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Idaho Geological Survey's annual reports from the Idaho State Mine Inspector to the governor for years 1909-1913, 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 1909-1913.









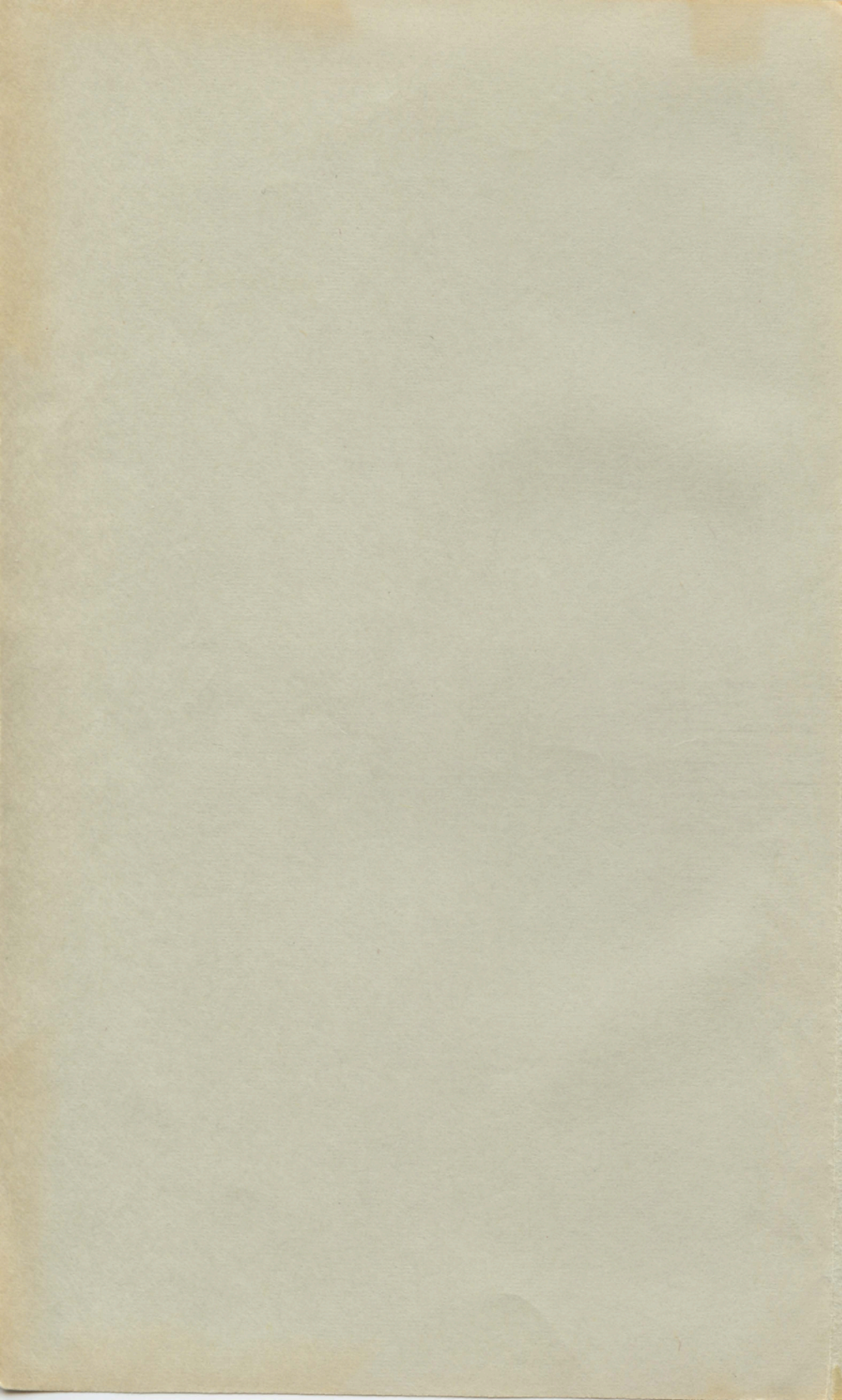
























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Total Mineral production for  
1909 on page 132-139









HYNDMAN PEAK—ELEVATION 12,048. THE HIGHEST PEAK IN IDAHO. 25 MILES NORTHEAST OF HAILEY.

ELEVENTH ANNUAL REPORT

—OF THE—

MINING INDUSTRY

OF IDAHO

FOR THE YEAR 1909.



F. CUSHING MOORE  
*State Inspector of Mines*



BOISE, IDAHO, JANUARY 1, 1910.

TO HIS EXCELLENCY, JAMES H. BRADY, *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, 1909.

Very respectfully,

F. CUSHING MOORE,

*State Inspector of Mines.*

# INTRODUCTION

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In spite of the depressed conditions of the mining industry, which prevailed throughout the United States, during the early part of the year, the production of Idaho has been about normal, and slightly in excess of that of last year.

The producing mines of the State have been able to operate regardless of financial conditions, aside from a few which could not produce at a profit on the existing low metal prices. But the mines in the embryo state are the ones that have suffered to the greatest extent, many of which have been compelled to close down, and in other cases options on valuable properties have been lost. This condition of inactivity in this State is directly due to the financial depression of 1907 and the subsequent popularity of irrigation schemes, the general tendency of capital toward manufacturing enterprises, etc. In turn, these conditions have largely been brought about by the mining promoter—not the legitimate promoter but the “wildcat-ter”—who is the most of all responsible for the idle mines and the abandoned mills and smelters, so frequently seen in the mining sections—colossal monuments to the memory of knavish promoters and impracticable managers.

The element of chance, perhaps, enters into mining ventures to a greater extent than in most ordinary business enterprises, but, conducted upon intelligent business principles and experienced management, mining has been demonstrated to be one of the most profitable enterprises in which money can be invested, for, when a mine becomes a

producer, it offsets the losses of many failures, and if the ordinary precaution used in other business investments were exercised, the gross exaggerations and misrepresentations of some unscrupulous promoters would be detected and the culprit exposed or brought to justice before the funds had been squandered.

Idaho has a very specific statute upon this subject, which I quote in full:

*Frauds in the Management of Corporations.*

“Publishing False Prospectus or Report.

“Sec. 7128. Any person who knowingly makes or publishes in any way whatever, or permits to be so made or published, any book, prospectus, notice, report, statement, exhibit or other publication of, or concerning the affairs, financial condition or property of, any corporation, joint stock association, co-partnership or individual, which said book, prospectus, notice, report, statement, exhibit or other publication, shall contain any statement which is false or wilfully exaggerated or which is intended to give, or which shall have a tendency to give, a less or greater apparent value to the shares, bonds or property of said corporation, joint stock association, co-partnership or individual, or any part of said shares, bonds or property, than said shares, bonds or property or any part thereof, shall really and in fact possess, shall be deemed guilty of a felony, and upon conviction thereof shall be imprisoned for not more than ten years or fined not more than ten thousand dollars, or shall suffer both said fine and imprisonment.”

The promoter who squanders money on worthless property which he has obtained from outside investors may be

considered a good fellow in the district where he is spending some of this money; but in the long run he is not a benefactor but a malefactor, for the benefit derived by the district is only temporary and the after effect operates seriously to its detriment.

Idaho contains very many meritorious mining properties which are awaiting the assistance of capital to become productive, and as the lives of all mines are limited, the future of the State's mineral production depends upon the development of new properties, and active, intelligent prospecting must be carried on if we expect to hold the enviable position which we now occupy; for the prospect bears the same relation to the mineral production of the country that the school boy bears to the National Government, and immense sums of money have to be expended upon their development, as large sums are expended upon the education of the younger generation; but the ludicrous exaggerations and misstatements sometimes made in connection with financing mining properties are greatly to be condemned.

Again, the failure of a property to make good is very frequently occasioned by gross mismanagement. Mine examination and management is a profession as much as the legal, medical and other professions are, and requires years of training, so that it is not to be expected that a man inexperienced in this line can judge the worth of a mining property or develop it to a profitable state. This is one of the greatest thorns in the wound of the mining industry at the present time, for wherever a mining boom is started or there is any considerable activity in a mining section, you find companies organized and properties promoted and



operated by farmers, preachers, doctors and men from all the walks of life. It is surprising that the mining industry has not suffered to a greater extent from these causes than is apparent.

The mineral production of the United States for 1909 will aggregate over two billion dollars in gross values, and has employed 65 per cent of the hauling facilities of all the railroad systems of the country. Of this great total the mines of the country, exclusive of coal and iron enterprises, according to a recent statistical article in the Mining World, have paid \$55,000,000 in dividends during the eleven months of 1909, and a total of \$599,000,000 on an issued capitalization of \$560,000,000, or equivalent to 107 per cent on their total capitalization in net profits, and simply shows the possibilities for profit in mining operation when intelligently handled.

#### FATAL ACCIDENTS.

During the past year 19 fatal accidents have occurred in connection with mining operations within the State. It is to be deplored that such a large number of lives should be lost in connection with the working of mines, but when it is taken into consideration that in the neighborhood of 6000 men were employed—or 3.33 per thousand men employed—it compares very favorably with the other industrial pursuits.

Ten of these fatal accidents were occasioned by the falling of rock in the working faces of the mines, most of which were from the Coeur d'Alenes, where the slabby condition of the walls necessitates constant barring down; and, while all possible precaution is taken on the part of the operators, men become too careless and do not prop-

erly protect themselves. This was also true of falling down chutes, raises and other openings in the mines, from which there were four fatal accidents, and simply goes to show that most of the accidents occurring under ground are due to the carelessness of the miner himself. However, most of these fatal accidents occurred to men who were unaccustomed to underground work and who did not take the proper precautions, such as the experienced miner does.

The accompanying table shows the number of fatal accidents and the causes for same since the first of 1903; prior to this time no record was kept in this office of fatal accidents.

CAUSE.	1903	1904	1905	1906	1907	1908	1909	Total	Per cent
Fall of rock from working faces.....	4	3	5	4	5	4	10	35	.079
Explosion of blasting compounds.....	7	5	5	6	2	1	2	28	.063
Falling down chutes, raises, and other openings.....	3	1	3	4	7	1	4	23	.052
Hoisting accidents — bucket, cage, or skip.....	3	0	2	0	0	1	1	7	.013
Electrocution by contact with live wire.....	0	0	2	0	1	1	1	5	.011
Car accidents.....	0	0	1	1	1	2	1	6	.013
Tapping old workings.....	1	1	0	0	2	0	0	4	.009
Caving bank in placer mine..	1	0	1	0	0	0	0	2	.005
Suffocation from gas or smoke	1	0	0	0	0	0	0	1	.002
Accidents in handling timber.	0	0	1	0	0	0	0	1	.002
Falling staging while drilling	0	0	0	1	0	0	0	1	.002
Gasolene tank explosion. ....	0	0	1	0	0	0	0	1	.002
Total.....	20	10	20	17	18	10	19	114	.....
Average number men employed	7,000	6,000	6,000	7,000	7,000	5,500	6,000	44,500	.....
Per cent of fatal accidents.....	.285	.166	.333	.242	.255	.175	.333	.256	.....

The tabulation of this data shows that .79 out of every one thousand men employed since the end of 1902 in min-

ing operations throughout the State were killed by falling ground. The next greatest source of fatal accidents was that in connection with the use of blasting compounds. This shows .63 fatalities per thousand, but it will be noted that a great falling off in the fatal accidents occurring from this cause has been experienced in the last few years, which is largely due to the improved means of thawing and handling powder. The miner who is accustomed to handling powder becomes too careless, and unless he is forced to employ safe and sane methods, subjects himself to unnecessary risk. However, all of the mining properties in the State have adopted approved methods of thawing powder and this source of danger has largely been minimized.

The next cause of accidents of importance is that of falling down chutes, raises and openings in mines. No further explanation is required in this connection, other than to state that nine-tenths of these accidents are due entirely to carelessness or poor eyesight on the part of the miner, as it is impossible to keep all the openings in a mine so tightly covered that a man cannot fall through them if he tries. However, recently, at the Standard mine, in the Coeur d'Alenes, grizzlies have been employed over all chutes down which ore is being thrown, and all chutes which are not in use are kept covered. These grizzlies are made of light T-rails, with openings sufficient to permit the passage of ore, but of small enough dimensions to prevent a man from falling through, but this cannot be done in all cases, and this element of risk will always be prevalent in mining operations where the ore deposits are steeply inclined.

The total number of fatal accidents since the first of 1903 to date is 114, and the total number of men which were employed during that time was 44,500, or 2.56 men to every thousand employed, which is an extremely creditable showing, when taken in comparison with other mining districts and with other industries which employ manual labor.

However, it is greatly to be deplored that any fatal accidents should occur, and every possible means to safeguard the miners should be employed. The large operators of the State employ nearly every such protection that can be used without materially interfering with the maintenance of their productions; however, there have been many comparatively small operators who have apparently failed to realize the risk to which they were subjecting their employees by faulty equipment, insufficient ventilation, and failure to provide adequate exits and employ the proper discipline in connection with hoisting operations, etc.

The giving of verbal signals to a hoist engineer has caused several fatal accidents and should be tolerated under no conditions.

A law passed by the Tenth Session of the Legislature, covering the operation and equipment of mines, with which the writer was identified, has been very fruitful of beneficial results in several instances. This law has been given considerable publicity and copies are in this office ready for distribution to those who have not been supplied, but there are many who are unfamiliar with the requirements of this law and who may in the future come under its operation; therefore I am publishing this section in full.

This law, perhaps, should be changed in several details and does not cover many points which it should, but is



simply one step in the right direction and should be modified as the objectionable features are detected and the shortcomings apprehended.

*Operation and Equipment of Mines.*

(Session Laws 1909, Page 266. (Senate Bill No. 160.)

Be It Enacted by the Legislature of the State of Idaho:

Section 1. The rules, regulations and methods prescribed in Section 2-29 of this act, shall be observed and followed by each and every person, employee, firm or corporation operating mines within the State of Idaho.

Sec. 2. Shafts or tunnels, which at the present time are covered with frame buildings, such as shaft houses, blacksmith shops, machine shops or engine rooms, shall be provided with fire protection. In all cases, dry hand-grenade fire extinguishers shall be available at convenient points around the buildings, and water protection under sufficient natural pressure, with at least one hydrant, with hose and nozzle attachment, located outside of the building, shall be provided wherever water is available.

Sec. 3. Every working adit or cross-cut tunnel entrance, where wooden buildings exist at or near the portal of same, shall be provided with a fire door not less than fifty feet from the earth portal of the tunnel. This door shall be hung and so adjusted that upon being released it will close of its own accord, either by its own weight when hung from the top of the tunnel, or by means of suspended weights when hung from the side. The door shall be held open by a rope passing over a pulley, terminating outside of any of the buildings at the mouth of the tunnel, and shall be so fitted that, when closed, it will cut off the circulation of air as completely as possible. Where electric haulage is used in said adit or cross-cut tunnel, a door consisting of two doors hung from the sides and closing tightly can be used.

If there be no other exit which can be reached from the

underground workings connected with such entrance tunnel, then such entrance tunnel shall further be provided with a short raise and ladder way to the surface immediately inside of the fire door.

Sec. 4. At all mines employing, underground, more than fifteen men, and where the vein has been driven on and stoping commenced, shall be provided with more than one exit, and where there is no such escapement raise or exit, work on such an outlet shall be commenced immediately, and be diligently carried on until completed.

Sec. 5. Shafts sunk to a greater depth than 100 feet must have two or more compartments, one compartment to be used for a manway, and to be fitted with a good, substantial ladderway, provided with platforms or cross pieces at intervals of not to exceed twenty feet, and where practicable the ladder shall be in lengths of not to exceed twenty, and inclined at a convenient angle.

Sec. 6. Where wooden buildings exist at or near the collar of a shaft, and when there is no other exit which may be reached from this shaft, through underground workings, then the manway compartment of the shaft must be partitioned off from the other compartments, and provided with a trapdoor, over the manway compartment, at the surface, which must be kept closed or so arranged that it can be closed from a point outside of the building by the releasing of a rope, and said manway compartment shall in addition be connected with the surface by a short drift or raise starting at a point not less than twenty-five feet below the collar of the shaft and terminating outside of any buildings.

Sec. 7. The construction of new buildings, for mechanical plant, timber shed, blacksmith shop or for any other purpose, over or at the entrance to a mine, shall be prohibited, excepting in high, snowy countries where a shed may be permitted between the buildings and the entrance to the mine, which can be rapidly destroyed in case of fire,

but all frame buildings shall be placed at a distance of not less than twenty-five feet from the entrance.

Sec. 8. The collar of all shafts shall be fixed and protected so that persons and foreign objects can not fall into the shafts, and all openings in mines such as chutes, winzes, timber slides and mill holes, when not in use for any considerable length of time, shall be protected by a plank or guard rail, and all abandoned or unused surface shafts or raises to the surface shall be securely fenced off or covered.

Sec. 9. It shall be unlawful for any person to sink or operate a vertical or steeply inclined shaft to a greater depth than 250 feet without having the same equipped with a mine cage, skip or bucket fitted with safety clutches.

Where a bucket is used, the same must be attached to a fixed safety crosshead by two chains or cables. Loose crossheads for shaft buckets are strictly prohibited.

