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20181105 Christopher Tate, Idaho Geological Survey

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Idaho Geological Survey’s annual reports from the Idaho State Mine Inspector to the governor for years 1903-1908, originally in a single bound volume, are divided by year. A digital facsimile of the volume may be re-created by removing this page and combining PDF files for years 1903-1908.
Tenth Annual Report

OF THE

Mining Industry of

Idaho

FOR THE YEAR 1908

ROBERT N. BELL
STATE INSPECTOR OF MINES
Boise, Idaho, December 31, 1908.

To His Excellency, Frank R. Gooding, Governor of Idaho:

Dear Sir:—I have the honor to submit herewith my report as State Inspector of Mines for the year ending December 31, 1908.

Very respectfully,

Robert N. Bell,
State Inspector of Mines.
REPORT OF INSPECTOR
OF MINES.

INTRODUCTORY REVIEW.

The mining industry of Idaho during 1908 has experienced a rather dull year, and, while a large tonnage of ore was mined and treated, the profits of the business for this period will be seriously curtailed, as compared with the previous years, owing to the low market value of our principal metals that has prevailed throughout 1908. Numerous new mining development enterprises that were in progress during 1907 suspended operation with the approach of the money panic of a year ago, and a great many of them have since remained idle, reducing the number of men employed in mining labor throughout the State fully twenty per cent for this year, as compared with 1907.

SHOSHONE COUNTY.

In the Coeur d'Alene district, two of the principal producers, the Hecla and Morning mines, were closed down for the first six months of the year through lack of market for their ores, and the Last Chance mine was also idle for two months of the year. These properties threw out of employment a force of fully 1,000 men, but resumed full operation in June and have since been employing their normal force and making the usual production of ore.

The Hercules, Standard Mammoth, Bunker Hill & Sullivan, and Snowstorm mines were operated continuously, and the producing mines of this district are now giving employment to about 2,000 men, while the smaller producers and development enterprises of the district provide employment for approximately another 1,000.

Among the notable events of the year in this rich field was the completion of the Idaho Northern Railway up the north fork of the Coeur d'Alene River from Enaville on the O. R. & N. Railway to Murray on Pritchard Creek, which will give railroad transportation to the well mineralized
section of the Coeur d'Alenes known as the north side, which is likely to afford an important added item of mineral traffic to the district from now on, as the north side has a number of very promising properties and rich deposits of silver, lead, gold and tungsten ore.

The rapid construction of the Chicago, Milwaukee & St. Paul Railway down the St. Joe River, now nearing completion, is another railway transportation feature, extending through the south border of the Coeur d'Alene district, that will doubtless prove a great advantage in the development of the numerous rich copper, gold and lead-silver prospects of that section, and will result in greatly enlarging the productive area of this famous field.

At Burke, the old Tiger-Poorman mine, owned by the Federal Company, was closed permanently after being developed to a depth of 2,200 feet through a vertical shaft. Its famous pumping station has been dismantled and the mine has been allowed to fill as an exhausted proposition. In the bottom level, the ore shoot had contracted in length and width so much as to become unprofitable. However, it still contains a big, strong root of an ore shoot, and it is a pity it hasn't been given the advantage of a winze in the ore body to 400 feet or 500 feet further depth to see if it didn't expand to more profitable proportions, as has been experienced at other points at great depth in this district.

At Mullan, the complete development of the new ore shoot discovered in the Star mine at a depth of 800 feet marks the birth of another Coeur d'Alene bonanza resource of high grade concentrating lead-silver ore, and discloses a new ore shoot on the Morning fissure which traverses the full length of this property, which is 500 feet in length and from 5 to 15 feet in width and contains the normal average values of this part of the district in silver and lead. Extensive plans of further development to great depth are in progress at this property and it will doubtless ultimately make one of the large producers of this field.

In addition to the Star, the other new ore developments
of the Coeur d'Alenes which promise definite results in rich mineral when further developed, are those of the Alice mine at Ruddy Gulch, the Cooney mine at Burke, the Ambergris mine at the head of Nine Mile Creek, the Bear Top at Murray, and the Caledonia mine on the footwall side of the Wardner iodide near Wardner. Each of these properties can ship high grade crude ore from their present development, and from bodies of considerable size and present commercial importance, that are, with further work, likely to take important positions in the total output of the district.

