
<tr>
<td>Daley Cons. Mines Co.</td>
<td>261</td>
</tr>
<tr>
<td>Dandy Gold Placers, Inc</td>
<td>214</td>
</tr>
<tr>
<td>Davis Min. Co.</td>
<td>214</td>
</tr>
<tr>
<td>Day Dev. Co.</td>
<td>261</td>
</tr>
<tr>
<td>Dayrock Min. Co.</td>
<td>261</td>
</tr>
<tr>
<td>Deadwood Basin Dist.</td>
<td>324</td>
</tr>
<tr>
<td>Deadwood Min. Co., Ltd</td>
<td>301</td>
</tr>
<tr>
<td>Deficient Minerals, Domestic Source of</td>
<td>27</td>
</tr>
<tr>
<td>De Lamar Placers</td>
<td>241</td>
</tr>
<tr>
<td>Delamar Mill Corp.</td>
<td>241</td>
</tr>
<tr>
<td>Delaware-Idaho Gold Min. Co.</td>
<td>232</td>
</tr>
<tr>
<td>Delaware Mines Corp.</td>
<td>262</td>
</tr>
<tr>
<td>Del Monte Claims, Inc</td>
<td>173</td>
</tr>
<tr>
<td>Diatomaceous Earth</td>
<td>110</td>
</tr>
<tr>
<td>Dickens-East Min. Co.</td>
<td>262</td>
</tr>
<tr>
<td>Dividends</td>
<td>329</td>
</tr>
<tr>
<td>Dixie Dist.</td>
<td>319</td>
</tr>
<tr>
<td>Dixie Queen Min. Co., Inc.</td>
<td>183</td>
</tr>
<tr>
<td>Dobson Pass Lead &amp; Silver Mines Corp.</td>
<td>262</td>
</tr>
<tr>
<td>Douglas Min. Co., Ltd</td>
<td>262</td>
</tr>
<tr>
<td>Driggs Coal Mine Co.</td>
<td>308</td>
</tr>
<tr>
<td>Duluth Min. Co.</td>
<td>262</td>
</tr>
<tr>
<td>Eagle Dist.</td>
<td>322</td>
</tr>
<tr>
<td>East Alameda Min. Co., Ltd</td>
<td>262</td>
</tr>
<tr>
<td>East Hecla Min. Co., Ltd</td>
<td>262</td>
</tr>
<tr>
<td>East Standard Min. Co.</td>
<td>262</td>
</tr>
<tr>
<td>Echo Min. Co., Ltd</td>
<td>263</td>
</tr>
<tr>
<td>Eldorado Dist.</td>
<td>320</td>
</tr>
<tr>
<td>Company Name</td>
<td>Page</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Elk City Dist.</td>
<td>319</td>
</tr>
<tr>
<td>Elk City Gold Min. Co.</td>
<td>214</td>
</tr>
<tr>
<td>Elk Creek Mine, Inc.</td>
<td>195</td>
</tr>
<tr>
<td>Elgin &amp; Ogden Min. Co.</td>
<td>283</td>
</tr>
<tr>
<td>Elmore County</td>
<td>199, 318</td>
</tr>
<tr>
<td>El Oro Mine</td>
<td>183</td>
</tr>
<tr>
<td>Ella Gold Mines, Inc.</td>
<td>214</td>
</tr>
<tr>
<td>Empire Mines Co.</td>
<td>241</td>
</tr>
<tr>
<td>Empire Tungsten Min. Co.</td>
<td>173</td>
</tr>
<tr>
<td>Engineers Gold Min. Co.</td>
<td>227</td>
</tr>
<tr>
<td>Enterprise Min. Co.</td>
<td>263</td>
</tr>
<tr>
<td>Era Min. &amp; Dev. Co., Inc.</td>
<td>308</td>
</tr>
<tr>
<td>Estep Estate, Walter A.</td>
<td>214</td>
</tr>
<tr>
<td>Eureka Dev. Co., Ltd.</td>
<td>161</td>
</tr>
<tr>
<td>Eureka Dist.</td>
<td>320</td>
</tr>
<tr>
<td>Evolution Dist.</td>
<td>322</td>
</tr>
<tr>
<td>Explorers Inc.</td>
<td>215</td>
</tr>
<tr>
<td>Explosives</td>
<td>99</td>
</tr>
<tr>
<td>Far West Gold-Silver Min. Co., 215, 263</td>
<td></td>
</tr>
<tr>
<td>Federal M. &amp; S. Co.</td>
<td>161, 263, 330</td>
</tr>
<tr>
<td>Feldspar</td>
<td>110</td>
</tr>
<tr>
<td>Felix Min. Co.</td>
<td>205</td>
</tr>
<tr>
<td>Ferrochrome</td>
<td>37</td>
</tr>
<tr>
<td>Ferromanganese</td>
<td>37</td>
</tr>
<tr>
<td>Fields Mutual Dev. Co.</td>
<td>161</td>
</tr>
<tr>
<td>Five Points M. &amp; M. Co., Inc.</td>
<td>183</td>
</tr>
<tr>
<td>Flag Staff Min. Co.</td>
<td>201</td>
</tr>
<tr>
<td>Florence Dist.</td>
<td>319</td>
</tr>
<tr>
<td>Flynn Group Min. Co.</td>
<td>265</td>
</tr>
<tr>
<td>Ford Motor Co.</td>
<td>195</td>
</tr>
<tr>
<td>Foreword</td>
<td>8</td>
</tr>
<tr>
<td>Formosa Lead Min. Co., Ltd</td>
<td>265</td>