Where a cage or skip is used, it must be provided with a bonnet in addition to safety clutches. The bonnet must be made of boiler sheet iron of at least 3-16 inch thickness, and must cover the top of the cage in such a manner as to afford the greatest protection to life and limb from any falling objects.

Where a cage and skip are used together in the same compartment of the shaft, the bonnet may be dispensed with, if the skip is placed above the cage, provided this act does not apply to skips, cages, or buckets used solely to hoist or lower materials.

Sec. 10. All gallows frames shall be equipped with automatic chairs placed in such a position as to catch the cage or skip, and prevent its falling, in case of overwinding and consequent breaking of the cable.

Sec. 11. After a shaft has reached 200 feet in depth and stoping commenced, the gallows frame shall not be less than forty feet in height between the collar of the shaft and sheave wheel.

Sec. 12. Wherever a steam, electric, gas, air or water driven hoist is used in the handling of men in mines, it shall be equipped with an indicator, placed in clear view of the hoist engineer, and 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 will at all times show the exact location of the bucket, cage or skip.

Sec. 13. Electric power cables, where used underground, shall be thoroughly insulated; and where electric haulage is used underground, the trolley wires must be protected by inverted U-shaped guards, placed along the trolley wires, opposite any hand-loading chutes.

Sec. 14. Every shaft that is equipped with a bucket, cage or skip operated by a hoist shall be supplied with pull bell, and also with an electric bell and flash light signal, where practicable.

Sec. 15. At all mines where hoisting apparatus is used in the State of Idaho, the following code of bell signals shall hereafter be adopted and used:

One bell, hoist.

One bell, stop (if in motion).

Two bells, lower.

Three bells, hoist men (run slowly).

Four bells, blasting signal. Engineer must answer by raising bucket or cage a few feet and letting it back slowly; then one bell, hoist men away from blast.

Nine bells, danger signal (fire, accident or other danger), followed by the station call where the danger exists.

No person other than the cager shall ring the signal bell except in case of absolute necessity, and then only after giving seven bells, thereby notifying the hoist engineer that someone other than the cager is ringing the bell.



*Station Signals.*

Bells.	Pause.	Bells.	No. Station.
2	"	1	1
2	"	2	2
2	"	3	3
2	"	4	4
2	"	5	5
3	"	1	6
3	"	2	7
Etc.	Etc.	Etc.	Etc.
5	"	5	20

Sec. 16. Every mining property using hoisting apparatus within the State of Idaho shall keep one copy of this entire code posted on the gallows frame, and a copy of the bell signals before the hoist engineer, and on each station.

Sec. 17. All mines employing more than fifteen men equipped with cages or skips used for hoisting men and material, from two or more levels, shall have a man known as a cager, whose duty shall be to load and unload the cage or skip, and to give signals to the hoisting engineer, etc.

Sec. 18. It shall be unlawful for any cager or other person to ride upon a cage or skip except after having given a bell signal known by the engineer to be a signal for the handling of men. No private or short signals will be allowed when men are to be hoisted or lowered.

Sec. 19. It shall be unlawful for any one, excepting the cager, to ring the hoist bells without first giving a special signal, notifying the hoist engineer that someone other than the cager is ringing the bell.

Sec. 20. It shall be unlawful for men to travel on a cage or skip loaded with steel supplies or material, other than the cager or those who are assisting him in the loading and unloading of such material.

Sec. 21. It shall be unlawful for any person, whether working for himself or whether he be in the employ of any other person, company or corporation, to ride upon

the bail or cable of a hoisting bucket, cage or skip.

Sec. 22. It shall be unlawful for any hoist engineer to raise or lower a bucket, cage or skip, except upon bell signals.

Sec. 23. When a man is being broken in as hoist engineer and when he is under the tutorage of a qualified hoist engineer, and a signal is given to hoist or lower men, the qualified hoist engineer there present must take charge of the hoist, the new man not being allowed to handle the hoist when men are on the cage or skip until he has qualified as a hoist engineer.

Sec. 24. It shall be unlawful for any hoist engineer, while on duty, to answer questions or converse with any one in any manner whatsoever, excepting such persons as may be assisting him in the operation of the hoist, and then only when necessary. When approached by any one desiring to converse with him, he shall bring the hoist to rest and descend from the bridge before answering any such inquiries, or entering into conversation.

Sec. 25. It is unlawful for any person, company or corporation to hoist or lower men at a greater speed than 600 feet per minute; or to hoist or lower the men when going on or coming off of shift, after the cage has remained idle several hours, until one round trip has been made with the empty cage; and when a shaft is equipped with chairs at the several levels, the hoist engineer must slow up when passing stations when men are on the cage or skip.

Sec. 26. No person addicted to the use of intoxicating liquors or under twenty-one years of age shall be employed as hoisting engineer, and no person under the influence of liquor shall be permitted underground, either in the capacity of employee or otherwise.

Sec. 27. It shall be unlawful for any mining company or person to store more explosives in the underground workings of any mine where men are employed than is required for twenty-four hours' use, and it shall also be un-

lawful to store or thaw powder in any building used as a dwelling or in which men are employed in any capacity, excepting in the storing, thawing or removing of the same, and storage places for powder shall be situated not less than 200 feet distant from any dwelling or working place for men, unless some impregnable, natural object intervenes, and then only in a properly designed building or an underground excavation to be used exclusively for that purpose, and conspicuously marked as such.

Powder thawers using fire, candles, lanterns or lights of any kind are hereby prohibited in mines employing more than fifteen men.

Sec. 28. No person, whether working for himself or in the employ of another person, company or corporation, while loading or charging a hole with nitro-glycerine, powder or other explosive, or in removing powder from same, shall use or employ any steel or iron bar; nor shall any mine manager, superintendent, foreman or shift boss, or other person having the management or direction of mine labor, allow or permit the use of a steel, iron or other metal tamping bar by employees under his management or direction.

Sec. 29. Oils and other inflammable materials shall be stored or kept at a safe distance from the mine buildings, and at a safe distance from the powder magazine, and their removal from said building for use shall be in such quantities as are necessary to meet the requirements of one day only.

Sec. 30. Any person, firm or corporation operating mines within the State of Idaho who shall fail, neglect or refuse to comply with any of the provisions of this act, relating to the duties of employer, shall be guilty of a misdemeanor, and upon conviction shall be fined a sum of not more than \$300, or imprisonment for not more than six months, or both such fine and imprisonment; and any employee in any mine who shall fail, neglect or refuse to com-

ply with any of the requirements of this act, relating to the duties of employees, shall be guilty of a misdemeanor, and upon conviction shall be fined a sum of not more than \$300, or imprisonment for not more than six months, or both such fine and imprisonment.

Sec. 31. It shall be the duty of the Prosecuting Attorney of the proper county to prosecute the violations of the provisions of this act upon the furnishing of the necessary information by or at the direction of the Inspector of Mines.

Sec. 33. It shall be the duty of the State Inspector of Mines to have printed a sufficient number of copies of this act for distribution.

Approved March 15, 1909.

#### THE ANNUAL REPORT.

Idaho, with its 84,000 square miles of area, cut in two by extensive mountain ranges traversable only on horseback or by wagon, and this through a small portion of the year, necessitates much time and extensive round about trips to cover the mining districts of this State, which are, of course, located principally in the mountainous sections, and it is practically impossible to cover all of the districts in one season. But outlying districts which have been neglected this year can be covered next season, and some of the smaller districts which were investigated this year can be slighted.

In the preparation of this report I have been compelled to use some data on districts which I have not visited, which has been obtained from what I consider reliable sources, and I trust that I have made no misstatements or exaggerations in connection with any of these properties which I have not personally inspected.

The Idaho statutes prescribe that the annual report issued by the Mine Inspector shall contain details of all accidents, fatal or otherwise, the number of mines examined, the number of mines in operation, the number of mines idle, the number of men employed, wages paid and the nationality of employees, also data regarding the manner of working the mines, the condition of hoisting machinery, boilers, engines, cars, buckets, ropes, chains, etc., also the appliances for the extinguishing of a fire, manner of working and timbering the mine, and much other data which no previous Inspector has ever attempted to embody in his report, and which is absolutely precluded, as the funds available to the office are insufficient.

The law also prescribes that the report shall contain such available statistics and other information calculated to exhibit the mineral resources of the State and to promote the development of the same, and I consider that this phase of the law is of greater benefit to the State than the publishing of a great accumulation of dry repetitions and figures which would be read by no one, so I will attempt to follow the general plan pursued by my predecessor, which has apparently met with almost universal approval, judging from the demand for copies of the reports of previous years and the interest which is manifest in the current issue.

While all the detail prescribed by law is not being published in this report, I am attempting to accumulate all this data in the office, which has never been done in the past. This, of course, necessitates the co-operation of all mine operators, and this I have been unable to secure during the year. Section 203 of the Revised Codes of Idaho specifies "that the owner, lessor, lessee, agent, manager or



other person in charge of each and every mine, of whatever kind or character, within the State, shall forward to the Inspector of Mines at his office, not later than the first day of June in each year, a detailed report showing the character of the mine, the number of men then employed and the estimated maximum number of men to be employed therein during the ensuing year, the method of working such mine and the general condition thereof."

The date prescribed in this paragraph should be changed from June to December of each year, so that the information would be up to date and available for the annual report. This section carries no penalty with it and it has been complied with in very few instances, much to the inconvenience of the Inspector. A bill was introduced the latter part of the Tenth Session of the Legislature changing the date and prescribing a penalty for the violation thereof, but it was lost somewhere in the rush to close up the work at the end of the session and never came up for consideration. This, however, should be attended to at the next session of the Legislature.

#### ANNUAL ASSESSMENT WORK.

One of the most flagrant abuses of the mining laws which has come under my observation is that in connection with the performance of the annual assessment work. The United States statutes provide that \$100 in work shall be expended each year for the benefit of every mining claim, and the State laws provide that an affidavit shall be filed with the County Recorder within 60 days after the time allowed for the performance of such labor.

This latter requirement is nearly always complied with, but violation of the former is constantly being practiced.

In every mining district it is of common occurrence, and it is universally true in other States as well as this, that groups of claims have been held for years, the annual proof of labor on which has been filed each year, but upon which very little work has been performed, and, according to the existing mining ethics, are not open to relocation, as the proof of labor has been filed. The jumping of claims is to be condemned, but the holding of claims without complying with the laws is to be more severely condemned and reminds one very strongly of "the dog in the manger," for the locator will not work the property himself nor allow others to do so.

I would very much like to see a law enacted and enforced which would modify the form of the affidavit of proof of annual labor, so that it would require that the character and extent of the work performed each year be set forth in this affidavit; giving the location of the work performed each year, with reference to corner stakes or fixed monuments, and, in case the work is done in surface or underground workings which had previously been constructed, that the dimensions of these workings prior to the starting of the new work be given, so that it would be an easy matter for a prospector to determine whether or not the assessment work had been legitimately performed upon a piece of ground, and whether or not it was rightly open to relocation.

In other cases, large mining companies swear to the proof of labor on claims where no work was performed which actually benefited the claims, and, if they were required to give the location and extent of work sworn to there would be a greater tendency to conform to the law.

# IDAHO BY COUNTIES.

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## ADA COUNTY.

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Ada County, while boasting a comparatively small production during 1909, has experienced one of the most active years in its mining development within recent times, and has made extensive preparations for future operations. The mining slopes immediately north and east of Boise City contain some promising prospects, carrying very good gold and silver values, which are easily accessible to transportation facilities.

### BLACK HORNET DISTRICT.

In the Black Hornet District several new promising discoveries have been made, and a number of older properties developed and equipped.

*Ironsides Mine.*—The Ironsides mine is, perhaps, the most conspicuous property in this district, as it has been equipped with a modern 20-stamp concentration mill, with building and foundation sufficient to accommodate an additional 10 stamps. This mill is operated by electricity, which is supplied from the power plant at the Barber dam.

The property carries several well defined gold-bearing veins in granite, the principal one of which has a maximum width of about 10 feet, has been traced for over 1,200 feet in length, and has developed large ore reserves of fair milling grade, with some pay streaks, from 1 to 7 feet wide, which will run much higher. The best ore from the mine is of a more or less porous quartz, containing iron pyrites, together with a sprinkling of lead and zinc sulphides. The vein is of similar type to many others in the granite districts of the State and has been a large producer in the

past, having a claimed production of about \$100,000 since its discovery.

The mine was on a producing basis a few years ago but operations were ceased, owing to the loss of its former mill by fire. The mine has over 2,000 feet of underground development work, which attains a depth of approximately 400 feet under the apex, is controlled by New York parties, and, with the new milling equipment, should aid materially in the production of the county in the coming year.

*Three Links Mining Company.*—The Buffalo group, owned by the Three Links Mining Company, in the same locality, has been developed quite continuously through the year by a small force of men and some small shipments have been made.

The property contains four fissure veins in granite, which have been developed by surface cuts, shafts and tunnels to an aggregate length of 1,300 feet. The veins are well defined fissures in granite, carrying good values in free milling ore, the gold from which is of extremely high grade, varying from \$18 to \$19.50 per ounce.

The company owns a 5-stamp mill, which is on the ground, but which has not as yet been set up, but it is expected that this mill will be in running order in the near future.

*Celtic Gold Mining Company.*—This company owns a large group of claims on Picket Pin Gulch, in this same district. The property carries a strong fissured zone in granite, associated with parallel and cross dikes of blue syenite rock. This zone is traceable upon the surface by open cuts and shallow workings for approximately 3,000 feet in length. The shattered granitic rock for some distance on each side of the main fissure appears to carry values sufficient to justify milling on a large scale. The bulk of the ore is free milling, but associated with the precious metal is considerable arsenopyrite. This

granite zone, for 50 feet in width, is claimed to average between \$3 and \$5 per ton, and the higher streaks about \$79 in gold and silver.

The property is equipped with a 5-stamp amalgamation mill, which is inadequate, both in point of tonnage and process, and it is contemplated by the management to install an extensive milling plant, with concentration end, in the near future. The mine has about 3,500 feet of underground development work and contains large ore reserves.

*Constant Group.*—Adjoining the Celtic on the west, the Constant group, owned by Mr. J. J. Oberbillig and Mr. C. A. Johnson of Boise, is one of the new discoveries of the year, and presents a very promising fissure vein exposed in granite. The development work consists of surface cuts and shallow tunnel workings, aggregating in length about 400 feet. The ore, which is of extremely high grade, running from \$50 to \$1,000 per ton, is found in small quartz seams in the fissure, varying from 1 1-2 to 4 inches, and is reported to have paid its own way from the grass roots. There are other vein manifestations on the property which have not been developed at this time, but give promise of being of greater magnitude and are worthy of extensive development.

*Twentieth Century.*—The Twentieth Century Gold Mining Company, located nine miles east of Boise, on the slopes adjacent to the Barber dam, has been developed on a small scale during the year. There are five veins developed in a shear zone in granite, carrying uniform low grade values. The zone is approximately 100 feet in width and is mineralized with finely disseminated arsenopyrite, accompanied by free gold, which is said to average from \$3 to \$4 per ton. Aside from the occurrence of arsenopyrite, the property presents an ideal proposition for cyaniding.

*Big Giant Mining Company.*—The property of the Big Giant Mining Company, located on Big Giant Mountain,

near the Idaho City road, ten miles northeast of Boise, has kept a small force of men at work during the year. However, little active development work has been carried on, as the property has already immense ore reserves blocked out and is in sore need of an elaborate milling plant.

The property is equipped with a 25-ton amalgamation and cyanide plant, in which considerable experimental work has been done this year, showing that a saving of 93 to 95 per cent of the values can be made, where the ore is crushed to pass an 8 to 16 mesh screen. The ore is a clean milk-white quartz, carrying iron pyrites, showing very little lead or zinc sulphides, and is supposed to average between \$4 to \$5 in gold per ton. The vein is fully 50 feet wide in places, occurs in granite and has been traced for a great distance through the property. The total underground development aggregates about 8,000 feet.

The property is largely owned by Boise people, and I am informed that it is their intention to install an extensive milling plant in the near future.

*Spofford Gold Mining Company.*—In the same vicinity of the Big Giant, the property of the Spofford Mining Company, embracing 14 claims, has been developed for the past two years, about 1,500 feet of development work having been accomplished, in which a 7-foot quartz vein, claimed to average about \$7 a ton in free milling values, has been opened up at a depth of 250 feet under the apex. The company is operating a small force of men at the present time, but arrangements are being made to place a mill on the property in the near future.

#### NEAL MINING DISTRICT.

*George F. Roth Mining Company.*—The Homestake mine, owned by the George F. Roth Mining Company, has previously been credited to Elmore County, but I am informed on good authority that it lies just inside the Ada County line.

During the year this property has been developed through a long tunnel which intersects the vein about 500 feet under the apex of the mountain, and preparations are being made to sink 200 to 300 feet deeper.

The vein, which is from 4 to 6 feet wide, contains short ore shoots in which there is claimed to be blocked out ready for milling about 30,000 tons of ore which will average \$10 per ton. The ore carries finely disseminated iron pyrites, which are obtained in concentrates in the ratio of 25 to 1, and average from \$90 to \$100 per ton.

The property is equipped with a 10-stamp mill and concentration plant, which has been running since the middle of July on ore extracted from the development work, which is said to average about \$5 per ton, principally in gold.