There are also a number of other new properties being operated that show imminent promise of results, and, as the old mines gradually drop out, their place will doubtless be taken with new properties that will maintain the present great output of the district indefinitely.

The principal producers, including the Bunker Hill & Sullivan, Last Chance, Hercules, Hecla, Standard-Mammoth, Morning, Gold Hunter and Snowstorm mines, are all in splendid physical condition and producing their normal tonnage at this date. Their total yield of ore for the year just closed has aggregated 1,250,000 tons.

These big lead-silver mines continue to maintain, in spite of their great depth, a comparatively high-grade ore; in fact, the average yield of the ore of the district as a whole is probably a little higher now than at any period of its history. The bulk of this great tonnage is, of course, concentrating ore and averages about 8 per cent lead, and 5 ounces silver per ton for the whole district.

The operators are seriously concerned over the possible cut in the tariff rate, which would have a serious effect on their profits and would probably be the cause of a retrenchment in the wage scale, which at the present time is probably the highest of any lead-silver producing district in the world, and while the silver values in the ore are a big item in the cost of lead production, the mines are getting very deep and consequently more expensive to operate than formerly. They involve the employment of a high class of
mine labor, and to take the present tariff off lead, and put this class of white labor in competition with the peon labor of Mexico would prove disastrous and probably result in closing down several of these big mining business enterprises.

The principal producers are nearly all in bonanza at this time, but have involved enormous outlays in preliminary development costs and plant equipment, representing years of dead, unprofitable work, as nearly all the mines in the district were poor at the surface, and some of them had a hard struggle for existence for several hundred feet in depth, and their profits figured against their total history from first to last does not show more than a reasonable margin of profit, which would be largely wiped out with a removal of the present tariff rate in several of the largest tonnage producers.

An important economy has been introduced at the big mines in the past year in the form of picking plants, by which the ore is roughly sorted at the portal of the mines on grizzlies and conveyor belts, where the clean ore and clean waste are separated from the stope product, the former to be shipped direct to the smelter, and the latter returned to the mines for filling. This has materially increased the milling results and reduced sliming losses formerly suffered from crushing so much waste with the ore, and the crude mineral shipments of the district have in consequence been greatly increased during the past year.

The Snowstorm copper mine produces nothing but shipping ore. Its lower levels have developed in a magnificent manner during the past season, and this mine has made the largest output of its history during 1908, shipping a total of 100,000 tons of ore containing slightly over 90 pounds of copper, and with 6.14 ounces silver per ton. The mine is paying dividends at the rate of $45,000 per month, and has ore resources for several years ahead that will yield this rate of profit if present copper prices are maintained.
WOOD RIVER DISTRICT.

Several of the other mining districts of the State have experienced a very slack year in production—this is especially true of the Wood River District.

In the Wood River field, an unusually light output has been made owing to the lack of market and low metal values. Nineteen hundred and eight, however, has been a year of great preparation in this field, and five new mills have been in process of construction, of which two have been completed, including the Idaho Consolidated mill at Bellevue, which has also been equipped with a hydro-electric power plant of large capacity, and the Croesus mill of 100 tons daily capacity, three miles west of Hailey, where magnificent development in the mine has been recorded at the deepest point reached in the Wood River district, which argues favorably for the further development at depth for the other permanent fissures of this field.

At the Independence mine, near Ketchum, a new mill of 100 tons daily capacity is being installed, the machinery of which is all on the ground. An electric transmission line has also been constructed to this property from Hailey, over which the power will be carried to run the mill from the Cramer electric plant. The Independence has a magnificent reserve of high grade ore estimated at 60,000 tons, and, with the completion of its mill, should become a very important producer next year.

A new mill of 100 tons a day capacity is also being installed at the Lucky Boy mine on Warm Springs Creek, and still another one of the same capacity in the Muldoon mine in the Muldoon district, and the future of this field is bright with promise of a largely increased yield of rich ore in the future.