</tr>
<tr>
<td>Four Square Gold, Inc.</td>
<td>309</td>
</tr>
<tr>
<td>Four Square Gold Syndicate</td>
<td>265</td>
</tr>
<tr>
<td>Fremont County</td>
<td>294</td>
</tr>
<tr>
<td>French Creek Gold M. &amp; M. Co.</td>
<td>215</td>
</tr>
<tr>
<td>Frisco Group</td>
<td>263</td>
</tr>
<tr>
<td>Galena Mine</td>
<td>258</td>
</tr>
<tr>
<td>Galena Min. Co.</td>
<td>266</td>
</tr>
<tr>
<td>Garnet</td>
<td>110</td>
</tr>
<tr>
<td>Gas</td>
<td>120</td>
</tr>
<tr>
<td>Gem County</td>
<td>204, 318</td>
</tr>
<tr>
<td>Gem State Min. Co. (Shoshone Co.)</td>
<td>266</td>
</tr>
<tr>
<td>General Mines Corp.</td>
<td>266</td>
</tr>
<tr>
<td>Gertie Min. Co.</td>
<td>266</td>
</tr>
<tr>
<td>Gibbonsville Dist.</td>
<td>320</td>
</tr>
<tr>
<td>Gibbonsville Premier Gold Mine, Ltd., Inc.</td>
<td>232</td>
</tr>
<tr>
<td>Glamorgan Group</td>
<td>263</td>
</tr>
<tr>
<td>Gnome Gold M. Co.</td>
<td>215</td>
</tr>
<tr>
<td>Golconda Group Min. Co.</td>
<td>241</td>
</tr>
<tr>
<td>Golconda Lead Mines</td>
<td>266</td>
</tr>
<tr>
<td>Gold</td>
<td>110, 310</td>
</tr>
<tr>
<td>Gold Bar Placer Inc.</td>
<td>215</td>
</tr>
<tr>
<td>Gold Bug Min. Co.</td>
<td>215</td>
</tr>
<tr>
<td>Gold Cheapyly Recovered</td>
<td>148</td>
</tr>
<tr>
<td>Gold Cross Min. Co.</td>
<td>215</td>
</tr>
<tr>
<td>Gold—Its Past and Future</td>
<td>10</td>
</tr>
<tr>
<td>Gold Bottom Min. Co.</td>
<td>161</td>
</tr>
<tr>
<td>Gold Canyon Min. Co., Inc.</td>
<td>232</td>
</tr>
<tr>
<td>Gold Digger Group</td>
<td>205</td>
</tr>
<tr>
<td>Gold Eagle Dredging Co.</td>
<td>216</td>
</tr>
<tr>
<td>Gold Flotation Dev. Co.</td>
<td>232</td>
</tr>
<tr>
<td>Goldflour Min. Co.</td>
<td>242</td>
</tr>
<tr>
<td>Gold Fork Min. Co.</td>
<td>301</td>
</tr>
<tr>
<td>Gold Hill Mines, Inc.</td>
<td>232</td>
</tr>
<tr>
<td>Gold Hill M. &amp; M. Co.</td>
<td>227</td>
</tr>
<tr>
<td>Gold Hunter Mines, Inc.</td>
<td>266</td>
</tr>
<tr>
<td>Gold Master Cons. M. Co., Inc.</td>
<td>216</td>
</tr>
<tr>
<td>Gold Mt. Mines Co.</td>
<td>183</td>
</tr>
<tr>
<td>Gold Point Mines, Inc.</td>
<td>216</td>
</tr>
<tr>
<td>Gold Producers, Inc.</td>
<td>233</td>
</tr>
<tr>
<td>Gold Reef Min. Co.</td>
<td>309</td>
</tr>
<tr>
<td>Gold Recovery Co.</td>
<td>162</td>
</tr>
<tr>
<td>Gold River Mines Inc., The</td>
<td>309</td>
</tr>
<tr>
<td>Gold Run M. Co.</td>
<td>216</td>
</tr>
<tr>
<td>Gold—Snake River</td>
<td>114</td>
</tr>
<tr>
<td>Goldstone Mine (Partnership)</td>
<td>233</td>
</tr>
<tr>
<td>Golden Age Min. Prop., Inc.</td>
<td>168</td>
</tr>
<tr>
<td>Golden Anchor Min. Co.</td>
<td>261</td>
</tr>
<tr>
<td>Golden Arrow Mines, Inc.</td>
<td>162</td>
</tr>
<tr>
<td>Golden Chest Min. and C. Co.</td>
<td>267</td>
</tr>
<tr>
<td>Golden Day Min. Co.</td>
<td>308</td>
</tr>
<tr>
<td>Golden Eagle Placer Co.</td>
<td>308</td>
</tr>
<tr>
<td>Golden Reward Min. Co.</td>
<td>233</td>
</tr>
<tr>
<td>Golden Sceptre Min. Co.</td>
<td>179</td>
</tr>
<tr>
<td>Golden Seal M. &amp; M. Co.</td>
<td>168</td>
</tr>
<tr>
<td>Goodenough Min. Co.</td>
<td>266</td>
</tr>
<tr>
<td>Goodenough United M. &amp; M. Co., Ltd.</td>
<td>216</td>
</tr>
<tr>
<td>Good Luck Group</td>
<td>202</td>
</tr>
<tr>
<td>Government Gulch Group</td>
<td>263</td>
</tr>
<tr>
<td>Government Gulch Min. Co.</td>
<td>267</td>
</tr>
<tr>
<td>Granada Lead Mines, Inc.</td>