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## BANNOCK COUNTY.

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During the past year considerable activity has been displayed in the mining districts surrounding Pocatello, which is the county seat of Bannock County.

*Fort Hall Mining Company.*—The property of the Fort Hall Mining Company, located eight miles southeast of Pocatello and one and a half miles south of Port Neuf siding, on the Oregon Short Line Railway, has been developed during the year by a crew of 10 to 18 men. A new mill has just been completed and extensive operations are contemplated.

The property contains an immense body of disseminated iron pyrites and chalcopyrite, in beds of argillite and altered dolomite, between igneous breccia and shale, carrying light values in gold. The ore-bearing zone is developed 100 feet in thickness, 60 feet of which is more heavily mineralized, and is claimed to average 2 per cent in cop-

per, together with a little gold and silver, with high iron contents, which affords a favorable product for an elaborate concentration plant and should prove profitable if handled on a large enough scale. The property is largely owned by Pocatello business men.

*Papoose Mining Company.*—Immediately east of the Fort Hall Mining Company's property the Papoose Mining Company has driven a 900-foot cross-cut tunnel and worked three men most of the year. There are several other promising properties in this vicinity.

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## BEAR LAKE COUNTY.

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Bear Lake County has a number of small properties containing a variety of mineral deposits such as gold, silver, lead and copper, which have been developed to a limited extent, but the most important mineral resource at the present time appears to be the phosphate rock deposits.

*San Francisco Chemical Company.*—This company owns a large tract of land containing deposits of phosphate rock, which is very desirable for the manufacture of high grade fertilizers. This deposit occurs in flat dipping beds, in a sedimentary formation, identified as belonging to the upper carboniferous series. The veins range from a few inches to 10 feet in thickness, and carry an average value of from 60 to 70 per cent calcium phosphate.

The property has remained inactive during most of the year, only 735 tons of the rock having been shipped. This was largely due to the inability of the company to obtain satisfactory freight rates, but I am informed that extensive operations will be undertaken in the spring.

In this same sedimentary formation there are a number



of copper deposits which have been operated by small forces of men and are reported to have developed very good showings, but I was unable to investigate this section during the year.

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## BLAINE COUNTY.

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Blaine County has had a comparatively small production during the past year, but considerable activity has been displayed in the development of some of the old bonanzas at great depth, and the prospects for the future have been brightened by the discovery of some new important mineral deposits.

### WOOD RIVER DISTRICT.

Hailey, which is the county seat of Blaine County and the metropolis of the Wood River district, has grown materially during the past year and has taken on many city airs. While this is largely due to the wealthy farming community surrounding the county seat, the profits from the Wood River mines has aided greatly to the development of this little city.

*Idaho Consolidated Mines Company.*—The famous Minnie Moore, Relief and other adjacent properties owned by the Idaho Consolidated Mines Company has remained inactive for the past two years. This property has been a great producer in the past, the Minnie Moore alone having a record of approximately \$8,000,000 to date, but was closed down a few years ago by the management for the Schwab interests, who had control of it at that time.

Since then Mr. Irvin E. Rockwell, one of the heavy owners, has operated the mill on tailings from the old mill at a profit sufficient to carry on all experimental work

in the present mill, build a fine power plant and keep up operating expenses.

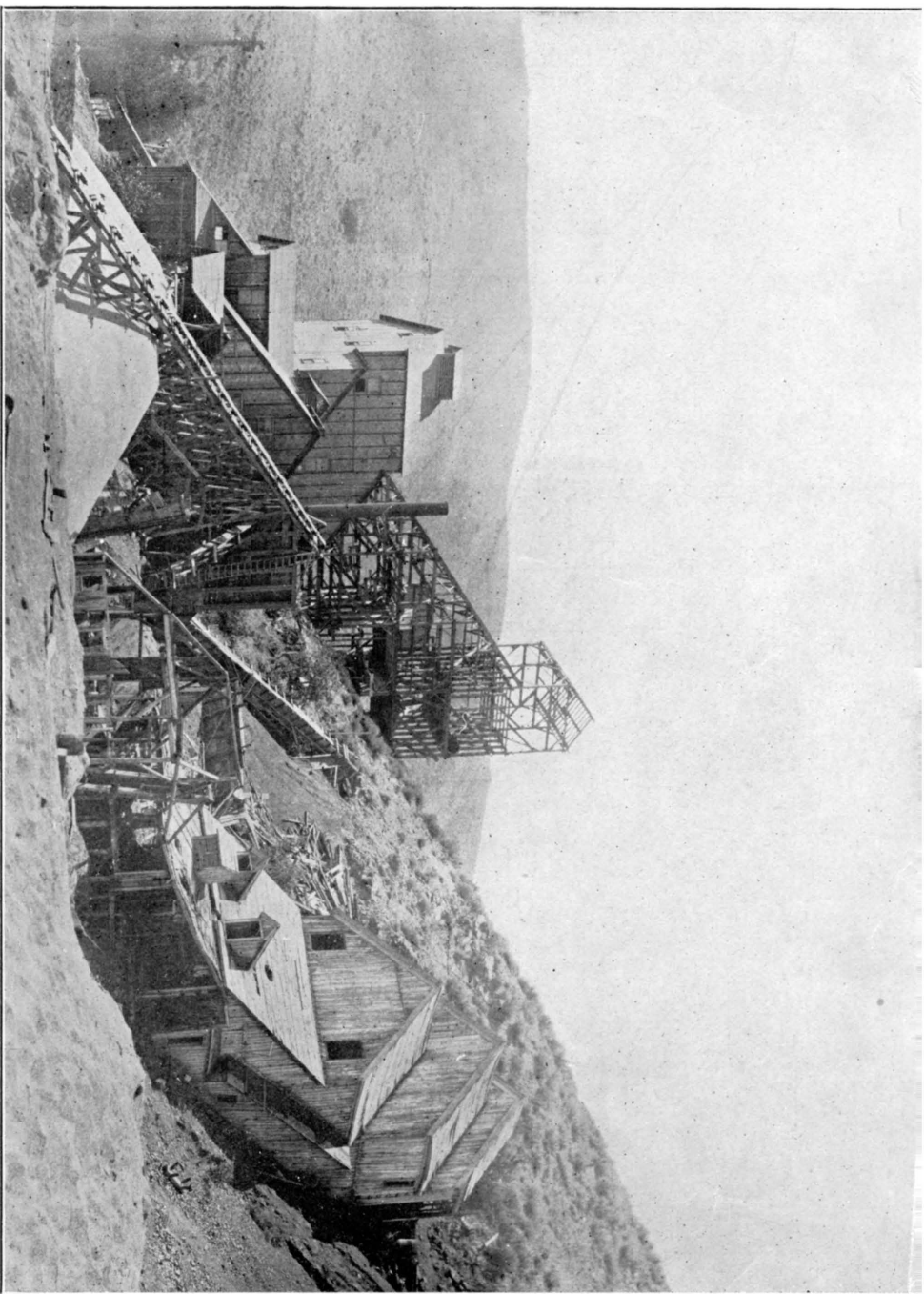
At the present time the mine is being unwatered, thus far the 1,000 level has been recovered. It is the intention of the management to extract all the water from the mine and do some extensive prospecting on the 1,200-foot level, where the ore terminated against a great fault.

The unwatering of the mine has been accomplished by the use of two Henry Worthington 2-stage turbine pumps, coupled in tandem on the column pipe 400 feet apart. These pumps are each operated by 35 horse power motors, and have been running for fifteen months without any material repairs. These pumps were specially built for this particular job, as they are required to operate in an incline shaft.

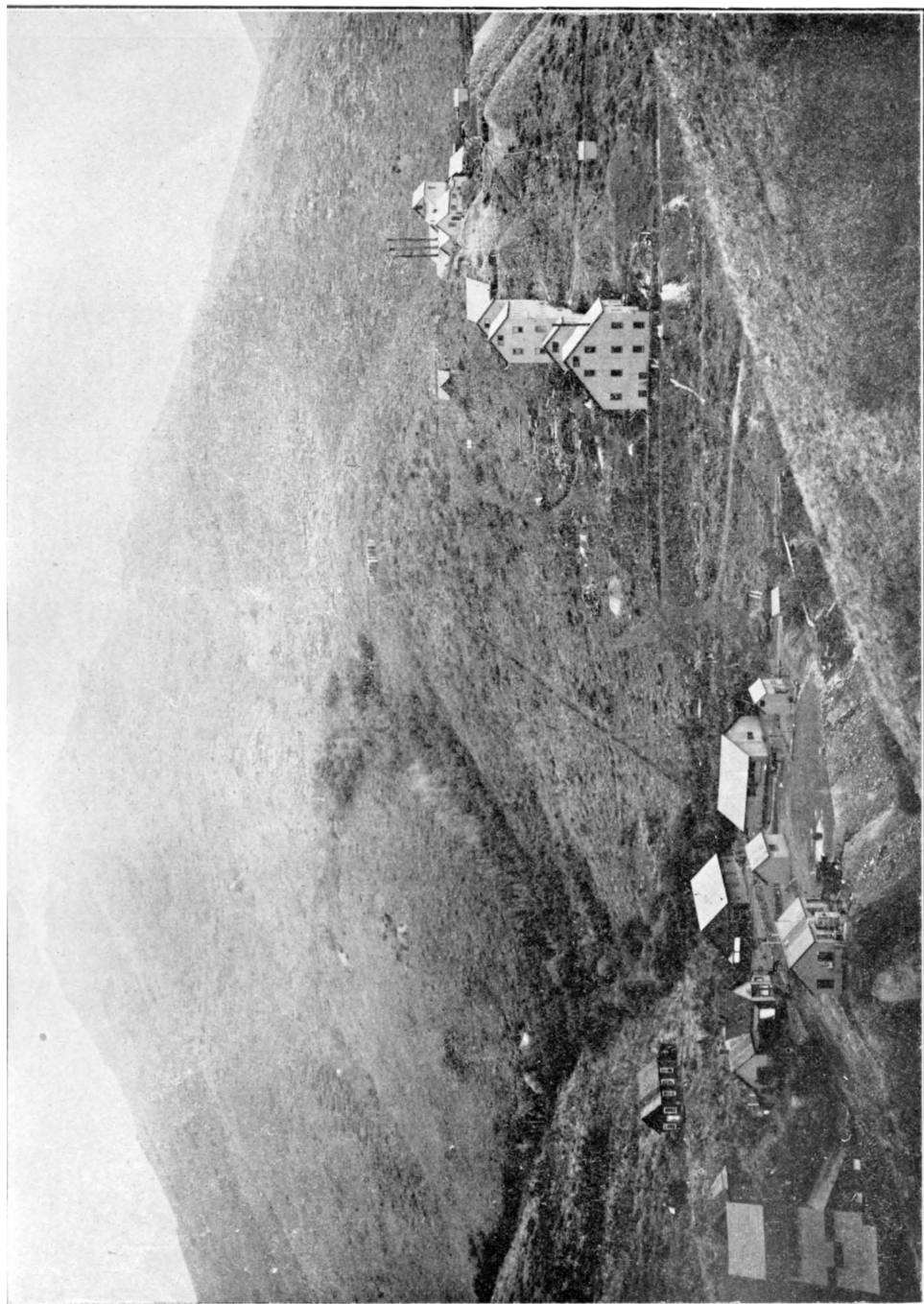
The company owns a very fine power plant, located about a quarter of a mile from the mill on Wood River, where an abundance of water is had under 38-foot head. This plant was installed by Mr. A. J. Wiley of Boise, and is strictly modern in every respect, consisting of 2 units of 400 horse power each. The current is generated at 6,600 volt tension by Westinghouse generators, directly connected to Morgan-Smith horizontal turbines, controlled by Lombard governors. The current is transformed for use in the mine and mill to 220 volts.

The old steam hoist at the Minnie Moore shaft has been converted to electric drive, as has also the compressor for the mine. Some very interesting experimental work has been carried on at the mill in connection with a dry concentration process, but the question of classifying the material sufficiently close has entailed so much expense that the process is not yet perfect, but the saving was extremely good where the material was properly classified.

Another improvement in mill practice, which is conspicuous in the wet unit of this plant, is found in connection with the use of the Callow screen, where the efficiency and



MINNIE MOORE MILL, SHOWING ADDITION TO MILL IN COURSE OF CONSTRUCTION—BELLEVUE, BLAINE COUNTY.



CROESUS MINE AND MILL NEAR HAILEY, BLAINE COUNTY. 4

capacity is greatly increased by the use of a high pressure spray, acting directly upon the top of this screen.

A crushing unit is being added to this mill to accommodate the ore from the mine as soon as it is unwatered and ore developed. A grade has been excavated from the top of the ore bins, in the crushing plant, to the mine, on which an electric trolley line is being installed.

*Croesus Mine.*—The Croesus mine, which has been a very important producer in the past, has been operated this year under lease to Mr. S. E. Rigg and others. The mine is developed to 800 feet in depth by a vertical 3-compartment shaft, from which levels have been run every 100 feet.

The early production of this mine was entirely of gold values, most of which was derived from a pyrrhotite ore, but in the last few years a vein carrying high lead, silver and gold values has been developed. This lead-bearing fissure was discovered on the seventh level and has subsequently been opened on the sixth and eighth levels. This vein is in marked contrast to the one formerly developed and presents some very interesting features, having a distinctly different dip and entirely different mineralization, although it is in very close association with the former developed vein in the present levels. Ore shipped from the gold vein averages about \$65 in gold and silver, the precious metals being found in the ratio of 2 1-2 ounces of gold to 15 or 20 ounces of silver. Some ore from this vein has been shipped which gave returns as high as \$400 per ton. The lead ore shipped averages about 48 per cent lead, 31 ounces in silver and \$8 in gold per ton. The veins are accompanied by intrusive dikes of dark-colored fine-grained diabase or basalt, and occur in the regional granodiorite mass, which overlies the sedimentary formation in the Minnie Moore mine.

*Arkoosh Group.*—This property has the distinction of being the best mineral discovery made in the Wood River district in many years. It lies about three-quarters of a

mile southeast of the Croesus, in the regional grano-diorite, and was opened late in the fall by Mr. J. George Arkoosh, the owner.

This property contains a magnificent galena ore shoot, at the present time developed about 100 feet in length by a shallow surface tunnel. The ore is of extremely high grade and averages from 1 to 5 feet in width, carrying the usual high silver values occurring in the Wood River district. This property lies directly between the Minnie Moore and Croesus properties and undoubtedly upon the same vein system and will most likely be one of the largest producers in the district during the coming season.

*Eureka Mine.*—The Eureka mine at Bullion has been operated during the past year by Mr. W. A. Wilson of Salt Lake at a fair margin or profit. The mine and mill equipment, however, is the same as was employed in the early days and has served its usefulness, so will necessitate new equipment before further shipments can be made.

*Colorado and Idaho Mining and Exploration Company.*—The old Idaho-Democrat mine at Bullion has been operated during the latter part of the year by the Colorado and Idaho Mining and Exploration Company under the management of Mr. P. A. Danaher. This company is also operating properties at Cherry Creek, Nevada.

The old Idaho-Democrat property was a great producer in the early days of the Wood River district and has been worked nearly constantly for the past twenty years, producing high grade galena from a narrow fissure vein in granite. The property is being equipped and will be thoroughly prospected at depth under the present management.

*Wood River Zinc Company.*—The Wood River Zinc Company, owning the Nay Aug mine, located on Deer creek, has operated constantly throughout the year. The vein, which is a small, well defined fissure in granite, where exposed by the lower workings, from which the ore is being

mined at the present time, is overlaid by a sedimentary lime series from which large quantities of high grade ore were shipped in the early days. The ore from the mine carries a high percentage of zinc blende but is separated by hand sorting and the use of two stationary Cornish buddles, each operated by one man, and gave very satisfactory results as a substitute for a mill.

The ore shipped from the mine at the present time carries 45 per cent lead, 60 to 70 ounces silver, \$9 in gold per ton, 5 to 6 per cent zinc and a little less than 1 per cent copper. The copper occurs in the form of chalcopyrite, and, where this mineral is prevalent, the gold values are high.

*Independence Mine.*—The Independence mine near Ketchum, which was equipped with a new mill of 100 tons daily capacity last year, has remained inactive during the greater part of the year, so I am informed, owing to the fact that the company has been involved in litigation. However, the mine has an immense tonnage of ore blocked out which will pay a handsome profit as soon as the plant is placed in operation again. The mine is operated by electricity, the power for which is furnished from the Cramer electric power plant at Hailey.

*North Star Mine.*—In the same vicinity the North Star property has remained inactive, with large ore reserves blocked out in the mine. This inactivity is caused by the complex nature of the ore, being an intimate mixture of iron, zinc and lead sulphides in such close association that a commercial product can not be made therefrom, but, with the advancement in metallurgical processes this property will undoubtedly be placed on the dividend paying list.

*Boston-Idaho Company.*—The Boston-Idaho Company, owning the Lucky Boy and Ontario groups on Warm Springs Creek near Ketchum, has operated in a desultory manner during the greater part of the year. A new concentrating plant of 100 tons daily capacity has been built

on the property, but, owing to mismanagement, has been unproductive.