CUSTER COUNTY.

In Custer County, the White Knob mine was idle during the greater part of the year, owing to lack of market for its ores.

At Loon Creek, the Lost Packer Company successfully
operated its 100-ton smelter for ninety days during the summer and made a large yield of high-grade gold and silver-bearing copper matte.

The Golden Sunbeam mine, in the Yankee Fork District, operated continuously with a 50-ton mill throughout the year, and made a large output of precious bullion. This property has developed in a magnificent manner during the year and promises to continue a large and steady producer for a long time in the future.

LEMHI COUNTY.

In Lemhi County the ore shipments from the lead-silver district were very light, due to the long haul by wagons to railway transportation and the low price of the metals. Several new and important discoveries were recorded, however, and a new independent smelter plant to treat the medium grade ores of this district is in process of construction at Spring Mountain, which should greatly encourage ore development in this section.

At Indian Creek, the Ulysses mine resumed operation during the year, and is again making an important yield of gold bullion.

The coal mines at Salmon City were developed during the year with a small force, and have made a remarkable improvement and a handsome output, supplying the local market with a desirable article of domestic fuel and showing up unsuspected reserves that promise a big tonnage for further demand.

SILVER CITY DISTRICT.

In Owyhee County, the Silver City district is giving employment to a force of about six hundred men.

In this field the old DeLamar mine has greatly improved its ore resources, and has increased its milling capacity fifty per cent during the past year. The Trade Dollar Consolidated mine is employing its normal force, but its operation has been somewhat interrupted during the year through the tying on of the Boise & Interurban Railway to its electric power plant.
Considerable activity in new mining development is in progress around Silver City that should result in important ore disclosures in another year.

The most successful new enterprise of the year at this point is that of the Potosi mine, which has been developed to a depth of 300 feet with three levels, and is showing some remarkably handsome reserves of rich ore. This property was equipped with a 20-ton milling plant, which was gotten into successful operation at the close of the year and is now being run at a handsome margin of profit with a prospect that the mine may develop into a good dividend payer at an early date.

SEVEN DEVILS.

The extension of the Northwestern Railway down the Snake River canyon will shortly be completed to a point 58 miles below Huntington. This brings the west slope of the Seven Devils range in close touch with railway transportation, and is already proving a great stimulus in the development of the rich copper ore resources of that region.

ATLANTA DISTRICT.

In Elmore County, the Atlanta District has been the scene of great activity during the year through the purchase and transfer of the Pettit mines from the original owners for $125,000 cash to the Bagdad-Chase Gold Mining Company, of Rochester, New York. This property has been equipped with a 20-stamp mill, which has been in successful and profitable operation throughout the year and is now being enlarged by an addition of 20 more stamps, which will increase its capacity to 150 tons a day.

The new mill of the Atlanta Mines Company at this point was tried out during the year and found inadequate to the successful treatment of the extensive ore reserves of this property, and will have to be overhauled and considerably readjusted for a successful extraction of the values.

The Pettit mine is responding in a very handsome manner to development and is showing up an enormous tonnage of ore of good milling grade.
The ore resources of this district need very close treatment for a successful extraction of their values on account of their mixed silver minerals, but they occur in enormous tonnage and would warrant a big consolidation and a milling plant of 1,000 tons a day capacity.

ELK CITY DISTRICT.

The Elk City District, in Idaho County, has enjoyed a prosperous year of mining development and has given employment to a good many men.

The Buster mine at this point has been developed to a depth of 400 feet on a 10-foot fissure vein, containing average values of $10 to $20 per ton. This mine is equipped with a 10-stamp mill and cyanide plant and has been successfully operated throughout the year, making a large production of gold.

This district has numerous handsome fissure veins, and many of them are now being exploited, and other important producers are likely to result with further development. It also contains some immense zones of low-grade gold ore that are likely to produce mines of the Treadwell type with proper development and equipment. It is also noted for immense bodies of old channel placer gravel and good dredging ground and will continue to yield a large output of precious bullion from these resources for years to come.

BOISE BASIN.