<td>267</td>
</tr>
<tr>
<td>Grant Min. Co., The</td>
<td>183</td>
</tr>
<tr>
<td>Grangeville Gold Corp.</td>
<td>217</td>
</tr>
<tr>
<td>Granite State Cons. Mines Co.</td>
<td>205</td>
</tr>
<tr>
<td>Graphite</td>
<td>115</td>
</tr>
<tr>
<td>Great Eastern Min. Co., Ltd</td>
<td>267</td>
</tr>
<tr>
<td>Green Hill Cleveland M. Co.</td>
<td>267</td>
</tr>
<tr>
<td>Green-Hill Min. Corp.</td>
<td>217</td>
</tr>
<tr>
<td>Greyhound M. &amp; M. Co., Ltd.</td>
<td>196</td>
</tr>
<tr>
<td>Grimes Co., The</td>
<td>168</td>
</tr>
<tr>
<td>Gypsum</td>
<td>115</td>
</tr>
<tr>
<td>Hall Interstate Min. Co.</td>
<td>301</td>
</tr>
<tr>
<td>Happy Day Min. Co., Ltd.</td>
<td>267</td>
</tr>
<tr>
<td>Harpster Min. Co.</td>
<td>217</td>
</tr>
<tr>
<td>Hayden Lake M. &amp; M. Co.</td>
<td>224</td>
</tr>
<tr>
<td>Haywire M. &amp; M., Inc.</td>
<td>309</td>
</tr>
<tr>
<td>Hecla Checkmate M. &amp; M. Co., Ltd.</td>
<td>205</td>
</tr>
<tr>
<td>Hecla Min. Co.</td>
<td>287, 331</td>
</tr>
<tr>
<td>Helmer Silver Mines Co.</td>
<td>269</td>
</tr>
<tr>
<td>Hercules Group</td>
<td>269</td>
</tr>
<tr>
<td>Hercules Min. Co.</td>
<td>269</td>
</tr>
<tr>
<td>Heley, Oscar—Obituary</td>
<td>66</td>
</tr>
<tr>
<td>Hi-Bar Mining Co.</td>
<td>184</td>
</tr>
<tr>
<td>Hidden Treasure Min. Co.</td>
<td>269</td>
</tr>
<tr>
<td>High Cropping Silver-Lead M. Co.</td>
<td>224</td>
</tr>
<tr>
<td>Highland Petroleum, Inc.</td>
<td>189</td>
</tr>
<tr>
<td>Highland Surprise Cons. M. Co.</td>
<td>270</td>
</tr>
<tr>
<td>Holcomb Co., Ltd.</td>
<td>301</td>
</tr>
<tr>
<td>Homestead Min. &amp; Leasing Co.</td>
<td>308</td>
</tr>
</tbody>
</table>
Hope Silver-Lead Mines, Inc. 173
Horn Silver Cons. Mines Co. 181
Hornsilver M. & M. Co. 270
Horseshoe Min. Co. 270
Humming Bird Group 269
Hundred Fold Min. Co. 270
Hunter Dist. 322
Huron Mines, Inc. 205
Hypotheek M. & M. Co. 270
Ida Bell Gold Mines, Inc. 242
Idaho Almaden Mines Co. 306
Idaho Aluminum Corp., Ltd. 245
Idaho & Eastern Group 269
Idaho Bureau of Mines and Geology:
    Report of Director 50
    Bureau Activities 56
    Publications 57
Idaho-Canadian Dredging Co. 169
Idaho Ceramic Materials Co. 228
Idaho Copper Min. Co., Ltd. 270
Idaho Copper Co. 152
Idaho County 206, 318
Idaho Diamond Sulphide M. Co., Inc., The 224
Idaho Exp., Inc. 242
Idaho Falls Gold Min. Co. 233
Idaho Fire Brick & Clay Co. 228
Idaho Gambrinus Inc. 308
Idaho Gold Chief Min. Co. 202
Idaho Goldfields, Inc. 217
Idaho Gold Min. Co. 177
Idaho Gold Recovery Corp. 308
Idaho Klondike Min. Co., Inc. 217
Idaho Lakeview Mines Co. 173
Idaho Lead-Silver Mines Co. 173
Idaho Lime-Phosphate, Inc. 309
Idaho Minerals Co. 301
Idaho Mineral Products Co. 162
Idaho Mines, Inc. 202
Idaho M. S. & Refiners, Inc. 169
Idaho Modoc Placer Min. Co. 169
Idaho-Mont. & Orlando Cons. Min. Co. 270
Idaho Mother Lode Gold Mines, Inc. 270
Idaho-Nevada Copper Corp., Ltd. 169, 202
Idaho Portland Cement Co. 153
Idaho Rainbow Mines Inc. 217
Idaho Star Min. Co. 271
Idaho Sun Valley Mines, Inc. 308
Idamont Lead-Zinc Mines Co. 179
Idora Min. Co., Ltd. 271
Illustrations, Table of 5, 6
Ima Mines Corp. 233
Imperial Min. Co. 271
Importance of Mining In Idaho 330
Indepeende M. & M. Co. Ltd. 271
Independence Lead Mines Co. 271
Independence Min. Co., Ltd. 271
Independence Mines & Power Co. 301
Independence Placer Min.