The ore, which occurs in several distinct fissures in granite and limestone, carries good values in lead and silver, associated with zinc. Considerable experimental work has been carried on in connection with magnetic separation, but no satisfactory results have been obtained, so I am informed, but under proper management the property should again become productive, as it was in the early days when ore from the surface workings was shipped at handsome profit.

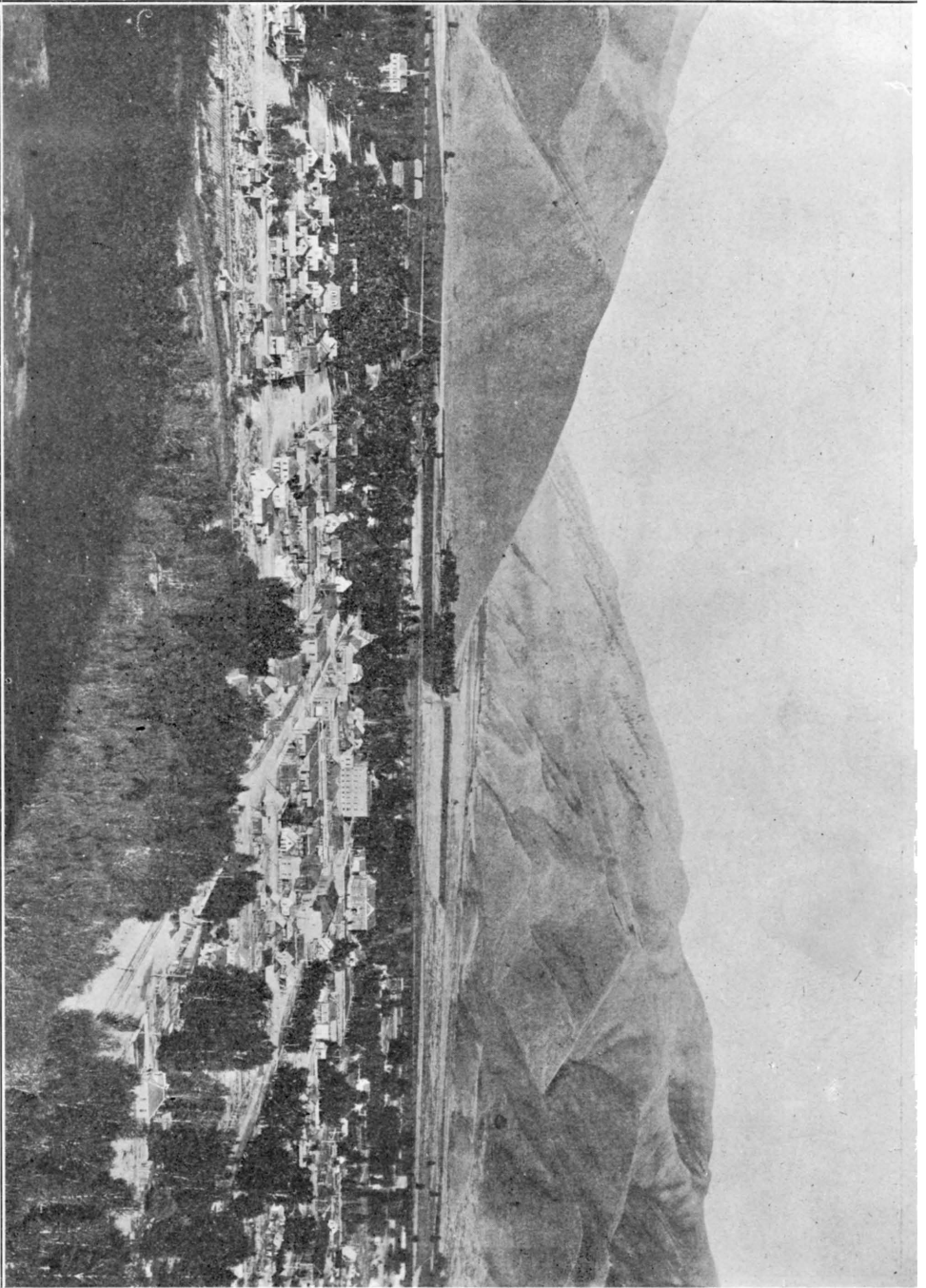
*Boulder Consolidated Mining Company.*—The Boulder Consolidated Mining Company, owning a group of claims on the summit on the divide above Boulder Creek, has been operated by a small force of men during the year, the work consisting of driving a crosscut tunnel to tap an extensive system of veins which has been developed by surface cuts at some 3,000 feet greater elevation.

The property is located on a precipitous ridge, which is subject to snow slides, and the present lower tunnel has the only possible point of attack. It is to be regretted that it became necessary to drop so far down the mountain before attempting to develop the vein, as the surface showing is extremely attractive. The vein carries high grade lead-silver mineral in limestone, slate and shale formation, with a diorite foot-wall.

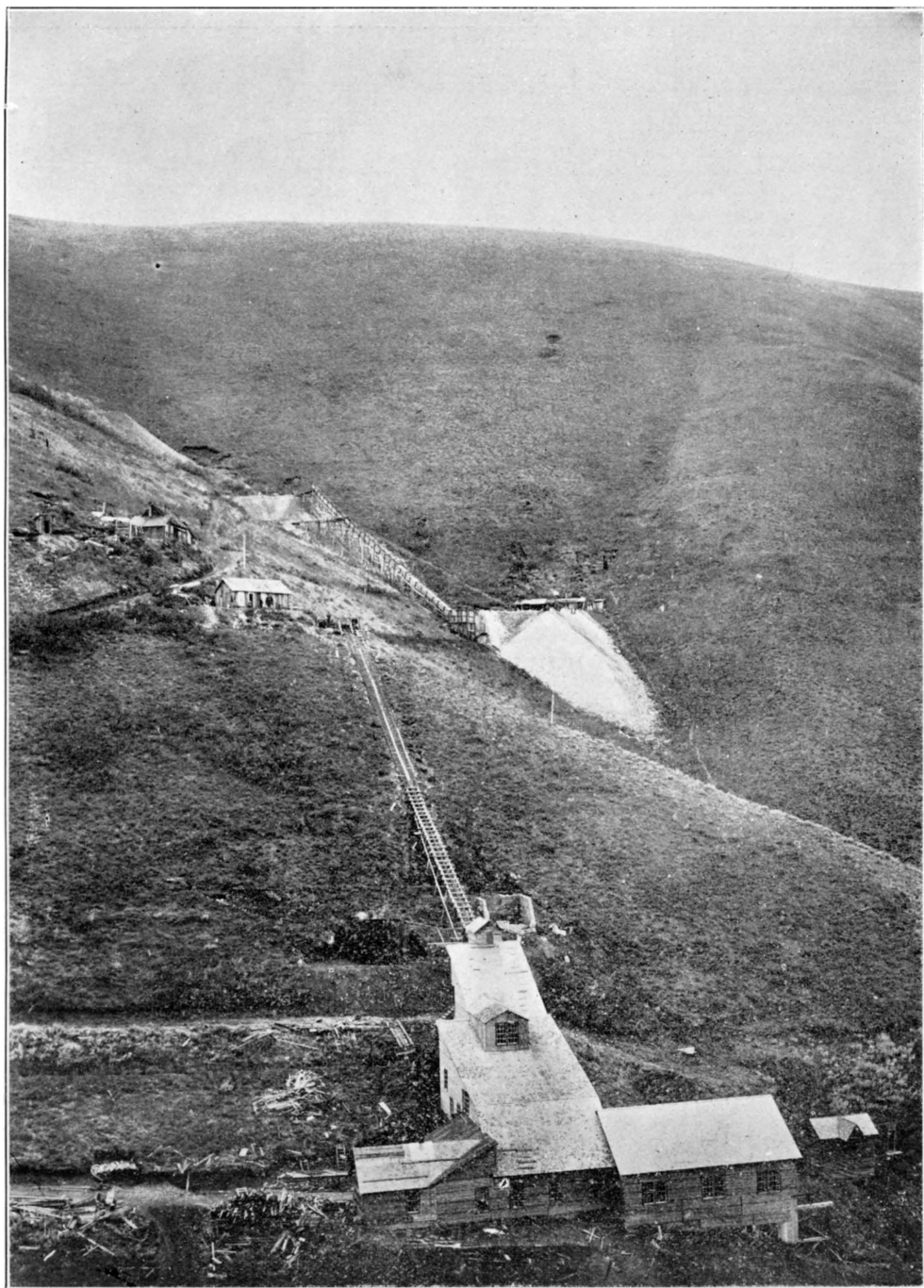
The ore occurs in lenses of clean mineral, and also in large bodies of disseminated ore of good concentrating grade. If the vein can be located at depth, where the present tunnel is being driven, immense ore bodies should be available, but the great expense necessary to open up a vein at such depth and the uncertainty of the position of the deposit at that depth will handicap the operations materially.

*Muldoon Mining Company.*—In the Muldoon Mining District, thirty miles east of Bellevue, the Muldoon Min-





HAILEY, THE METROPOLIS OF THE WOOD RIVER MINING DISTRICT, BLAINE COUNTY.



MINE AND MILL OF THE INDEPENDENCE MINING CO., NEAR KETCHUM, IDAHO.

ing Company is operating the old Muldoon mine, which at one time was a large producer and was equipped with mill and smelter. The mine is developed at the present time to a depth of 400 feet under the apex by a series of cross-cut tunnels. A tunnel is being driven at the present time to cut the vein at approximately 250 feet greater depth.

The ore occurs in a complex fissure vein, carrying argenterous galena associated with iron pyrite, zinc blende and arsenopyrite in a quartz gangue. The silver values in the ore average about an ounce to the unit of lead. The ore occurs in short shoots, in places 30 feet in width. Some shipping ore is found in the shoots, claimed to run 42 per cent lead and 48 ounces silver to the ton; the bulk of the ore, however, is of milling grade.

The property is equipped with a 100-ton concentrating mill, consisting of jigs and Wilfleys; two of the latter are working up slimes and are producing a very high grade product. The product from the jigs is extremely high in iron, and from the nature of the ore it appears that all of the ore should be crushed fine, as the wagon haul from the mine to the railroad at Bellevue is extremely expensive and the product produced should be as high as possible. The mill is electric driven, the power for which is supplied from a strictly modern, fire proof hydro-electric power station located within a few rods of the mill. This plant was put in by the company and is equipped with a Hug water wheel, controlled by Lombard governor, water for which is supplied by a 22-inch pipe line 2,700 feet in length under a head of 200 feet. This wheel is belt connected to a 100 k. w., 2,300-volt, Western Electric generator.

The vein can be traced for several miles over the mountain, where it is being developed in the property owned by the Mutual Mining Company, which adjoins the Muldoon on the west. This property is being operated under the same management and the development consists of

driving a cross-cut tunnel to open the vein at great depth. The tunnel is at the present time in about 3,000 feet, but the ore has not as yet been encountered.

*Garfield Mining and Milling Company.*—Continuing on this vein system west, the Garfield Mining and Milling Company is developing a group of claims formerly owned by William O'Connor under the management of Mr. O. P. Zortman of Bellevue. Four veins are exposed on this property, being developed by several short tunnels. The north vein carries considerable copper carbonate ore, with pyrite and arsenopyrite, containing gold values. South of this, a vein is exposed showing lead carbonates and galena, with silver values in the ratio of one ounce of silver to the unit of lead.

Still farther to the south in the same group another vein has been traced by surface cuts through the Mutual property to the Muldoon. A lower tunnel is being driven to open two of these veins, and an additional depth of 350 feet can be obtained by driving a tunnel from the creek level.

*Eagle Group.*—Adjoining this group of claims on the north is the Eagle group of 10 claims, from which \$10,000 worth of ore is supposed to have been shipped in the early days. Considerable mineralization is exposed on this property but the vein has very little definition and no work has been expended upon it for several years.

#### SKELETON CREEK DISTRICT.

*El Oro Gold Mining and Milling Company.*—The El Oro Gold Mining and Milling Co., owning the Frazier mine, located on Skeleton Creek, thirty miles north of Soldier, has been developed during the year under the management of Mr. Irv. Johnson of Boise. The property has been equipped with a small mill, but this was not accomplished until so late in the season that it was necessary to suspend operations for the winter. This property has a well

defined fissure vein in granite varying from 3 to 10 feet in width, carrying average values from \$10 to \$20 per ton in free gold, and will undoubtedly be a large producer during the coming year.

#### LITTLE LOST RIVER DISTRICT.

*Wilbert Mining Company.*—The Wilbert Mining Company, located on Little Lost River, has operated a small force of men during the year, and has made some small shipments of lead-silver ore from its property. Messrs. Fallaets and Fowler have also made small shipments from their property on Badger Creek.

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### BOISE COUNTY.

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Boise County, which ranks second in the production of gold in the State, has enjoyed considerable activity during the year, several new mining ventures having been undertaken and many former producers were additionally equipped.

#### BOISE BASIN DISTRICT.

[ *Boston-Idaho Gold Dredging Company, Ltd.*—One of the properties which has been extensively equipped during the year, is that of the Boston-Idaho Gold Dredging Company, operating a dredge at Cold Springs, on Moore's Creek, about six miles below Idaho City.

This company owns extensive dredging ground, containing about 25,000,000 cubic yards of gravel available for washing, which averages about 25 feet in depth, including an overburden of from 6 to 12 feet of tailings, which has been carried down from the old placer operations of the Boise Basin. The ground is claimed to average from 18 to 20 cents per cubic yard, has no large boulders or clay,

and is ideal for dredging, as the gravel rests upon a bed rock consisting of old Payette Lake deposit.

The dredge which is in operation at the present time has a capacity of 2,000 cubic yards per day, is of the open connected bucket type, with 5 cubic foot buckets, built by the Risdon Iron Works. This dredge is heated by steam, so that it can be operated through the entire winter, and is driven by electricity, the power for which is supplied from a plant owned by the company on the South Fork of the Payette River six miles above Garden Valley. The power plant consists of a 50-foot dam, which diverts the entire river at the low stage, at which time 1,500 horse power is available. Two horizontal Leffel turbines, fitted with Lombard governors, direct connected to two 450 k. w. generators, supply the current for the dredge, several other properties in the Basin and the towns of Centerville, Placerville, Quartzburg and Edna.

The company contemplates installing another dredge in the spring, which will be of the latest type and as large as any in the northwest. The only other dredge of this size in the northwest is on Alder Gulch, Montana. This dredge will be built by the Yuba Construction Company of Marysville, California, having an 8,000 cubic yard daily capacity, with ladder carrying 13 cubic foot buckets, close connected, and will be equal to the most improved dredges at Oroville, California, capable of handling gravel as economically as it is possible to be done anywhere at the present time. Only two men per shift of eight hours are required to operate the dredge.

The present dredge requires 150 horse power, but when the new dredge is completed, the company will use approximately half of the available power of the Payette River plant.

*Woodburn Placers.*—This well known property, owned by Mr. Harry Woodburn of Boise, was operated continuously during the water season, which lasted one hundred

days. A large amount of gravel was handled profitably, four giants being constantly employed. In order to facilitate operations and take advantage of the water, eight giants were used at the property in the several working pits. When it was necessary to clean up one pit, the water was turned into another, thus losing no time in cleaning up.

An improved derrick for handling boulders was installed, which proved a great saving in expense over the old method used heretofore, consisting of blasting the boulders and passing them through the sluice. This derrick was built on the ground, and, after many alterations, has been perfected, so that it is an extremely ingenious arrangement.

The property has immense reserves of gravel carrying fair values, and the only obstacle which prevents it from being one of the greatest dividend payers in the country is the short water season, but at this it annually pays a very handsome profit.

*Moline Mining Company.*—The Moline Mining Company owns a large tract of dredging ground located near Placerville and has operated successfully for the past four and a half years at a handsome margin of profit. The dredge used was constructed by the Risdon Iron Works, having a 2,000 cubic yard daily capacity, with 5 cubic foot buckets, open connected. I am told that the ground belonging to the company has been thoroughly prospected and its extent and value is such that it insures an output of gold at a large profit for many years to come.

The season's run has averaged eight months in length of twenty-seven days each, the actual gravel being handled was 1,400 cubic yards per day. The dredge is operated by a compound condensing steam engine. The gravel is from 30 to 40 feet deep and lies upon a soft sedimentary bed rock, which is easily cleaned. ]

*Gold Hill and Iowa Mining Company.*—The Gold Hill

and Iowa Mining Company owns a group of claims composed of several old properties which have been great producers in the past. The old shaft workings are being unwatered and a 20-stamp mill is being installed, both of which are to be operated by electric power, with steam auxiliary, the electric power to be furnished from the Boston-Idaho power plant on the Payette River.

The Gold Hill and Iowa vein is a pronounced fissure from 3 to 10 feet wide in porphyritic granite formation, carrying free gold and iron sulphide. The Pioneer vein, which is distinct from the Gold Hill and of a very different character, consists of a quartz-porphyry dike, impregnated with iron pyrite and a stock-work of rich gold-bearing quartz seams 20 to 60 feet in width, which is claimed to carry from \$8 to \$12 per ton. This property is under the management of Mr. J. E. Carter of Quartzburg.