The old Boise Basin hydraulic diggings enjoyed a successful water season, and made a little better than the usual production of recent years.

At this point, some extensive dredge installations are under way by the Boston-Idaho Gold Dredging Company, who have moved a dredge of 3,000 yards daily capacity from Yreka, California, to their property below Idaho City, which is to be ready for operation by April 1st, at which date they expect to have completed a hydro-electric power plant on the south fork of the Payette River, which will have horse power capacity of about 1,400 that will be transmitted about fifteen miles to the dredging operation.
This company is also having designed a monster dredge of 9,000 cubic yards daily capacity for the same ground, which is quite extensive and contains good average values, amounting to something like 16 cents to 18 cents per cubic yard, and has been very thoroughly tested during two years' operation by drilling.

The company own 600 acres of this class of ground at this point which is ideally adapted for a big dredging operation.

COAL FIELDS.

In the Fremont County coal fields the Brown Bear mine has been successfully developed to a depth of 200 feet during the year, where the coal is found to be of even better quality than in the shallow levels above. This district is producing now a good tonnage of coal that supplies the local farmers of that region, and, with railway transportation, will doubtless prove a resource of high grade fuel capable of supplying the total demands of the State.

PHOSPHATE FIELD.

Idaho will also be credited this year with an output of 5,700 tons of high grade phosphate rock from the property of the San Francisco Chemical Company at Montpelier, Bear Lake County. Recent development of the phosphate deposits of this field tend strongly to confirm the opinion that it is likely to prove the richest and most important source of phosphate rock ever discovered in the United States.

FATAL ACCIDENTS.

As near as can be learned, the number of men employed in mining operations throughout the State during the past year has averaged 5,500, of which 3,000 are employed in the Coeur d'Alenes.

The total number of accidents reported are 10, as against 18 for 1907, and 17 in 1906, which means that the number of fatal accidents per thousand men employed would approximate 1.75, which is a very favorable showing, compared to former years in this State, and is probably as low
a proportion of fatalities to the number of men employed as obtained anywhere in big mining operations. The causes of these fatal accidents are as follows:

- Falling ground .......................... 4
- Caught by moving ore cars ................. 2
- Falling down chutes ......................... 1
- Contact with live wires ...................... 1
- Thawing powder ............................. 1
- Caught by moving cage ....................... 1

Total ........................................ 10

All these fatalities were due to the normal hazards of the business, in which the personal judgment and lack of care on the part of the victim were contributing causes.

The large number due to falling ground were in every instance caused by neglect of properly baring down the backs after blasting, and generally caused by small slabs or falls of rock from stope backs or similar situations that might have been prevented by proper personal care and precaution.

There were no fatalities that could be justly charged to faulty equipment, and in no case were two men killed together up to December 20th.

The freedom from blasting accidents and premature explosions that formerly cut such an important figure is a notable fact of the past year, especially when it is considered that in eight of the big Coeur d’Alene producers there was a total of 1,000 tons of nitro-blasting powder used during the year, embracing the handling of hundreds of thousands of individual blasts and primers. This immunity is doubtless largely due to the splendid systematic methods of handling explosives in the Coeur d’Alene district, where all the big companies employ men especially for this purpose in preparing the primers and thawing the powder and distributing it through the mines, sufficient powder only being taken into the mine for 24 hours’ requirement on each level, where it is carefully handled and distributed
between shifts in the larger properties, when most of the men are out.

At the Standard-Mammoth and Morning mines, the holes are all blasted by special men between drilling shifts, who work in pairs and carefully note missed holes, greatly reducing accidents of this nature, and this care in making primers and blasting can not be too highly recommended.

The only powder accident recorded during the year was due to careless thawing of powder at a prospect operation.

The big companies take every reasonable precaution to protect their men and endeavor to keep their equipment up in first-class condition all the time. Where such large forces are employed, however, carelessness on the part of the men themselves and unwarranted risks continually crop out, and, for the proper supervision of this field, a sufficient fund should be provided for the employment of a resident deputy inspector who could make the rounds of all the mines at least once every three months, and constantly drill the operatives in precautionary measures, especially the smaller properties where the longest risks in handling powder is usually found.