    Co., Ltd. 191
    Inland Empire M. & M. Co. 271
    Inland Empire Refineries, Inc. 308
    Inspectors of Mines 327
    Inspiration Lead Co., Inc. 271
    International Mines, Ltd. 272
    International Molybdenum Co. 179
    Iola Cons. Mines Corp., Ltd. 217
    Ione Min. Co. 272
    Iron Dyke Mines Co. 169
    Ivanhoe Min. Co. 162, 196
    Ivanhoe Min. Co., Ltd. 272
Jack Waite Min. Co. 272
Jerome County 320
Jim Blaine Silver Syndicate, Ltd. 272
Jumbo M. & M. Co. 217
Junobob Min. Co., Inc. 218
Junobob Min. Co., Ltd. 272
Kalso Mines Corp. 202
Kaniksu Min. Co. 173
Keith's Star Min. Co. 218
Keep Cool Min. Co. 173
Kennen Min. Co. 272
Key Placers Corp. 218
Kimberly Gold Mines, Inc. 218
King of Pine Creek Group 278
King of Pine Creek Min. Co. 272
King Solomon's Mines Co. 174
Laclede Group 269
Laclede Min. Co., Ltd. 272
Laney, Dr. F. B.—Obituary 65
Lang Mines, Inc. 233
Lansing Silver-Lead Min. Co. 272
Latah County 226
Lawrence Cons. Min. Co. 174
Lead Blossom M. & M. Co. 273
Lead 37, 115, 311
Lead Market—First Half 1939 14
Leesburg Bonanza Placer Co. 233
Leesburg Lode & Pl. Min. Co. 233
Leesburg Min. Co. 224
Lelande Dist. 323
Lemhi County 229, 320
Lemhi Lead Mines, Inc. 234
Lemhi Union Co. 234
Leroy Gold & Copper Co., Ltd. 273
Lewis County 237
Liberal King Min. Co. 273
Liberty Gem Mines, Inc. 162
Library 9
Limestone 119
Lincoln Min. Co. 273
Lincoln Mine Operating Co. 205
Lindgren, Waldemar—Obituary 66
Linford Copper Co. 273
Little North Fork C. M. & M. Co., Ltd. 225
Little Smokey Min. Co., Inc. 184
<table>
<thead>
<tr>
<th>Company Name</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Cabin M. &amp; M. Co., Ltd.</td>
<td>273</td>
</tr>
<tr>
<td>Lombardy M. &amp; M. Co.</td>
<td>274</td>
</tr>
<tr>
<td>Lon Chaney M. &amp; M. Co.</td>
<td>274</td>
</tr>
<tr>
<td>Lone Pine Group (a partnership)</td>
<td>218</td>
</tr>
<tr>
<td>Long Placers, Inc., Walter J.</td>
<td>242</td>
</tr>
<tr>
<td>Loon Creek Hyd. Pl. M. Co., Ltd.</td>
<td>196</td>
</tr>
<tr>
<td>Loyalty Mines, Inc.</td>
<td>218</td>
</tr>
<tr>
<td>Lucky Boy Min. &amp; C. Co., Ltd.</td>
<td>274</td>
</tr>
<tr>
<td>Lucky Five Min. Co.</td>
<td>218</td>
</tr>
<tr>
<td>Lucky Friday Silver-Lead Mines Co.</td>
<td>308</td>
</tr>
<tr>
<td>Lucky Lad M. Co.</td>
<td>301</td>
</tr>
<tr>
<td>Lucky Strike Min. Co.</td>
<td>174</td>
</tr>
<tr>
<td>M. &amp; I. Min. Co.</td>
<td>191</td>
</tr>
<tr>
<td>Mace Group</td>
<td>263</td>
</tr>
<tr>
<td>Mackay Exploration Co.</td>
<td>196</td>
</tr>
<tr>
<td>Mackinaw Dist.</td>
<td>320</td>
</tr>
<tr>
<td>Magazines</td>
<td>8</td>
</tr>
<tr>
<td>Maggie Creek M. Co.</td>
<td>309</td>
</tr>
<tr>
<td>Maher-Hearn Group</td>
<td>289</td>
</tr>
<tr>
<td>Maine-Standard Min. Co., Ltd.</td>
<td>274</td>
</tr>
<tr>
<td>Majestic Min. Co., Ltd.</td>
<td>274</td>
</tr>
<tr>
<td>Malgre Min. Co.</td>
<td>177</td>
</tr>
<tr>
<td>Mammoth Mine Corp.</td>
<td>219</td>
</tr>
<tr>
<td>Manganese</td>
<td>36, 119</td>
</tr>
<tr>
<td>Marble</td>
<td>119</td>
</tr>
<tr>
<td>Marshall Lake Dist.</td>
<td>319</td>
</tr>
<tr>
<td>Marsh Creek Min. Co.</td>
<td>202</td>
</tr>
<tr>
<td>Marsh Mines Cons.</td>
<td>274</td>
</tr>
<tr>
<td>Mayflower Gold Mines, Inc.</td>
<td>189</td>
</tr>
<tr>
<td>McDevitt Dist.</td>
<td>320</td>
</tr>
<tr>
<td>McIlwee Idaho Phosphate Co.</td>
<td>155</td>
</tr>
<tr>
<td>Meadow Creek Gold Placer Co.</td>
<td>169</td>
</tr>
<tr>
<td>Meadow Mines, Inc.</td>
<td>234</td>
</tr>
<tr>
<td>Men Employed and Wages</td>
<td>76</td>
</tr>
<tr>
<td>Mercury (see Quicksilver)</td>
<td></td>
</tr>
<tr>
<td>Merger Mines Corp.</td>
<td>274</td>
</tr>
<tr>
<td>Metal Production—Cda. Region—1884-1938</td>
<td>322</td>
</tr>
<tr>
<td>Metal Production by Counties, 1938</td>
<td>312</td>
</tr>
<tr>
<td>Metal Production, 1938 Final Annual Figures</td>
<td>310</td>
</tr>
<tr>
<td>Metal Production, 1939—Preliminary Annual Figures</td>
<td>325</td>
</tr>
<tr>
<td>Metals, Average Price</td>
<td>328</td>
</tr>
<tr>
<td>Metal Market Information</td>
<td>9</td>
</tr>
<tr>
<td>Metals Extraction Corp.</td>
<td>309</td>
</tr>
<tr>
<td>Metals Production Co.</td>
<td>179</td>
</tr>
<tr>
<td>Metals Recovery Co.</td>
<td>219</td>
</tr>
<tr>
<td>Metallurgical Industry</td>
<td>313</td>
</tr>
<tr>
<td>Metallurgical Research Corp.</td>
<td>308</td>
</tr>
<tr>
<td>Mica</td>
<td>119</td>
</tr>
<tr>
<td>Midland Min. Co.</td>
<td>275</td>
</tr>
<tr>
<td>Military M. &amp; M. Co., Ltd.</td>
<td>275</td>
</tr>
<tr>
<td>Milling Practice and Equipment, Progress In</td>
<td>41</td>
</tr>
<tr>
<td>Milwaukee Mines, Inc.</td>
<td>174</td>
</tr>
<tr>
<td>Mine Rescue Station, Cda. Dist.—1939</td>
<td>79</td>
</tr>