*Columbia Mining Company.*—The property of this company, located at Quartzburg, has just been equipped with a 6-foot Chilean mill of 50-ton daily capacity. The property carries a well defined quartz vein in granite, which is extensively developed. I am informed that the lowering of the water level by the pumping out of the Gold Hill and Iowa workings has exposed ore of good values in the lowest workings of this property, and it is expected that this mine will be a good producer during the coming year.

*Golden Age Mining Company.*—The Golden Age Mining Company, operating a property at Grimes Pass, near Pioneerville, has developed two quartz veins in granite, carrying fair gold values, associated with iron pyrites. One of these veins has been extensively developed, and associated with the pay streak, which is approximately six feet in width, is a mineralized area 40 feet wide carrying iron pyrites disseminated through the altered granite, which it is claimed will pay with proper milling facilities. The property is equipped with a small mill, which has been



operated during the past year, turning out a considerable production of precious bullion.

*Edna Mines Company.*—The Edna Mines Company, located on the divide between the Boise Basin and the Boise River, has just completed an 80-ton silver cyanide mill, electrically operated by power furnished from the Boston-Idaho power plant on the Payette River, transmitted over a high tension line 15 miles in length.

This property has a large deposit of silver-bearing ores of fair value, principally in chloride, with some silver sulphide exposed, but not in sufficient quantities to interfere with a good extraction by cyanidation. The values are said to average from 30 to 40 ounces of silver per ton, and it is reported that at least a two years' ore reserve is blocked out in the mine workings, which are 400 feet in depth.

#### PEARL MINING DISTRICT.

*Whitman Mining Company.*—Probably the best showing in the Pearl district at the present date, and one which has been the most actively worked during the past season, is the Leviathan, owned by the Whitman Mining Company.

This property is equipped with a small Hathaway mill and Card concentrating plant, with a capacity of from 16 to 20 tons per day, and a small compressor. Both the mill and mine is operated by electricity supplied from the power plant on the Payette River.

During 1909, 400 tons of concentrates, averaging \$65 per ton, 85 per cent of which value was in gold, and 100 tons of first class ore, which was hand sorted at the mine, of an average value of \$90 per ton, has been shipped.

This property carries a very strong fissure vein, which has been developed to a depth of approximately 400 feet. The ore varies from one to seven feet in width, with values from \$5 to \$100 per ton.

The property was worked in the early days through a shallow shaft and a number of cars of ore were shipped therefrom. A band of nearly clean iron pyrite mineral shows along the foot wall of the vein, and in many places stringers penetrate the granite hanging wall. The vein strikes nearly due east and west and dips to the north at an angle of 50 degrees. There is also a parallel vein developed in this property, which carries fair values in iron, zinc and lead sulphides, with from \$3 to \$4 in gold, disseminated through a granitic gangue averaging 15 feet in width. Large ore reserves are blocked out in this property, and, if properly equipped with milling facilities, should become a very extensive producer.

*Lincoln Mining Company.*—The property of the Lincoln Mining Company, located at Pearl, has remained inactive during the greater part of the year; however, one thousand tons was mined and milled, which averaged about \$8 per ton, 90 per cent of which was in gold values. This property has extensive ore reserves but the ore is of an extremely complex nature, from which it is very difficult to recover the values. The property is equipped with an up to date cyanide plant, but no very great success has been made in extraction, however the property justifies considerable research work in metallurgical processes and will handsomely reward the millman who can solve the problem.

*Granite State Mining Company.*—The El Paso group, owned by the Granite State Mining Company, located on the headwaters of Rock Creek, has been developed throughout the year by a small force of men operating through a long cross-cut tunnel. The mineralization of this property, in which large ore reserves have been developed, belongs to the same series of veins as those at Pearl. I am informed that it is the intention of the management to equip this property with a suitable mill in the near future.

*I. X. L. Mining Company.*—The I. X. L. Mining Com-

pany, owning a group of claims which adjoins the El Paso group on the southeast, has been developing through a long tunnel throughout the entire year under the management of Mr. W. H. Dorman of Caldwell. This tunnel will tap the vein in the neighborhood of 1,000 feet under the apex, but up to the present time the work has been very disappointing and no ore of commercial value has been developed at this horizon.

*United Mines Company.*—A little farther to the north, on the same vein series, the United Mines Company has been developing the old Kentuck mine through a long cross-cut tunnel approximately 900 feet under the apex of the vein. In this tunnel ore bodies of considerable magnitude have been developed, but, in common with the other Pearl mines, the ore is extremely complex, and at the present time the property is shut down awaiting a solution of the treatment problem.

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## BONNER COUNTY.

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Very little actual mining has been carried on by the companies of Bonner County during the year, the most actively developed district being that at the upper end of Priest Lake, where preparations are being made for extensive operations next year.

### PRIEST LAKE MINING DISTRICT.

*Idaho Continental Mine.*—The most important operations of the district have been carried on at the property of the Idaho Continental Company, which has produced considerable lead-silver ore during the year. The vein, which is 10 to 30 feet in width, occurs in schist formation and is an extremely attractive showing. Two shifts of

miners have been at work during the greater part of the year. With the construction of a railway, which is contemplated next summer, this district should come into prominence.

*Pan Handle Copper M. and S. Company.*—The property second in importance in this district is that of the Pan Handle Copper Company, the most important claims of which are the Woodrat and Idaho. The Woodrat has an incline shaft 150 feet in depth upon a vein four feet in width carrying good values in silver, lead and copper, with about 6 per cent zinc. This claim also carries another vein close to the lake shore, which is about 10 feet in width, with values in silver, copper and lead, said to amount to about \$12 per ton. In the Idaho claim a vein about twelve feet in width, carrying fair values, will be developed during 1910, so I am informed by the management.

*Mountain Chief Mine.*—Adjoining this property, and located about half a mile from the lake shore, is that of the Mountain Chief, which has employed a few men during the year, has about 800 feet of tunnel on a 4-foot vein, carries small silver and lead values in diorite and quartzite and is a very likely looking prospect.

*The Kootenai No. 2*, located on the lake shore of upper Priest Lake, and including about 3,000 feet of lake shore, has developed a vein which has been traced for 3,000 feet in length and which carries values in copper, lead, gold and silver in a granite and diorite formation. The shaft has been sunk 200 feet and considerable tunneling has been accomplished during the year. The property at present is only working one shift.

*Idaho Copper Company.*—The Idaho Copper Company, located on the lake shore near Granite Creek, equipped with a compressor and hoist, has been sinking a shaft on a vein carrying good zinc values. The property also carries another vein, which has a very strong iron gossan, as

disclosed by surface cuts, is about eight feet in width and occurs in granite and quartzite formation. This property is owned by Hillyard and Spokane parties.

*Gem Copper Mining Company.*—The Gem Copper Mining Company, located about two miles above the head of Priest Lake, is driving a cross-cut tunnel to tap the vein at a depth of 300 feet. I am informed that the tunnel has yet to be driven about 70 feet. The vein carries gold, silver and copper values, with a very strong iron outcropping 50 feet in width, occurring in diorite and quartzite formation.

*Alice Group.*—The Alice group, located about five miles above the Upper Priest Lake, on Hughes Fork of Gold Creek, comprising three claims, owned by Mr. A. Coolin and Mr. A. J. Marsten, has developed some very fine carbonate ore in a vein occurring in granite and slate. The vein is about 10 inches wide and has been traced for 500 feet in length. Values as high as \$85 per ton in combined gold, silver and lead are reported to have been obtained.

*Farmer Jones Mine.*—The Farmer Jones Mine, located on Pine Creek, about eight miles northwest of Priest River station, has been developing a free milling gold quartz vein in quartzite and porphyry. The workings consist of about 1,000 feet of tunnels and drifts. A mill run has recently been made on five tons of this ore, which yielded \$30 per ton by amalgamation with \$2.80 per ton remaining in the tailings.

*Rose of Killarney Mining Company.*—The Rose of Killarney, on Pine Creek, near the Farmer Jones, has developed a lead 12 feet in width of lead-silver ore. This property is opened by a tunnel 400 feet in length, is equipped with a one-drill compressor and has been idle until recently, but has been started up for the winter's work.

#### BLACKTAIL MINING DISTRICT.

I am informed that considerable activity has been displayed in the Blacktail district.

*Little Joe Mine.*—The Little Joe mine, controlled by some members of the Berg Awning Company of Spokane, Washington, made several small shipments during the summer.

Another property, owned by Dr. Myers, has been developed in a limited way and produced some ore.

*B. E. F. & H. Mine.*—The B. E. F. & H. mine, near Lakeview, has been operated in a limited way during the season.

*The Weber Mine.*—The Weber mine, also at Lakeview, has been idle throughout the year, owing to the fact that it has been tied up in litigation.

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## CASSIA COUNTY.

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Cassia County has had practically no mineral production during the year, but there are several promising prospects located on Conner Creek, ten miles south of Albion.

*South Hercules Mining Company.*—The only property which is being developed actively at the present time is that of the South Hercules Mining Company, formerly known as the Golden Eagle group, which consists of eight claims and is being developed under the management of Mr. E. J. Hunter of Albion.

The mineral showing consists of a quartz vein carrying lead carbonate with high silver values. It has a strike of north 25 degrees east, and a steep dip to the northwest. The vein near the surface is approximately five feet wide, but a crosscut into the hanging wall from the shaft shows that the vein has materially widened. This shaft has been sunk to the 200-foot level with several drifts therefrom which exposes considerable ore, all of which is within the oxidized zone of the vein. A lower tunnel is being driven, which will give several hundred feet of depth

under the bottom of the shaft and will be approximately 800 feet in length when the vein is encountered. A two-drill water driven compressor has been installed and machine drills are to be used in driving the tunnel.

There are several properties lying immediately to the east of the Southern Hercules, which have been actively developed in the past and which have shipped considerable ore from surface workings.

*Melcher Mining Co.*—The property of the Melcher Mining Co. has had a great amount of development work expended upon it and has a cross-cut tunnel 2,175 feet in length. This latter tunnel cuts several small stringers and a 7-foot vein was encountered within 100 feet of the face carrying good values in gold, silver and copper, but it is not supposed to be the main vein for which the tunnel was driven, and that it should be extended approximately 1,000 feet before this vein is encountered. The tunnel passes through schist for about 800 feet, and then encounters the granite.

From surface shafts considerable ore of high gold and silver values has been shipped in the past, some of it running as high as \$420 per ton, but averaging about \$40 to \$50. The property is equipped with a 6-drill steam driven compressor.

*Alice Claim.*—The Alice claim, lying west of the Melcher Mining Company's property, is claimed to have produced six cars of lead-silver and gold ore, averaging \$40 per ton during its early development.

There are several shafts sunk upon this property, all of which expose a quartzite vein in mica-schist, four to five feet wide, carrying fair values.

*Cumora Mine.*—North of the Alice mine lies the Cumora. This property is largely owned by Boise people, Mr. L. A. Coate and Mr. A. E. Carlson being the principal owners.

The vein upon this property has a strike of about north 17 degrees east, is well defined and has a quartz gangue

containing lead and gold values. The vein occurs in a mica-schist, is very regular and dips 70 degrees to the west. The shaft has been sunk 150 feet on the vein, from the tunnel level, from which approximately 500 feet of drifts have been run. There are two surface shafts near the north end of the claim from which considerable ore of good value has been shipped. The property has been operated recently by leasers.

*Giant Claim.*—Lying south and carrying the extension of the Cumora vein is a claim owned by Mr. Jack Crumerford of Albion, known as the Giant, which has been developed extensively

*Badger Group.*—Northwest of the Giant and Cumora lies the Badger group, on which there is a 96-foot shaft, and from which recently seven carloads of ore have been shipped averageing \$50 per ton in gold, lead and silver.

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## CUSTER COUNTY.

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Custer County, which is probably the most inaccessible county in the State, has produced great wealth during the past, but in the last few years has been extremely quiet. While there are a few producing mines, the general tendency among owners and operators has been to wait until such a time as railway transportation was afforded, and at the present time there is ample justification to expect that in the near future a railway will be built from Salmon City up the Salmon River, through the heart of the mining district of Custer County.

*Sunbeam Mine.*—The most important producer in Custer County during the past year has been the Golden Sunbeam mine, located on Jordan Creek seven miles west of



Custer and owned by the Sunbeam Consolidated Gold Mining Company, of which Mr. E. C. Gable is the president and manager.

The property carries an immense mass of rhyolite or volcanic mud resting on an inclined bed of diorite. This rhyolite mass, which is several thousand feet in extent, is claimed to carry gold values throughout its developed extent, but no gold value is perceptible to the eye except along lines of fracture, where a few inches to several feet in width carrying high values and only these richer streaks have been mined up to the present time.

The mill at the present time consists of two 6-foot Manadnock mills, the gold being saved upon amalgamation plates and the tailings passed over canvas tables. An 82 per cent saving is made upon the plates, and, with the saving made upon the tables, brings the total saving up to about 85 per cent. The concentrates run about \$350 per ton, the ratio of concentration being 1,000 to 1. The mill at the present time is being driven by steam power, but as soon as the power plant, which is being constructed by this company on the Salmon River at the mouth of the Yankee Fork, is completed the mill will be operated by electricity. This power plant will have available 1,500 horse power and will supply several other properties in this district, in addition to the company's needs.

The mine is developed by three tunnels to a depth of 450 feet beneath the outcropping. A "glory hole" has been started at the surface, the ore from which is dropped to No. 1 tunnel, thence to No. 3, which is at the top of the mill. Elaborate sampling has been carried on at the property for several years, and it is claimed that good average values are found sufficient to justify milling the bulk of the entire rhyolite deposit if a large mill were available, which is anticipated in the near future.

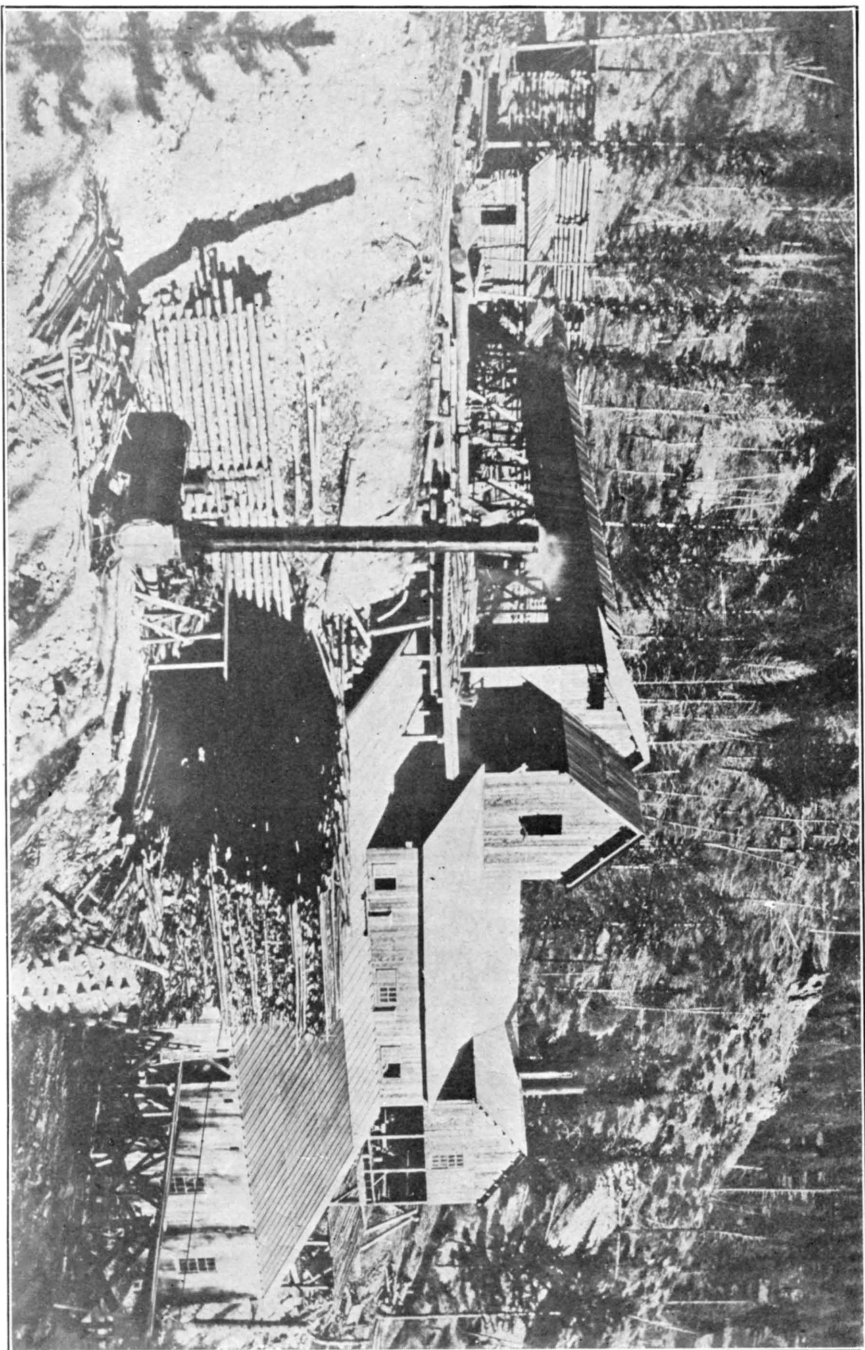
*Lost Packer.*—The Lost Packer mine, located on Spring Creek, a tributary to Loon Creek, about 40 miles northerly

of the mouth of the Yankee Fork, has been developed continuously through the year, but its smelting plant has not been operated, owing to the expense of hauling coke, the company being content to place additional ore reserve in sight and await the construction of a railway up the Salmon River, which will place this property within 40 miles of railway transportation. At the present time it is necessary to freight all supplies from Mackay, about 130 miles, with two mountain summits to traverse.