Idaho is fortunate in having her mining operations largely situated in high mountain districts where tunneling operations may be successfully carried on to great depth on the ore bodies and involve very few shaft mining operations.

RECOMMENDATIONS.

There are several important statutory requirements which should be passed for the better protection of underground workers, and, to further strengthen the authority of the Inspector of Mines, I would recommend the following items for the consideration of the present session of the Legislature:

First. That the office of Inspector of Mines should be taken out of politics, and eliminated from the elective list.

My successor is especially well equipped by education,
experience and character to fulfill the duties of the office, but his nomination at the last Republican convention was an accident due to a political trade, and it is hardly conducive to the best interest of the department to subject such a man to the dickerings that usually characterize political conventions, where the selection of a candidate isn't always governed by his merit, and, while good men will doubtless always be available for this position, it belittles them in their own estimation to have to plead for the support of a lot of dickering delegates from a farming community for this nomination.

The position ought to be made an appointive one by the Governor, subject, however, to competitive examination of the candidates on civil service lines before a board of examiners consisting of three of the principal mining operators of the State, who could readily formulate a list of questions, and would doubtless be glad to serve without compensation for such a limited, but important duty.

Education on mining lines, practical experience and character should be the governing requirements of the candidates. The position involves for its intelligent administration a lot of necessary detailed technical information that makes an ordinary, practical miner about as competent to fill the position, as a practical carpenter would be to fulfill the duties of an architect on a big building, as there are a good many things in mining, mechanical, electrical engineering and chemistry, not to mention some clerical, literary and legal ability, called for among the common duties of a Mine Inspector in this State, that the ordinary, practical miner doesn't generally possess in a marked degree.

The term of office should be extended to four, in place of two, years, as it takes a man the greater part of his two years' term to find and get acquainted with the mines of the State, scattered as they are over 84,000 square miles of rough mountain territory.

An ample provision should be made for the office fund,
which embraces the financial requirement of the department in the way of clerk hire, printing and compensation of deputies, etc. My greatest item of cost in this feature of my work has been the printing bills. I have generally published a rather extended and illustrated review of the mining progress and development of the State for the purpose of encouraging meritorious enterprises, and showing up to the best advantage the promising undeveloped mineral resources of the State. I think this idea should be continued and extended, as it seems to have met with popular favor. These reports circulated all over the world are, as a matter of fact, a semi-official advertisement of the mineral resources of the State, and are amply warranted in the present stage of our development.

There is no use hiding our light under a bushel, and every department of the State that ventilates and publishes its natural advantages should be substantially supported, for we have in Idaho probably as large a variety and extent of undeveloped natural resources as any other State in the Union which, with proper nursing and ventilation, should result in making this one of the most prosperous of commonwealths.

Idaho possesses, besides her immense area of irrigable land and water resources, immense water power possibilities. The Snake River, with a minimum flow of 4,000 second feet, falls over a succession of steep cataracts through a vertical elevation of 2,000 feet within 150 miles of its course in the heart of its great valley, affording an amount of easily available power that is hardly appreciated. This is only one feature of the State's water power resources, which are duplicated at other points along this stream and on its great tributaries.

We have the largest remaining resources of pine timber, the largest deposit of lead ore of any State in the Union, immense deposits of useful cement making and building material, clays and tripoli stone, promising sources of natural gas and oil and some of the richest and most extensive deposits of phosphate rock ever discovered.
Our lead mines yield enough sulphur each year (which is now wasted) that, if employed and combined with the phosphates, could produce sufficient fertilizers to supply the total requirements of the United States.

We have an important area of cretaceous formations, containing large workable deposits of high grade bituminous coal, which, when properly developed, will supply all the fuel requirements of the State indefinitely.

Our great granite regions contain a variety of the rarer earths, metals, and minerals, which are attracting attention in the commercial world at this time and should be investigated and their development facilitated. To this particular feature, the services of the State Chemist could be brought into excellent play by affording resident prospectors an opportunity of having a qualitative test made for the determination of suspected valuable or rare minerals. This grand array of natural resources are all imminently related to the mineralogy and geology of the State, and their development and utilization can be decidedly advanced and pushed by the proper attention of this department, and the work of the Inspector on these lines should be liberally supported.