<tr>
<td>Mineral Dome, Inc.</td>
<td>309</td>
</tr>
<tr>
<td>Mineral Farm Min. Co., Ltd.</td>
<td>275</td>
</tr>
<tr>
<td>Mineral Hill Dist.</td>
<td>320</td>
</tr>
<tr>
<td>Mineral Mt. M. &amp; M. Co.</td>
<td>275</td>
</tr>
<tr>
<td>Mineral Point Min. Co.</td>
<td>275</td>
</tr>
<tr>
<td>Mineral Recoveries, Inc.</td>
<td>298</td>
</tr>
<tr>
<td>Mineral Waters</td>
<td>119</td>
</tr>
<tr>
<td>Mineral Zone Min. Co.</td>
<td>219</td>
</tr>
<tr>
<td>Minerva Silver, Inc.</td>
<td>175</td>
</tr>
<tr>
<td>Mines Eng. Corp.</td>
<td>308</td>
</tr>
<tr>
<td>Mining Laws:</td>
<td></td>
</tr>
<tr>
<td>Leesburg Dist.—1866</td>
<td>129</td>
</tr>
<tr>
<td>Leases of Mineral Rights In State Lands</td>
<td>131</td>
</tr>
<tr>
<td>Occupational Disease Compensation Law</td>
<td>133</td>
</tr>
<tr>
<td>Occupational Disease Compensation Law, Index</td>
<td>140</td>
</tr>
<tr>
<td>Assessment Work, United States Law Extends Time For Doing</td>
<td>130</td>
</tr>
<tr>
<td>Montana Headlight Oil Co.</td>
<td>308</td>
</tr>
<tr>
<td>Montana Standard Min. Co., Ltd.</td>
<td>309</td>
</tr>
<tr>
<td>Montgomery Mines, Inc.</td>
<td>179</td>
</tr>
<tr>
<td>Moon Creek Min. Co.</td>
<td>309</td>
</tr>
<tr>
<td>Moonlight Min. Co.</td>
<td>276</td>
</tr>
<tr>
<td>Moose Gold Min. Co.</td>
<td>308</td>
</tr>
<tr>
<td>Morning Group</td>
<td>265</td>
</tr>
<tr>
<td>Moscow Queen Min. Co.</td>
<td>228</td>
</tr>
<tr>
<td>Mother Lode Gold M. &amp; M. Co.</td>
<td>242</td>
</tr>
<tr>
<td>Mountain City Copper Co.</td>
<td>309</td>
</tr>
<tr>
<td>Mountain City Dev. Co., Inc.</td>
<td>308</td>
</tr>
<tr>
<td>Mountain Con. Min. Co., Inc.</td>
<td>276</td>
</tr>
<tr>
<td>Mountain Producers Gold Co.</td>
<td>308</td>
</tr>
<tr>
<td>Mountain Queen Min. Co., Ltd.</td>
<td>276</td>
</tr>
<tr>
<td>Mountain Sheep Min. Co.</td>
<td>309</td>
</tr>
<tr>
<td>Mullan Min. Co.</td>
<td>276</td>
</tr>
<tr>
<td>Murray Hill Min. Co.</td>
<td>276</td>
</tr>
<tr>
<td>Musselshell Min. Co.</td>
<td>191</td>
</tr>
<tr>
<td>Nabob Silver-Lead Co.</td>
<td>277</td>
</tr>
<tr>
<td>Nancy Lee Mines, Inc.</td>
<td>309</td>
</tr>
<tr>
<td>National Copper Min. Co., Ltd.</td>
<td>277</td>
</tr>
<tr>
<td>Natural Gas (see Gas)</td>
<td></td>
</tr>
<tr>
<td>Navigable Rivers, Leasing of beds</td>
<td>131</td>
</tr>
<tr>
<td>Nevada Mines</td>
<td>175</td>
</tr>
<tr>
<td>Nevada-Stewart Min. Co.</td>
<td>277</td>
</tr>
<tr>
<td>Newsome Dist.</td>
<td>319</td>
</tr>
<tr>
<td>New Hope Min. Co., Ltd.</td>
<td>277</td>
</tr>
<tr>
<td>New Jersey Cons. Mines Co.</td>
<td>278</td>
</tr>
<tr>
<td>New Jersey Group</td>
<td>278</td>
</tr>
<tr>
<td>New Liberty Min. Co.</td>
<td>196, 202</td>
</tr>
<tr>
<td>Nez Perce County</td>
<td>238, 321</td>
</tr>
<tr>
<td>Niagara Placer Min. Co.</td>
<td>278</td>
</tr>
<tr>
<td>Nickel</td>
<td>120</td>
</tr>
<tr>
<td>Nine Mile Min. Co.</td>
<td>278</td>
</tr>
<tr>
<td>Nitrates</td>
<td>120</td>
</tr>
<tr>
<td>North Bunker Hill Min. Co., Ltd</td>
<td>278</td>
</tr>
</tbody>
</table>
INDEX

North Fork Development Co. ................................................. 278
North Hill Min. Co. .......................................................... 219
North Star Min. Co. ............................................................ 278
North Star M. & D. Co. ....................................................... 278
Northern Light M. & M. Co. ................................................ 278
Northwest Dev. Co. ............................................................ 309

Occupational Disease Compensation Law .................................. 133
Oil ..................................................................................... 120
Ojus Min. Co. ...................................................................... 206
Old Channel Min. Co., Inc. .................................................. 202
Old Liberty Min. Co. ............................................................ 206
Oneida County .................................................................... 239
Oom Paul Cons. Min. Co. ..................................................... 279
Opportunity Min. Co. ........................................................... 1/5
Orogrande Dist. .................................................................... 319
Orogrande-Frisco Gold Mines, Inc. ........................................ 219
Orogrande Gold, Inc. ............................................................. 242
Orogrande Gold Min. Co. ...................................................... 219
Othello Min. Co. .................................................................. 157