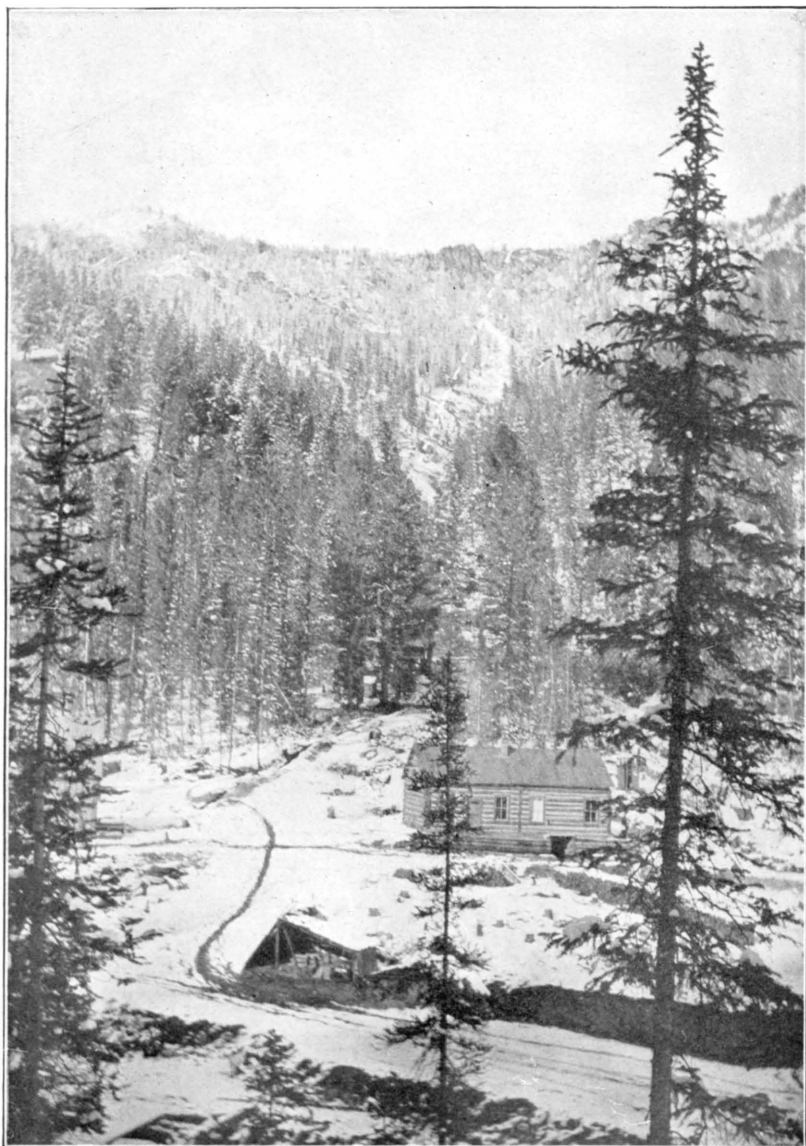
A strong fissure vein carrying chalcopyrite associated with extremely high gold values is developed upon this property by several tunnels and drifts to a depth of 1,000 feet beneath the apex. The last two tunnels, the 800 and 1,000-foot, have not as yet reached the ore body, but are being driven at the present time. The next tunnel above, 700-foot, has encountered the south shoot, but the 600-foot and those above have developed two ore shoots. No stopping has been carried on to any extent below the 400-foot level. This vein, which carries in places two feet of clean massive chalcopyrite, is cut by a number of dikes which have been determined as aplite by the Smithsonian Institute. These dikes displace the vein a distance equal to the thickness of the dike. This displacement caused a great deal of delay and expense in the early development of the mine, but the present superintendent, Mr. Boyle, has become so accustomed to the nature of this deposit that he is able to pick up the vein on the other side of a dike with very little dead work. This property will undoubtedly figure conspicuously in the production of Custer County as soon as transportation is brought within reach and the smelter can again be operated.

The company also owns an extensive lime and iron deposit in the immediate neighborhood.

There are several promising lead properties in this vicinity, but very little work has been done on any of them and it is impossible to state anything as to their worth.



GREYHOUND MILL AND SMELTER, 42 MILES NORTH OF STANLEY BASIN.



SURFACE WORKINGS AND OUTCROP LOST PACKER MINE—SMELTER AND MINE BUILDINGS TO LEFT OF PICTURE.

*Loon Creek Placers.*—This property, located on Loon Creek about five miles southeast of the Lost Packer, contains an area of about 500 acres of placer gravel. The property was worked extensively in the early days and is reported to have produced several million dollars worth of gold from the creek channel. The property is supplied with giants and other hydraulic equipment, but the company is at the present time constructing an extensive ditch, which will furnish additional water under a great head. The ground averages from 20 to 30 feet in thickness, and is claimed to carry values from 23 to 30 cents per cubic yard. The water season at this point is unusually long, the bed rock is soft, the gravel small and the gold, which is coarse, is said to average about \$18 per ounce.

*Greyhound Mining and Milling Company.*—Fifteen miles west of the Lost Packer and 42 miles north of Stanley Basin, on a tributary to Rapid River, the Greyhound Mining and Milling Company is developing a property consisting of fourteen claims.

Several well defined fissure veins, quartz-filled and carrying silver sulphide associated with iron pyrite, arsenopyrite and some galena, occurring in schist, have been developed. The main vein, on which most of the work has been performed, is opened by tunnel workings and surface cuts for 4,500 feet in length. This vein is from 5 to 15 feet in width, strikes north 25 degrees west, and dips to the west at an angle of 60 degrees. Nine tunnels, over an elevation of 2,000 feet, have been driven upon this vein and a lower tunnel from the mill level has been started, which will open up the ore bodies at 600 feet lower depth. The silver values in this vein are claimed to run from a few ounces to 2,000 ounces per ton, as high as \$8 per ton in gold and from 4 to 7 per cent lead.

A mill and smelter has recently been constructed upon the property. The milling process consists of crushing the ore through a Blake crusher, passing it through ten 1,050-

pound stamps, with double discharge made of special heavy design, with splash boards on the outside of the screens, the crushed material from which is passed to two Dorr Rake classifiers, working in incline troughs. The slimes overflow at the lower end and the thickened pulp is raked out at the upper end. The classifiers are coupled in tandem, and the thickened pulp from the last machine is washed prior to its passing to the vanners; the slime from these classifiers and the water used in washing the thickened pulp are passed directly to settling tanks, where, by means of steam pipe coils in the bottom of the tanks, which is a patent process invented by the manager, Steve Smith, the solid matter is precipitated to the bottom of the tanks. When the tanks are filled with slimes and water and the solid matter settled, the clear water is decanted off by means of a vertical row of holes, fitted with plugs, which are drawn successively, beginning at the top. While one of these tanks is being emptied, the other accommodates the material from the classifiers. After the solid matter has accumulated in the tank to sufficient depth, the material is dried by continuing the flow of steam through the coils, and the dried material shoveled out and smelted with the first-class ore from the mine and concentrates from the vanners, which are briquetted in a round water jacket furnace of 40-ton daily capacity. This furnace is also of special heavy design, the air for which is supplied to the furnace cold by a No. 3 Green positive blower. Charcoal, with the addition of a very little coke, is used as fuel.

The ores necessary for flux are had from adjacent properties, including some very nice galena running as high as 80 per cent lead, with silver values ranging from 1 to 2 1-2 ounces to the unit of lead, and from \$16 to \$60 in gold, which is had from the Hardscrabble mine, about four miles distant, and suitable iron, high in manganese and excellent lime, is easily obtained.

The mill was completed and placed in operation in the

fore part of November and enjoyed a short run, but this was terminated by a heavy snow storm, which tied up some necessary supplies and discouraged some smelter men who were on their way to the mine, so that operations in the mill and smelter have been abandoned until spring.

#### SHEEP MOUNTAIN AND SEAFOAM DISTRICTS.

Across Rapid River to the east, in the Sheep Mountain district, several promising lead-silver prospects have been developed in the past and some have shipped considerable ore, but very little activity has been displayed in this section during the year.

*Singer Mine.*—The Singer property, in this district, has a wonderful amount of galena float showing on the surface, upon which a good deal of prospecting work has been performed and considerable ore shipped in the early days, but the veins from which this galena came have never been developed, but it justifies the expenditure of a great deal of money in prospecting, for the galena is of an exceptionally fine grade carrying good values in silver and gold.

*Castro Property.*—The Castro property, lying south of the Singer on the south slope of Sheep Mountain, has recently been taken under bond by Senator Ravenal Macbeth and Salt Lake associates, who are allied with the Utah copper interests of Bingham Canyon, Utah. This property is claimed to carry an immense deposit of iron, sulphide and pyrrhotite, with gold values from \$3.80 to \$14 per ton.

South of this district, in the vicinity of the Seafoam Creek, a number of very promising prospects have been developed in a limited way, but nothing more than assessment work was carried on this year; however, with the prospects of a railway to Stanley Basin in the near future they are attracting considerable attention and without

doubt many of these properties will be developed actively during the coming year.

#### STANLEY BASIN DISTRICT.

*Valley Creek Mine.*—The Valley Creek mine at Valley Creek, in Stanley Basin, has operated during the greater part of the season at fair profit, so I am informed, but the ore is rather refractory and a very good saving has not been accomplished. The property carries a large vein containing gold values associated with a little lead. I understand that it is contemplated to improve the milling facilities in the near future, but in the past the property has been sadly mismanaged.

*Stanley Basin Placers.*—During the season, at the Stanley Basin placers, two dredges have been operating on extensive placer deposits. The upper one, which is a small bucket dredge, is reported to have operated at profit; but the lower one, which is a dry land dredge mounted on a track so that it can be moved along the side of the pit and fitted with a drag scoop, is considered a failure.

The gravel rests upon a clay bed rock, which was torn up in dragging the scoop to the dredge, and the scoop is of such large dimensions that the clay is dumped into the gold saving device in such large chunks as to prohibit thorough disintegration, and consequently carries away the bulk of the gold values into the tailings pile.

#### CLAYTON MINING DISTRICT.

The Clayton mining district, which contains a number of valuable silver-lead properties, has been inactive for a number of years, but with the prospects of a railroad up the Salmon River in the near future is beginning to show signs of life.

*Clayton Mining and Smelting Company.*—One of the most important properties in this district is the Red Bird, owned by the Clayton Mining and Smelting Company.



This company owns a smelter which operated at handsome profit in the early days. It is claimed that over a million dollars was produced at that time, when silver was worth approximately \$1 an ounce, but the property has been idle ever since.

The property is developed by five cross-cut tunnels to about 800 feet in depth and has large ore reserves of high grade lead and silver occurring in chambers and pipes on a contact of lime-shale with blue limestone. This property has an extremely desirable smelting ore, and with transportation facilities could be worked at a handsome profit. At the present time it is 60 miles from Mackay, the nearest railway point.

#### BAYHORSE DISTRICT.

This district also ceased operating at the time the drop in silver came, and has remained idle ever since.

*Ramshorn Mine.*—The Ramshorn mine is the most important property in this district and has produced over three million dollars worth of ore in the past and has immense ore reserves blocked out at the present time. The values lie in a dry silver ore in an immense fissure vein in black slate, and will prove a great source of mineral wealth as soon as transportation is afforded and silver again attains a fair price.

*White Knob Mine.*—The White Knob mine, owned by the Empire Copper Company, at Mackay, has been idle during the year, with the exception of some leasing operations which have produced 10 cars of shipping ore. The mine has been kept timbered and in good order pending a rise in the price of copper and from the upward tendency of the metal market there is considerable likelihood that the White Knob will again join the shipping list of properties of this county.

*Yankee Fork Placers.*—On Yankee Fork Creek, a tributary to the Salmon River, on which is located the town of

Custer, the Yankee Fork Placer Company, owning 500 acres of dredging ground, has been prospecting its holdings by drills during the past season. The water right at the mouth of the Yankee Fork Creek, which is being developed by the Sunbeam Consolidated Mines Company, formerly belonged to this company, but a transfer was arranged whereby this company was to receive 350 horse power from the power plant at the mouth of the river whenever dredging operations were undertaken.

I am informed that it is the intention of the company to install a dredge on this property as soon as it has been determined whether or not the dam and power plant at the mouth of the river is a success.

This ground is claimed to carry fair values in gold, in a gravel which is easily workable by dredges. The ground extends from the old town of Bonanza to the head of the canyon, close to the Salmon River. The property is under the management of Mr. Haven Sawyer of Boise.

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## ELMORE COUNTY.

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Elmore County ranks as the third county of the State in the production of gold, most of which has been derived from the milling operations in the vicinity of Atlanta. The production for 1909 was \$209,105.95 in gold and \$8,174.13 in silver, giving a total of \$217,280.08.

### ATLANTA DISTRICT.

*The Bagdad-Chase Gold Mining Company*, owning a large group of claims one and a half miles south of Atlanta upon Montezuma Creek, has operated throughout the year, employing an average of 60 men and running its 40-stamp, concentration and cyanide mill, treating 150 tons per day

at a fair margin of profit. The concentrates represent from 1 to 2 per cent of the total weight of the ore, averaging from \$100 to \$200 per ton, are roasted prior to treatment by cyanide process. The property is operated by electric power furnished from a plant owned by the company and is elaborately equipped.

The Atlanta lode, on which this property is located, has been developed extensively in this and adjacent properties, is from 50 to 150 feet in width and can be plainly traced along the crest of the mountain. In connection with this vein system there are several important lateral fissures upon which several good mines have been developed. This property has immense ore reserves blocked out but experienced considerable difficulty in treating the ore economically. Mr. Edgar Van Etten is the general manager.

*Atlanta Mines Company.*—The Atlanta Mines Company, owning the Monarch and other claims, adjacent to the Bagdad-Chase property, has been a great producer in the past, having a record of approximately \$5,000,000.

The present development of the property is accomplished through a shaft 600 feet in depth below the lowest tunnel, where immense ore bodies are blocked out. The mill, which has been remodeled this summer, will be put in operation in the spring. The plant consists of 20 stamps and cyanide plant, electric driven, with hydraulic auxiliary. The mine has been kept timbered, but no attempt has been made to develop ore during the past year, owing to the fact that immense reserves of ore are awaiting a mill suitable to handle the ore, which is rather refractory and contains a light dissemination of sulphides of iron, arsenic and antimony, with rich silver minerals, such as argentite and ruby silver in a shattered quartz gangue. Mr. Daniel Kirby is in charge of the operations.

*Minerva Mining Company.*—South of the Monarch mine, over the crest of the Atlanta ridge, the Minerva Mining

Company has been operating for the past year and a half under the management of Mr. Thomas Keough.

The property carries two large fissures, containing big shoots of milling ore from 5 to 15 feet in width filled with a shattered quartz gangue carrying values of about \$14 per ton in gold and silver.

The property is equipped with a 10-stamp mill and cyanide plant, operated by water power. The mill has operated profitably throughout the year, and I am informed that it is the contemplation of the management to increase the size of the mill in the near future.

*Idaho Gold Mining and Milling Company.*—The Idaho Gold Mining and Milling Company, adjoining the Monarch on the west, has been working 10 to 12 men in cleaning up and retimbering the old Yuba mine preparatory to an aggressive campaign of operations during the ensuing year. Mr. T. C. Cunningham is the manager.

This property was formerly equipped with a 20-stamp mill but has been idle for several years; however, prior to the suspension of operations, had produced considerable wealth from shallow surface workings. The ore developed in the lower workings is of low grade, but as no cross-cutting or raising has been carried on it is probable that the main vein developed in the upper workings has not been encountered.

*Tahoma Mining and Milling Company.*—On the Atlanta Hill, but north of the main Atlanta lode, the Tahoma Mining Company has recently taken charge of this property, the title to which has been involved for some time, and it is expected will put it in active operation shortly. This property was a large producer in the early days and is equipped with a 10-stamp mill, located on the banks of the Boise River three-quarters of a mile from the mine. The property has large ore reserves and is apt to again be a large producer.

*Bixby Group.*—This property, formerly known as the

Jesse Benton and Atlanta Eagle mines, lying north and west of the Bagdad-Chase and Monarch mines, has recently come into the control of Mr. G. L. Bixby and preparations are being made to equip and develop the property in a systematic manner during the coming year. This property, which is one of the earliest discoveries in the camp, is reported to have produced upwards of \$80,000 from shallow surface workings, and under good management is likely to again figure in the production of this district.

#### BLACK WARRIOR DISTRICT.

*Overlook Mine.*—The Overlook mine, in the Black Warrior district, has been developed to considerable extent during the year, placing immense ore reserves in sight, and I am told a mill is to be placed on the property in the spring. Twenty men have been employed throughout the year under the superintendence of Mr. Neal Campbell.