During my past three terms as Inspector of Mines there has never been a single legal complaint sent into the office regarding the dangerous condition of any underground working place, and only a very few unofficial complaints, which were generally put in by disgruntled, barroom loafers, or discharged employes. These cases have generally been recognized, however, and the complaints investigated.

The mining operators have usually cheerfully complied with all of my recommendations, especially in the larger properties, where systematic regard is held for the safety of the men. The small mines take longer chances, and, as they are often operated and undertaken in remote districts, and generally with insufficient capital, a good deal of discretion has to be used in governing the risks their operations may involve, and to strengthen the Inspector’s posi-
tion in this respect, there are several little statutory requirements that should be passed, which would involve very little additional expense to new operations and remove the danger of some unnecessary risks.

There has been no calamitous accidents from mine fires in Idaho during my six years' experience in the office, but some very close calls from smoke smothering have occurred both in shaft and tunnel work, and a law should be passed prohibiting the construction of buildings for mechanical plant, timber sheds and blacksmith shops over the entrance to a mine, excepting in high, snowy countries a light snow shed may be permitted between the buildings and the entrance to the mine that could be rapidly destroyed in case of fire but all frame buildings should be placed at a distance of not less than 25 feet from any entrance to a mine.

All working adit or cross-cut tunnel entrances should be provided with a fire door not less than 50 feet in from the earth portal of the tunnel, not less than 50 feet in from the earth portal of the tunnel. This door should be so hung and adjusted that it could be closed with a pull wire, terminating at the portal of the tunnel, and such tunnels should be further provided with a short raise and ladder-way to the surface immediately inside of such door.

It should be unlawful for a shaft to be operated with a bucket to a greater depth than 250 feet or to be covered with any building construction, excepting the gallows frame, bin or ore pocket, unless the same is absolutely fire proof.

Existing shafts or tunnels covered with building such as shaft house, blacksmith and machine shops, or engine rooms should be provided with fire protection. In all cases, dry hand-grenade fire extinguishers should be available at convenient points around the building, and water protection under pressure with at least one hydrant, with hose and nozzle attachment, located outside of the building should be provided wherever water is available.
Shafts of more than one compartment should be provided with a man-way with suitable ladders properly partitioned off, covered at the top by a trap door, and connected with the surface outside of the buildings with a short drift and raise, if necessary, at a point 25 feet below the collar of the shaft for emergency cases.

In all vertical manways in shafts or raises, ladders should be provided with platforms at intervals of not to exceed 20 feet, and the ladders set at such convenient angle from the vertical as the space permits, each platform to be provided with an opening to the ladders no larger than is necessary for the passage of a man.

Electric power cables, especially in wet shaft manways, should be thoroughly insulated and inverted U shaped guard rails placed along trolley wires opposite hand loading chutes.

Loose cross-heads used in bucket sinking are always a menace to life and should be avoided. In this connection, attention is called to a new device invented by Mr. Fred Burgen, superintendent of the Tiger-Poorman mine at Burke, and put in practical use in the Coeur d’Alenes in the past four years, known as the “Standard Self-Dumping Hoisting Bucket,” which is permanently attached to a solid cross-head with safety catches using double extension chains, which eliminates the danger from the spinning of the bucket, or the hanging up of a loose cross-head. This device has been successfully used, and proved one of the safest and most economical methods of handling a hoisting bucket employed, and is highly recommended.

The collars of shafts should be fixed and protected so that persons and foreign objects can not fall into the shaft, and cages should be equipped with safety catches and a steel hood or bonnet. All steam, electric, or air driven machinery used for the purpose of hoisting or lowering men and material in mines should be equipped with an indicator, geared positively to the shaft or drum of the hoist and
so adjusted with dial or slide as to provide a target or indicator that at all times will show the exact location of the cage, or skip in the shaft. This indicator must be placed in clear view of the engineer.