Owl Min. Co., Inc. ............................................................... 234
Owyhee County ................................................................... 239, 321
Owyhee Dev. Co., Inc. ........................................................... 242
Owyhee Processing Co., Inc. ................................................. 308
Oxford Copper Min. Co., Ltd. ................................................. 191

Packer John Mines Corp. ........................................................ 169
Page Group ......................................................................... 265
Pallisade M. & M. Co. ............................................................ 225
Pallisade Petroleum Co. ........................................................ 177
Papurel & Graham Mtn. Min. Co. .......................................... 279
Paradise Gold D. Co., Inc., The ............................................ 184
Paramount Mines Corp. ........................................................ 279
Park C. & Gold Min. Co., Ltd. ................................................. 279
Parker Mines, Inc. ............................................................... 163
Paris M. & M. Co., Inc. ........................................................ 155
Pasadena Mines, Inc. ............................................................ 220
Payette County ..................................................................... 245
Pearson Min. Co. .................................................................. 279
Phosphate ............................................................................. 122, 145
Phosphate Is Important Issue, Idaho ...................................... 145
Pierce Metals Dev. Co. ........................................................... 220
Pine Creek Lead-Zinc Min. Co. ............................................... 279
Pioneer Drilling Corp. ........................................................... 307
Pioneer Gold M. & D. Co. ...................................................... 279
Pioneer Min. Co., Ltd. ........................................................... 279
Pistol Creek Dist. .................................................................. 324
Pittsburgh-Idaho Hydraulic M. Co. ........................................ 169
Placer Basin Co. ................................................................... 152
Placer Center Dist. ................................................................ 323
Placers Exploration Syndicate, Inc. ....................................... 234
Plainview Min. Co., Inc. ....................................................... 280
Pocatello-Lemhi M. & Exp. Co. ............................................. 234
Polaris Min. Co. .................................................................... 280
Pondera Min. & Power Co. .................................................... 175
Ponderosa Min. Co. ............................................................. 175
Pontiac Min. Co. .................................................................. 280
Power County ....................................................................... 245, 321
Pratt and Sandy Creek Dist. .................................................. 321
Proctor Knott Min. Co. .......................................................... 280
Progress Gold Min. Co. ........................................................ 280

Public Relations:

The Boss and His Men .......................................................... 67
What Makes a Good Employee .............................................. 70
Puritan Min. Co., Ltd. ........................................................... 281
Pyrite .................................................................................. 122

Quicksilver ............................................................................ 39, 122
Quartz Creek Dredging Co. .................................................... 191

Rainbow M. & M. Co., Ltd. .................................................... 157, 225, 281
Ralph Davis, Inc. ................................................................. 206
Ramey Ridge Dist. ................................................................ 319
Ramona Min. Co. .................................................................. 281
Ramshorn Mines Co. ............................................................ 196
Rapid Creek Min. Co., Ltd. ................................................. 302
Rare Metal Mines Inc. ........................................................... 220
Ray Jefferson Min. Co. .......................................................... 281