*Boise King Placers.*—On the Middle Fork of the Boise River, about 12 miles below Atlanta, the Boise King Placer Company has been preparing its property for active operations in the spring. Ditches have been repaired and enlarged, new ground opened and cabins erected. The property comprises a tract of 640 acres, of which 480 acres is claimed to contain washable gravel averaging 40 feet in depth. The property is under the management of Mr. Arthur W. Stevens of Boise.

#### PINE GROVE MINING DISTRICT.

*Franklin Mine.*—The Franklin gold mine, located at Pine Grove, on the Mountainhome-Atlanta road about eighteen miles north of Dixie, has been equipped in a most approved manner by its owner, Mr. R. P. Chattin of Mountainhome, during the past summer.

This property was originally operated about fifteen years ago and at that time was developed to a limited extent by shallow tunnels and open cuts, and a small mill was built

which was reported to have produced about \$90,000 in precious metals. These early operations, however, were in poor hands and the business was badly managed, which resulted in the failure of the enterprise and the practical abandonment of the property for debts before its merits had been proven.

In 1903 the property was acquired by the present owners, a cross-cut tunnel was run at a point some distance north of the old workings, where rich float was reported to have been found. This tunnel encountered a large ore shoot from 2 to 10 feet wide, which was drifted upon for 300 feet. This ore shoot has since been developed by a second level.

A light 10-stamp mill was built on the property and subsequently a crude cyanide plant was installed, which is reported to have produced \$325,000, approximately half of which was net profit. This mill, however, was destroyed by fire in the spring of 1908 and the property has practically remained idle until recently, when a new mill was built, consisting of five 1,050 stamps, with battery frame and block set for five additional stamps, with amalgamation plates, tube mill, Dorr pulp thickeners, with Pachuca agitators, where all the slimes are agitated for a few hours, the tailings are then cyanided and the solution extracted by a Butters vacuum filter, the gold being precipitated on zinc dust. A saving of 96 per cent is claimed for the mill. The mill handles 25 tons a day through a 12 to 16-mesh screen. This mill, however, accomplished a very short run owing to the fact that it was completed late in the fall and being driven by water power fell victim to a cold snap which necessitated a shut down, and the management deemed it advisable to suspend operations until spring. The ore from the middle tunnel is transmitted to the foot of the mountain by an aerial tramway, from which point it is hauled to the mill, a distance of one-third of a mile.

The geology of the Pine Grove district consists essen-

tially of eruptive granite, belonging to the great central Idaho granite uplift. The formation, however, in the vicinity of the Franklin mine is associated with a very conspicuous development of coarse pegmatite and a wide zone of intrusive rock resembling aplite porphyry and porphyry breccia.

The Franklin vein strikes about north 20 degrees west, with a steep dip to the east, lies approximately 275 feet west of the big porphyry zone described and is evidently a replacement fissure, originally filled with a narrow branching dike of the same porphyry. The vein filling is a friable quartz richly impregnated with soft, brown iron oxide, associated with kidneys and bands of massive iron sulphide; however, free oxidized ore is found in the deepest workings. The gold values found in the iron sulphide are largely in the free state.

The lowest tunnel develops the vein 450 feet below the apex, 900 feet of drifting has been done on this level, but no ore of commercial value has been developed so far. This, however, is probably as much due to the lack of cross-cutting and further drifting as to the lack of continuity in depth. This horizon, especially its north branch, comes into some very interesting territory for further investigation and promises very interesting ore results.

The main ore shoot has a pitch between the surface and the No. 2 level of 45 degrees to the north. This pitch necessitated drifting north a considerable distance to find the ore from a point vertically under where it was struck in No. 1 level. If this inclination in the ore shoot is maintained in No. 3, the north drift at that horizon has not as yet been pushed far enough to determine its position. A small stope of quartz has been worked at a point where it should be encountered, if its pitch were maintained, but in raising from the No. 3 level the ground was badly disturbed at a point about 100 feet up. However, a pay streak of good ore was picked up on an intermediate level, in

raising on this vein, it was found to have a lighter dip than the old ore body, and to pass up under and to the west of the old stopes some distance.

The two ore courses are separated at the west cross-cut on the No. 2 level, but converge toward the north, and it is likely that these two ore bodies will consolidate in a short distance. This new west ore body laps past the south end of the old stopes, so as to preclude the possibility of its being a segment of the old stopes. Milling test from this ore body gave results of \$23 per ton in free gold for an average width of from 3 to 4 feet.

I am informed that there is at the present time in sight in the neighborhood of 3,000 tons of ore, which will assay \$35 per ton, and "probable" ore bringing the total reserves up to a gross value of half a million dollars.

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## FREMONT COUNTY.

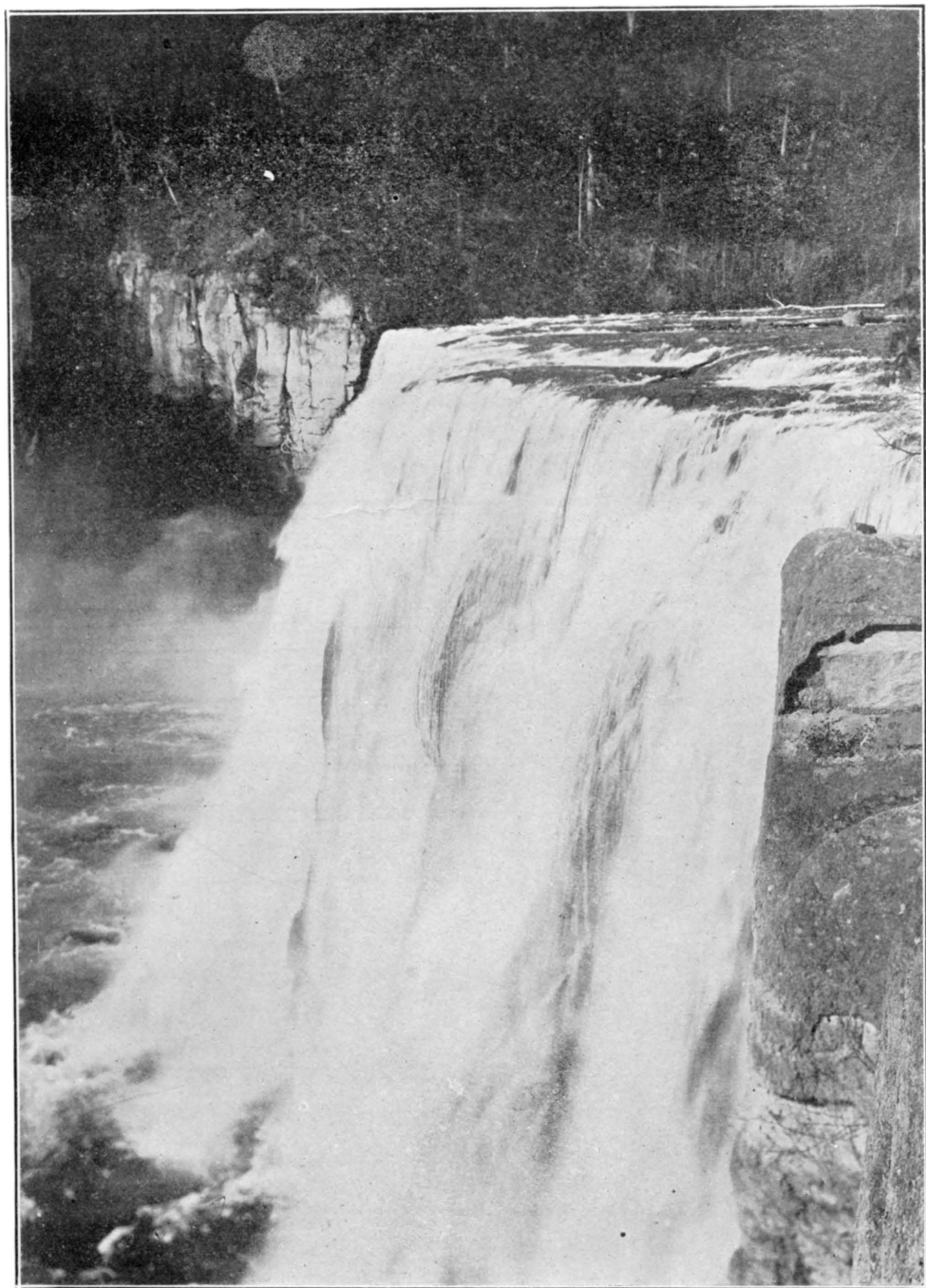
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Fremont County contributes very little to the mineral production of the State; however, there are some very promising coal measures which are being developed that may in a short time become commercially valuable.

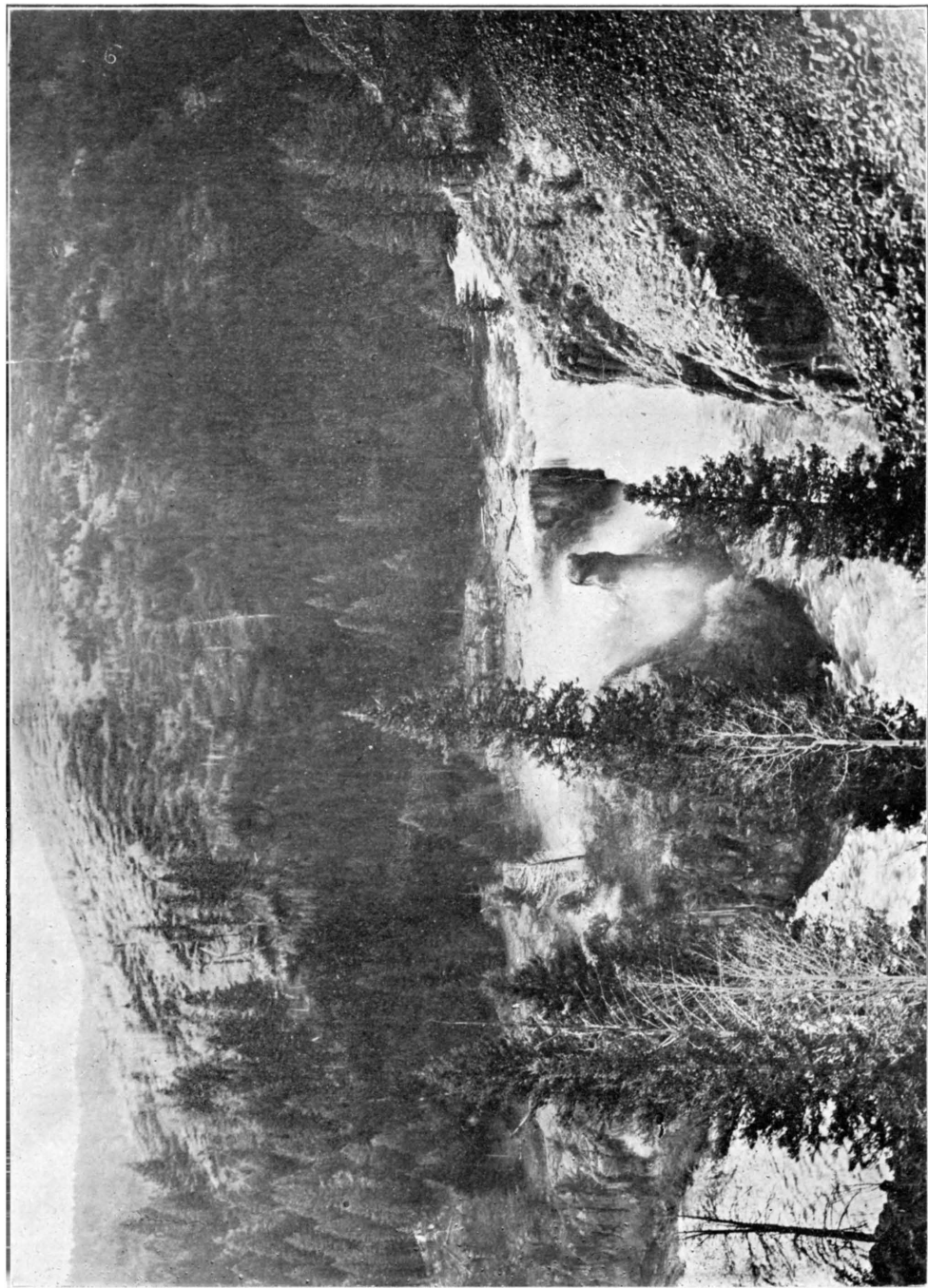
*Brown Bear Coal Mine.*—The Brown Bear coal mine, located in Teton Basin thirty miles east of St. Anthony on Horseshoe Creek, has operated a small force of men during the year developing the property and getting out a high grade coal to supply the local farmers with their winter's fuel, aggregating about 1,500 tons during the year.

This property is developed to a depth of 200 feet by a cross-cut tunnel with entries driven on the vein in both directions, north and south, for several hundred feet. This coal is firm and free from bone, occurs in hard sandstone





LOWER FALLS SNAKE RIVER, FREMONT COUNTY.



ONE OF FREMONT COUNTY'S WATER POWER RESOURCES, UPPER FALLS NORTH FORK SNAKE RIVER.

walls and has a dip of 45 degrees, thus affording excellent advantage for economical extraction of the coal by gravity. The property carries twelve other parallel veins, which range from 1 to 10 feet in thickness, upon which little development work has been done. This property, in combination with two or three other claims, would, if extensively developed, be capable of supplying the total fuel requirements of the State for years to come.

*Horseshoe Mine.*—Adjoining the Brown Bear mine on the south the Horseshoe mine has developed a 10-foot vein of high grade bituminous coal of similar character to that of the Brown Bear and carries the same series of coal measures as is developed on the Brown Bear. This property was formerly opened by a 500-foot tunnel, which was allowed to cave in, since which time it has remained idle.

*Old Scott Mine.*—Near the northwest corner of the county, 10 miles east of Kaufman, the old Scott mine has been operated to considerable extent during the past year and has increased its ore reserves to a marked degree. Several carloads of high grade lead-silver ore have been shipped, and it is held in high esteem by several of the Idaho Falls business men who are heavy owners.

*Weimer Copper Company.*—The Weimer Copper Company, owning a property near Kaufman station, in Skull Canyon, have produced in the past 30 to 40 carloads of copper ore from vertical fissures which connect flat, low grade ore beds, all within a great ore zone, in a contact of blue limestone with quartzite. Since the drop in price of copper this property has been inactive but presents considerable prospective value.

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## IDAHO COUNTY.

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Idaho County, which still continues to be one of the leading counties of the State in point of mineral production, has experienced a rather quiet year.

## ELK CITY DISTRICT.

*Buster Mine.*—The Buster mine at Elk City, which has been operated for several years, was closed down about the first of December and the shaft workings allowed to fill. This property has been a great producer and many people in the vicinity are skeptical of the statement that the ore reserves are exhausted. This property is owned by Mr. F. W. Bradley and associates of San Francisco.

*Elk City Dredging Company.*—During the past year the Elk City Dredging Company have constructed two large boats designed to work the gravels of Elk City Basin in the vicinity of the confluence of Elk Creek with the American River. This ground has been extensively prospected by borings and pits and it is claimed to carry high average values. The dredges were completed this fall, but before the necessary preparations for winter had been made a cold snap prevented further operation, and so they were abandoned until spring, when the working of the gravel will be taken up in earnest. The company is controlled by Cleveland, Ohio, parties.

*Del Rio Mining Company.*—The Del Rio Mining Company of Spokane, Washington, owns a group of six claims situated a mile and a half east of Elk City. The property is claimed to contain four distinct parallel veins, all of which have been more or less developed by open cuts and shallow shafts. The character of the ore is described as ribbon gold quartz, containing more or less hematite, in which 60 to 70 per cent of the gold contents is free milling and there are some phenomenally rich ore shoots in connection with these deposits, which occur in altered granite or schist formation. The veins are developed by several tunnels from which average samples give results from 80 cents to \$688.

## BUFFALO HUMP DISTRICT.

*Cracker Jack Mine.*—The Cracker Jack mine, owned by

the Mines Company, Limited, of which Mr. Mike Sweeny of Spokane, Washington, is secretary, has been developing its property and perfecting its milling practice through the year, employing a small force of men.

The old 10-stamp mill formerly used by the Cracker Jack Company has been dismantled and a new 20-stamp mill has been built on Lake Creek. The ore is handled from the lower tunnel of the mine by a Leschen tramway 2,200 feet in length. The mill is operated by electric power from a power plant on Lake Creek, also owned by the company, three miles below the mill. This plant is capable of supplying 250 horse power, but water is available to develop twice this amount. The mill is supplied with two vanners and two Wilfleys, to be used in connection with the stamps. The mine is equipped with a 14 by 22-inch Rand compressor, steam and electric driven.

The old 10-stamp mill was operated six months of the year prior to its being dismantled, testing the ores of the mine, and it is claimed that an excellent saving was made.

The vein, as developed in the property, is from 25 to 60 feet in width with a pay streak claimed to average from \$10 to \$15 per ton 25 feet in width, three feet of which is claimed to run from \$30 to \$80 per ton. I am informed that it is estimated that there are 42,000 tons of \$8 rock blocked out between the No. 1 and No. 2 tunnels, with no estimation made of ore at any greater depth. The ore amalgamates about 55 per cent free, the concentrates running from \$150 to \$300 per ton, and consist of iron pyrites, which may easily be cyanided as there are no objectionable minerals present. Freight is laid down at the property from Stites via Elk City at 4 cents per pound, the distance being 75 miles.