All mines equipped with cages or skips used for hoisting men and material from two or more levels should employ a man to be known as a cager to load or unload the cage or skip, and give signals to the hoisting engineer. It should be unlawful for men to be allowed to travel on a cage loaded with material or supplies of any kind, excepting the cager or others where necessary to assist in passing material through the shaft, and then only on special signals.

An uniform code of bell signals should be employed throughout the State as far as it applies to handling men, and shaft blasting, and the code should be conspicuously posted in sight of the engineer and at each station.

All gallows frames should be equipped with automatic chairs in such a position as to catch the cage or skip, and prevent it falling in cases of overwinding and breaking of the cable.

No gallows frame after a shaft has reached 200 feet in depth and stoping commenced, should be permitted to be less than 40 feet in height between the collar of the shaft and sheave wheel.

It should be unlawful for any mining company or person to store more explosives in the underground working of any mine where men are employed than is required for twenty-four hours' use.

It should be unlawful to store or thaw powder in any building used as a dwelling or in which men are employed in any capacity, excepting in the removing, thawing or storing of the same, and all storage places for powder should be situated not less than 300 feet distant from any dwelling or working place for men in a properly designed building or an underground excavation to be used exclusively for that purpose.
In thawing nitro-powder the use of hot water or exhaust steam radiators are especially recommended, but the water should never be used at over 130° F. temperature. In small operations, where only a 130° F. temperature. In small operations, where only a little powder is used, a thawing kettle, with a water jacket, should be used, and the space filled with water heated at a separate source. Never place such a kettle over a fire, but when more heat is required, empty the kettle and fill with more hot water heated at an independent source.

At all shaft mines employing more than ten men that have been worked to a greater depth than 200 feet, and at which the vein has been driven on, and the stoping and production of ore is commenced, it should be necessary to provide more than one exit from the mine. Where there is no such escapement shaft or exit, work on such an outlet should be commenced immediately, and be diligently carried on until completed, in addition to the local escapement near the entrance to the mine previously referred to.

It should be unlawful for any company or corporation to hoist or lower men out of or into a shaft at a greater speed than 800 feet per minute, or to lower men into a mine after the cage has remained idle several hours or after hoisting muck until one round trip has been made with the empty cage.

It should be required that all openings, such as chutes, winzes, timber slides, and mill holes in a mine, when not in use, shall be protected by a plank, grizzly bar or guard rail, and all abandoned or unused surface mine openings should be securely fenced off or covered.

CONCLUSION.

In concluding my six years' service in the office I wish to express my appreciation at the uniform courtesies extended by the miners, mine owners and operators of the State, and to acknowledge the educational feature attached to the position, which has largely made up for the meager
salary the office has afforded, and gives a man a very broad and comprehensive idea of the rich mineral resources and natural advantages of this great State.

During my last term, several of the minor districts have been neglected, as it is impossible for one man to cover them all within a years' time owing to the tediousness of travel to many points. I wish to say, however, that I have seriously transgressed the eight-hour law in an effort to get round, and have always worked hard and aimed to give value received for my pay from the State. My method of handling the duties of the office can doubtless be improved on, and my successor is well equipped with the necessary knowledge to do so, and will doubtless be able to systematize the work and carry it on in more complete detail, if given the proper financial support.

My usual extended and illustrated review of the mining progress of the State will have to be eliminated this year as the fund is exhausted with which to pay the printing bills.

I expect to do some wandering to other enchanted mineral fields, as I have been pretty closely confined by my duties for six years, but I shall always retain an affectionate regard for Idaho's broad valleys, her verdures covered mountains and clear running streams, and as long as I live, I expect to be identified with the material development of her magnificent natural resources.

The following statistical review is based on the metal contents of the minerals shipped during eleven months of 1908, with December largely estimated, and the precious bullion receipts of the United States Assay Office, at Boise, Seattle, Helena, Denver and San Francisco credited to Idaho.

In figuring the values the average New York quotations for the year are used, or as near as could be arrived at on December 25th.