Reciprocal Trade Agreements, Experience Under The .......... 32

Recreational Facilities, Idaho ................................................. 149
Red Dog Min. Co., Inc. ......................................................... 197
Red Hill M. & M. Co. ........................................................... 184
Red Ledge Inc. ...................................................................... 152
Red Lode Min. Co., Inc. ....................................................... 169
Red Metals Cons., Inc. .......................................................... 302
Reeds Creek Gold Mines Co. ................................................ 220
Reindeer-Queen Min. Co. ..................................................... 281
Releces-Gold Min. Co. ........................................................ 150
Rescue Gold Mines Co. ......................................................... 235
Rhode Island Min. Co., Ltd. .................................................. 281
Richard Allen Min. Co. ........................................................ 184
Riverside Copper Min. Co., Ltd. ......................................... 281
Roanoke Group ................................................................... 269
Robbins Dist. ........................................................................ 319
Rob Roy Min. Co. ................................................................ 281
Robinson M. & M. Co. ........................................................... 220
Rosetta M. & M. Co. .............................................................. 184
Roth Co., Geo. F. .................................................................. 202
Round Top Min. Co. ............................................................. 157
Royal Basin M. Co., The ...................................................... 225
Ruth Cons. M. & M. Co. ........................................................ 281
Rutile ................................................................................... 123

Safety, Twelve Fundamental Rules .......................................... 97
St. Elmo Silver Mines Corp. ................................................... 282
St. Joe Lead & Silver Mines Co. ............................................. 282
St. Joseph Lead Co. ............................................................... 309
St. Louis & Idaho M. & M. Co. .............................................. 282
Salmon River Dist. ............................................................... 319
Salmon River Gold Ores Co. ................................................ 220
Salmon River Min. Co. ........................................................ 197
Salmon River M. & M. Co. ..................................................... 220
Salt ....................................................................................... 123
Samson M. & D. Co., Ltd. ..................................................... 282
Sandstone (see Building Stone) .............................................. 123
San Francisco Chemical Co. .................................................. 155
San Francisco Min. Co., Ltd. ................................................ 282
Secesh Dredging M. & M. Co. .............................................. 221
Security Oil and Gas Co., Inc. .............................................. 309
Sentinel Mines Corp. ............................................................. 221
Shamrock Silver M. Co., Inc. .............................................. 225
Sheep Creek Min. Corp. ........................................................ 170
Sherman Lead Co. 282
Shoshone County 247, 321
Sierra Nevada Cons. Min. Co. 282
Signal Min. Co. 282
Silver 38, 123, 311
Silver, The Future of 12
Silver Bar Min. Co. 283
Silver Bowl, Inc. 283
Silver Circle Min. Co. 283
Silver Cons. Mines, Inc. 235
Silver Creek Gold Min. Co. 191
Silver Crescent, Inc. 283
Silver Dale & Big Hill M. Co. 283
Silver Dollar Min. Co. 283
Silver Hills Min. Co. 188
Silver Leaf Mines Corp. 175
Silver Lode M. & M. Co. 284
Silver Mountain Min. Co. 175
Silver Reef Mines, Inc. 284
Silver Spar Min. Co. 163
Silver Standard Min. Co. 284
Silver Star M. & D. Co. 157
Silver Strike M. Co. 284
Silver Summit Min. Co. 284
Silver Syndicate, Inc. 284
Sister M. & M. Co., Ltd. 285
Smith Creek Hyd. M. Co., Inc. 302
Smuggler Cons. Min. Co. 285
Snake River Dist. 321
Snake River Exp. Co. 242
Snake River Gold 114
Snake River Min. Co. 308
Snowshoe Min. Co. 285
Snyder Mines Inc., The 163
Sonora M. & M. Co. 285
Sontag Mines, Inc. 308
South Gilmore Min. Co. 235
South Salmon Placer M. Co., Ltd. 302