ROBERT N. BELL,
State Inspector of Mines.
<table>
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<tr>
<th>County</th>
<th>Gold, ozs.</th>
<th>$</th>
<th>Silver, ozs.</th>
<th>$</th>
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<td>17.25</td>
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<td>$4,937</td>
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<tr>
<td>Blaine County</td>
<td>412.50</td>
<td>8,526</td>
<td>150,000</td>
<td>150</td>
<td>$153,804</td>
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<tr>
<td>Boise County</td>
<td>10,451.25</td>
<td>216,027</td>
<td>3,131.89</td>
<td>1,654</td>
<td>$217,682</td>
<td>22</td>
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<tr>
<td>Bonner County</td>
<td>125.00</td>
<td>2,583</td>
<td>35,750.00</td>
<td>18,890</td>
<td>$22,725</td>
<td>65</td>
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<tr>
<td>Canyon County</td>
<td>46.00</td>
<td>950</td>
<td>78.36</td>
<td>4</td>
<td>$954</td>
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<tr>
<td>Cassia County</td>
<td>15.00</td>
<td>310</td>
<td>1,200.00</td>
<td>634</td>
<td>$2,624</td>
<td>08</td>
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<tr>
<td>Custer County</td>
<td>14,329.00</td>
<td>296,180</td>
<td>39,050.00</td>
<td>20,634</td>
<td>$138,836</td>
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<td>Elmore County</td>
<td>6,794.70</td>
<td>140,446</td>
<td>6,296.25</td>
<td>3,326</td>
<td>$143,773</td>
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<td>Fremont County</td>
<td>12.50</td>
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<td>0.30</td>
<td>15</td>
<td>$258</td>
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<tr>
<td>Idaho County</td>
<td>5,744.25</td>
<td>118,733</td>
<td>1,242.00</td>
<td>656</td>
<td>$118,389</td>
<td>91</td>
</tr>
</tbody>
</table>
### Lemhi County.
Gold, ozs., 3,415.00 ........................................ $ 70,588.05
Silver, ozs., 12,500.00 .................................. 6,605.00
Lead, lbs., 200,000.00 ................................ 8,400.00

Total value ............................................. $ 85,593.05

### Lincoln County.
Gold, ozs., 62.21 ......................................... $ 1,286.88
Silver, ozs., 5.27 ....................................... 278

Total value .............................................. $ 1,289.66

### Owyhee County.
Gold, ozs., 18,595 ....................................... $ 384,358.65
Silver, ozs., 877,995.25 ................................ 483,932.69

Total value .............................................. $ 848,291.34

### Oneida County.
Gold, ozs., 201.48 ....................................... $ 4,164.59
Silver, ozs., 10.68 ...................................... 564

Total value .............................................. $ 4,170.23

### Nez Perce County.
Gold, ozs., 2,996.51 ..................................... $ 61,937.86
Silver, ozs., 690.02 .................................... 364.60

Total value .............................................. $ 62,302.46

### Shoshone County.
Gold, ozs., 4,105.00 ..................................... $ 84,850.35
Silver, ozs., 6,531,880 .................................. 3,451,450.67
Lead, lbs., 205,506,159 .................................. 8,631,258.67
Copper, lbs., 8,990,306 .................................. 1,188,518.45

Total value ............................................. $13,356,078.15

### Twin Falls County.
Gold, ozs., 107.78 ....................................... $ 2,227.81
Silver, ozs., 5,83 ....................................... 308

Total value .............................................. $ 2,220.89

### Washington County.
Gold, ozs., 150 .......................................... $ 3,100.50
Silver, ozs., 326 ........................................ 172.25
Copper, lbs., 40,000 ..................................... 5,283.00

Total value .............................................. $ 3,555.75

### Totals for the State of Idaho.
Gold, ozs., 68,145.16 .................................... $1,409,992.97
Silver, ozs., 7,660,507.38 ............................ 4,047,511.63
Lead, lbs., 207,998.499 .................................. 8,764,485.35
Copper, lbs., 10,110,506 .................................. 1,236,608.89
Zinc, lbs., 64,000 ........................................ 3,029.50

Total value ............................................. $15,561,131.64
Output of 1907 ........................................... 22,165,191.34

Decrease .................................................. $ 6,604,059.70