Spokane Dredging & Min. Co. 237
Spokane Portland Cement Co. 309
Spokane Tunnel Min. Co. 285
Spring Barr Placer Co. 221
Square Deal M. & M. Co., Ltd. 285
Stanley-Five Bars Min. Co. 197, 203
Stanley Min. Co. 285
Sterling Min. Co., Ltd. 285
Stockholders’ Syndicate 155
Strategic Minerals Investigation 20
Streamline Silver Mines, Inc. 308
Submarine Gold M. Co., The 307
Success Min. Co., Ltd. 285
Sullivans Min. Co. 286
Sulphur 126
Summit Dist. 323
Sunnyside Mines, Inc. 308
Sunrise Mine Co. 286
Sunset Min. Co. 155
Sunshine Cons., Inc. 287
Sunshine Min. Co. 287, 331, 332
Sunshine Min. Co., Ltd. 287
Sunshine Premier Min. Co. 287
Sunshine Metals Corp. 225
Sun Valley Gold, Silver & Copper
Min. Co. 235
Superior Coal Min. Co. 288
Sylvanite Gold Copper Co. 221
Sylvanite Min. Co. 180
Symbols and Abbreviations 6, 7
Tacoma Placers 235
Talache Mines, Inc. 200, 203
Tale 126
Tamarack & Custer Cons. M. Co. 287
Teddy M. & M. Co., Ltd. 289
Tendoy Copper Queen Syndicate 235
Ten Mile Dist. 319
Ten-Said M. & M. Co. 228
Teton County 287
Teton Phosphate Co., Inc. 308
Texas Dist. 321
Texas-Owyhee M. & D. Co. 170
Thomas Mines 289
Thunder Mountain Dist. 324
Tin 126
Tip Top Group Min. Co. 163
Trade Dollar Min. Co., Ltd. 289
Treasuremont Min. Co. 163
Treasure Vault Min. Co., Ltd. 289
Tri-State Gold Min. Co. 235
Trout Creek Gold Placer M. Co. 309
Troy Gold & Copper Min. Co., Ltd. 228
Tungsten 39, 126
Twin Apex Mines Co. 197
Twin Falls County 298, 323
Two Margarets’ Min. Co. 221
Una Min. Co. 221
Uncle Sam M. & M. Co. 236
United American Mines Co., Ltd. 289
United Idaho Min. Co. 235
United Lead-Zinc Mines Co. 289
United Mercury Mines Co. 302
United Metals Co. 289
Unity Gold Prod. Co. 221
Utah-Bellevue Mines Co. 163
Utah-Idaho M. & M. Co. 155
Valley County 298, 324
Vendetta Chief Min. Co. 289
Ventilation, Mine 322
Verde-May Min. Co., Ltd. 289
Victor Min. Co. 290
Vienna-International M. & M. Co. 290
Vindicator Min. Co. 290
Wages 76
Walla Walla Leasing & Dev. Co. 308
Wallace Idaho Lead Mines, Inc. 290
Wallace Min. Co. 290
Wallace Silver-Lead Mines Co. 290
Wall Street Min. Co. 290
War Eagle Cons. Min. Co. 243
Warm Springs Min. Corp. 308
Warren Dist. 320
Warren Dredging Co. (Partnership) ........................................ 221
Washington County .................................................. 303, 324
Washington Basin M. & M. Co. .................................... 197
Washington-Idaho Lime Prod. Co. ................................. 191
West Bell Min. Co., Ltd............................................. 290
West Hecla Min. Co.................................................. 290
West Star Min. Co.................................................... 291
Western Gold Corp..................................................... 170
Western Gold Exp. Co............................................... 308
Western Metal Products Co........................................ 192
Western Min. & Exp. Corp.......................................... 243
Western Pacific Min. Co........................................... 291
Western States Min., M. & Exp. Co., Ltd......................... 197
Western Union Min. Co............................................. 291
Whitedelf Min. & Dev. Co........................................... 176
White Knob Min. Co................................................. 197
White Mica M. & M. Co.............................................. 188
Wilbert Min. Co., Ltd............................................... 181
Willow Creek Min. Co............................................... 291
Winner Group .......................................................... 203
Wolverine Min. Co., Ltd............................................ 291
Wonderful Min. Co., Ltd............................................ 291
Wood River Min. Co................................................ 164
Wyoming M. & M. Co., Ltd........................................ 291
Yakima-Shoshone Min. Co.......................................... 291
Yellow Jacket Dist..................................................... 321
Yellow Pine Co........................................................ 302
Yellow Pine Dist...................................................... 324
Ymir Cons. Min. Co................................................ 243
Yreka Dist.............................................................. 323
Yreka Min. Co........................................................ 292
Yuba Mines, Inc........................................................ 308
Zinc ................................................................. 38, 127, 311
Zinc Industry, Resume of........................................... 16