Great activity is being displayed by several of the trans-continental railroad companies, who have been surveying lines down the Salmon River and up the Clearwater and its various tributaries, and it is reasonable to expect that

within a few years this district will be in close proximity to railroad transportation, at which time there will be active development of properties which, at the present time, are so remotely located as to prohibit their development.

#### OROGRANDE DISTRICT.

*Butte and OroGrande Mining Company.*—The Butte and OroGrande Company has been operating a stamp mill and cyanide plant of 200 tons daily capacity throughout most of the year. The company owns 80 patented claims, covering a great zone of crushed schist and shattered granitic rock, claimed to carry from \$3 to \$4 in gold, which has been developed from 300 to 500 feet in width and is commonly known as the "Hogan Dike." It is claimed that between \$80,000 and \$90,000 has been produced during the past six years, but work has been temporarily suspended upon the property pending negotiations for a sale to eastern parties.

*Twin-Butte Property.*—One and a quarter miles south of Orogrande the Twin Butte property contains a large gneiss dike, and veins of quartz porphyry carrying gold values from \$4 to \$100 per ton. The property is equipped with a 10-foot Chilean mill having a daily capacity of 50 tons. A tramway 1,100 feet in length has just been completed from the mine to mill, and a cyanide plant is to be installed. Mr. H. M. Peterson of Orogrande is the manager.

*Treasury Hill Mining Company.*—The Butterfly group, owned by the Treasury Hill Mining Company, located on the northern slope of the West Fork of Crooked River one mile west of Orogrande, has been developed extensively during 1909. Most of the work was confined to the lower tunnel, which will have 900 feet of depth under the apex of an east and west vein which occurs in coarse grained gneiss, accompanied by a porphyry dike. The vein is from three to six feet in width and carries values from \$5 to \$2,-

000 per ton. Mr. Robert Puelz of Orogrande is in charge of the operations.

*Independence Group.*—The Independence group, located one and a half miles east of Orogrande on Quartz Creek, has developed a vein 9 to 40 feet in width carrying values in silver and copper. There are several other veins on this property, none of which have been developed extensively.

*Homestake Group.*—The Homestake group, lying 3 miles southeasterly of Orogrande, is developed by a 700-foot tunnel. The vein occurs in syenite and granite and is claimed to carry assay values of \$40 per ton, some of which is reported to blister when placed in contact with fire, which might indicate the presence of tellurides.

*Umatilla Mining Company.*—The Umatilla Mining Company, developing a group of claims two miles westerly of Orogrande, on Rock Creek, has the best developed property in the district, comprising over 2,000 feet of tunnels. The ore consists of quartz, carrying iron sulphide, with good gold values, in an east and west vein, varying from 5 to 30 feet in width. This property has extensive ore reserves blocked out, which, I am informed, are sufficient to justify a large milling plant, but the management continues to develop additional reserves regardless.

*Winner Mining Company.*—The Winner Mining Company, four miles north of Orogrande, has a quartz vein in a mineralized dyke 100 feet in width. The formation in which this dyke occurs is syenite and granite. The property is not extensively developed, but values from \$5 to \$1,000 per ton are reported to have been obtained from surface workings. A long lower tunnel is being driven to tap the vein; there is supposed to be only about 130 feet yet remaining to be driven.

*Idaho-Champion Gold Mining Company.*—The Idaho-Champion Gold Mining Company, located within four miles of Orogrande, is equipped with a 10-stamp mill and

latest improved cyanide plant. Three thousand feet of tunneling and shaft workings have been constructed, and I am informed that \$25,000 has been expended upon the property during this year.

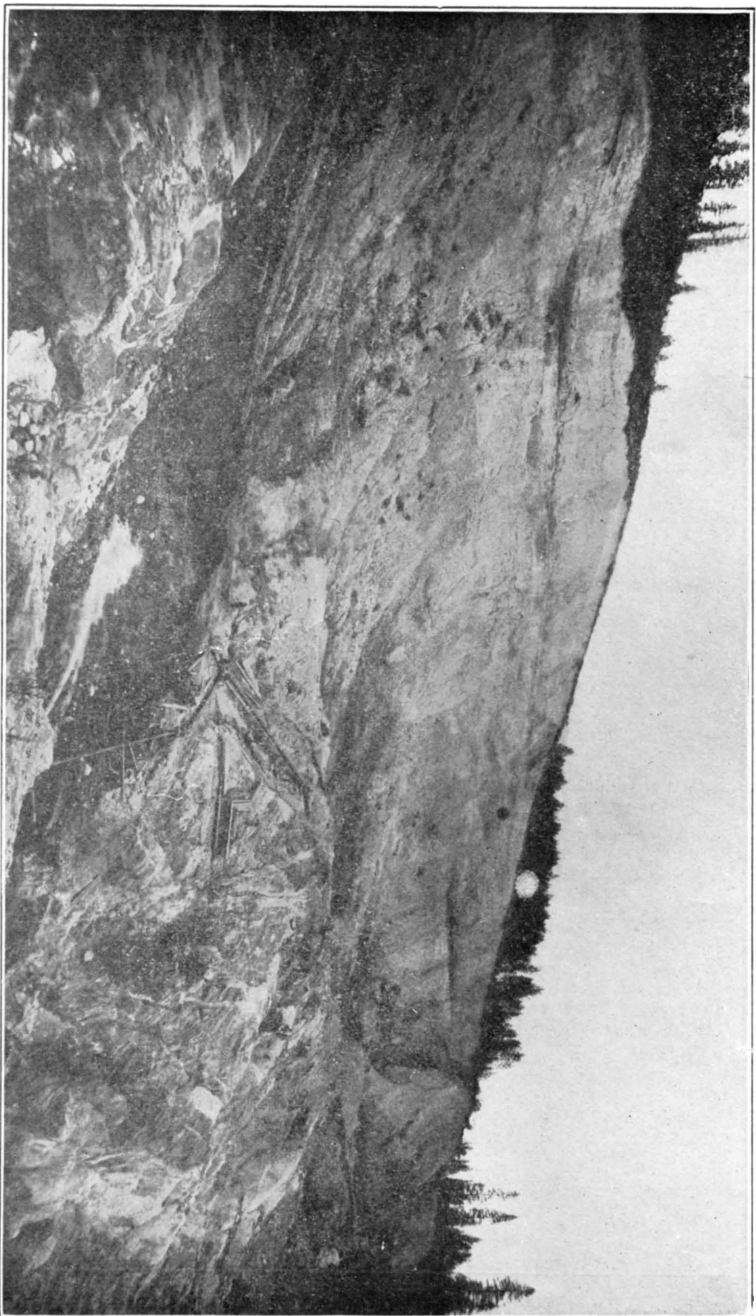
#### BIG CREEK DISTRICT.

*Hillsides Mine.*—The Hillsides mine, seven miles south of Orogrande on Big Creek, has developed a 3-foot quartz vein in granite and gneiss, the values running from \$12 to \$15 per ton, nearly all free. The property has been equipped with a saw mill and carries 1,500 feet of developed work. A tunnel is being driven to open the vein 300 feet in depth, which will be approximately 1,000 feet in length when the showing is reached. This vein belongs to a large vein system 100 feet wide with altered wall rock through it but carrying 12 feet of milling ore in three streaks. This property is under the management of Mr. J. W. Killinger of Spokane, Washington.

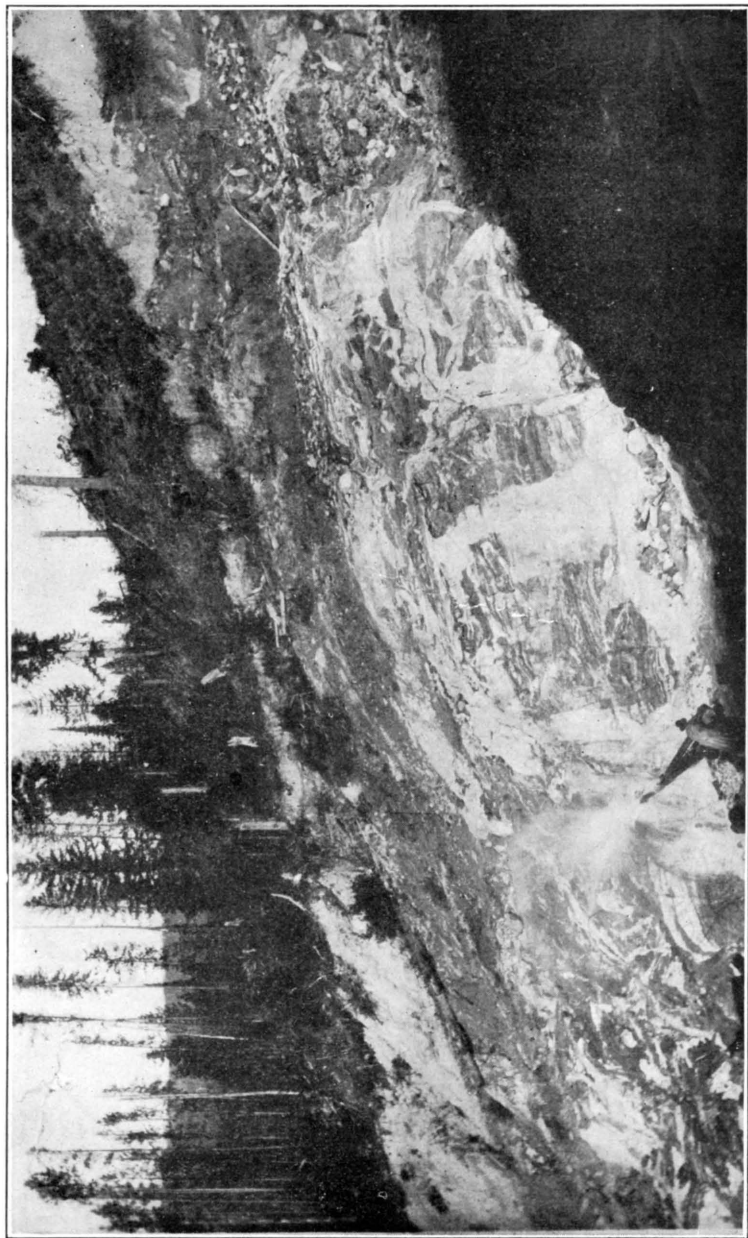
*Gold Bug Group.*—The Gold Bug group, adjoining the Hillsides on the east and supposed to carry the continuation of the same vein system, which has been traced by surface workings and open cuts for a mile and a half in length, is developed by a shaft 200 feet in depth, with drifts amounting to 400 feet. A cross-cut tunnel is being driven to tap the vein approximately 1,000 feet under the apex and 800 feet under the collar of the shaft. This tunnel has yet to be driven 300 feet to come vertically under the development above. This property is reported to have extensive reserves of ore averaging from \$10 to \$15 per ton.

*Columbia Group.*—The Columbia group, consisting of three claims, adjoins the Hillsides group on the southeast. The property is developed by two shafts and a cross-cut tunnel. The vein is claimed to be 60 feet in width and average in the neighborhood of \$5 per ton, and belongs to the same vein series as the Hillsides lode.





OLD PLACER PIT ON THE PROPERTY OF THE IDAHO PLACER MINES COMPANY, LIMITED, NEWSOME, IDAHO COUNTY.



HYDRAULIC MINING—IDAHO PLACER MINES COMPANY, LIMITED, NEWSOME, IDAHO COUNTY.

## COOK'S CORRAL DISTRICT.

*Blue Jacket Mine.*—The Blue Jacket mine, located in Cook's Corral district six miles west of Lucile, has an extensive deposit of low grade ore which has been developed to several hundred feet in depth in a zone of diorite and porphyry. The property is idle at the present time awaiting transportation facilities.

## NEWSOME DISTRICT.

The shallow placers of this district, which were worked in the early days, produced great wealth, but owing to the scarcity of data it is impossible to give the exact production; however, it is claimed that the records of the Wells Fargo Express Company show something over \$47,000,000 from this district. The scarcity of water in the early days caused only the shallow, rich diggings to be sought after and none of the deep gravel banks were touched, and there are at the present time several extensive deposits which have remained practically intact.

*Idaho Placer Mines Company.*—The property of the Idaho Placer Mines Company has one of the most extensive deposits of this character. It occupies the ridge lying between Newsome and Pilot Creeks, and contains an area of approximately 740 acres. The crest of the ridge, which is evidently the uneroded gravel-filled bed of an old river, has a southeasterly and northwesterly course, and is undoubtedly the continuation of the "old channel," which has been worked more or less continuously for the past forty-seven years at the Moose Creek placers, some six miles to the southeast, where the gravel bank 200 feet high is said to average from 12 to 21 cents per cubic yard.

The old channel, contained in the Idaho Placer Mines' property, has been devolped by surface cuts and workings for about 7,000 feet in length and 1,200 to 2,600 feet in width. At the lower or east end the gravel is from 20 to 40 feet in thickness, but at a point on the northerly rim

near the crest of the ridge, where some extensive placering has been done, the bank is fully 300 feet in height. In the absence of accurate data it is difficult to determine definitely the value, character or origin of the deposit. The bed rock, as exposed in this and other pits, is a soft schist, which can be easily worked; in fact, the bed rock can be cut away to any extent desired by a stream of water. There are many quartz veins occurring in the bed rock, which account for much of the rough gold found in these placers. The gold averages about \$16 per ounce.

The gravel is of very favorable character for rapid and economic mining, no large boulders are in evidence, and very little clay is to be seen in the banks. The company owns water rights which are claimed to supply a thousand miner inches during the dry season.

This large pit, at the north rim of the deposit, which has been worked extensively, has demonstrated that the property has values which justify elaborate operation and that the ground should be opened at the lower end, where water in great abundance can be had under sufficient head, and I am informed that a camp is to be established and the ground opened at this point in the spring, where shallow ground, the advantage of going into the deposit along the course of the channel on bed rock, great head of water and good dump facilities are to be had. At this point the bed rock of the channel is probably 400 feet above the present stream.

I am also informed that from the operations in the past in the pits and cuts sunk over the surface and from the banks of the large pit on the north rim, results were obtained which would indicate that the entire deposit should average approximately 10 cents per cubic yard, and that about 100,000,000 cubic yards of gravel are available for washing, which insures the work of a life time to exhaust.

The property is equipped with four giants, several thousand feet of hydraulic pipe, necessary fittings, tools and

electric light plant, and it is the intention of the management to prosecute active operations upon the property as soon as the weather permits in the spring.

*Moose Creek Placers.*—About six miles to the southeast of the Idaho Placer Mines Company's property, the Moose Creek placers, containing a large area of auriferous gravel of varying depth, in places as great as 200 feet, has been operated more or less continuously for the past 47 years.

This deposit is supposed to have produced handsomely and has been operated on an extensive scale in the past. The gravel is said to average from 18 to 21 cents per cubic yard. However, at the time of my visit to this section, the property was shut down, owing to litigation troubles, and nothing but assessment work has been done on it this year.

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## LATAH COUNTY.

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Latah County, while it boasts of no important mineral production, bears a very important relation to the mining industry of the State, for the State University, with its School of Mines, is located here. This institution, while being sorely in need of funds at all times, has become very popular and has turned out many graduates who have assumed responsible positions in this and adjoining States.

The School of Mines embraces the departments of Mining Engineering, Metallurgy, Mineralogy and Geology. The departments are under the supervision of Professor Robert S. McCaffery and Associate Professor William R. Chedsey. Professor McCaffery is a graduate of the Columbia School of Mines and has had the superintendence and management of copper and lead smelters in various parts of the United States and South America. Mr. Chedsey is a graduate of the Colorado School of Mines and has done considerable professional work in that State.

The School of Mines has a splendid library of well selected technical literature and magnificent classified collections of minerals, and, in addition to its main building, has two large specially constructed brick buildings, one designed for assaying and the other for ore dressing.

The assay building is equipped with double muffle coal and gasoline fired assay furnaces and gasoline melting furnaces, in a separate room 50x70 feet, a balance room supplied with fine assay, analytical and pulp balances, adjoining but entirely separated from the other departments; also a parting room and laboratory for wet determinations, fitted with gas, vacuum and pressure connections at each student's desk.

The Ore Dressing Department is equally well equipped with milling machinery of nearly every description and affords a fine opportunity for research work along metallurgical lines. The building is provided with large storage bins for ores, is equipped with crushing machinery, such as gyratory and Blake crushers, crushing rolls, automatic sampler, sample grinders, stamp mill and amalgamation plates, Huntington mill, Tube mill, trommel screens, several varieties of jigs, Wilfley and Card concentrating tables, Frue vanners, pulp thickeners, agitators and also oil fired roasting and smelting and refining furnaces, arranged to operate with oxidizing, reducing or neutral atmosphere, with acid, basic or neutral hearth.

This department, equipped as it is for research work, affords a great opportunity to owners of mining property containing commercial bodies of refractory ore, as experimental work can be carried on here at a very slight expense to the miner, with a good chance that a solution of the metallurgical problem can be had, and should be generally patronized.

LEMHI COUNTY.

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Lemhi County has had a very quiet year in a mining way, but Salmon City property and farm land on Birch Creek, Lemhi and Salmon Rivers, have experienced a very decided boom owing to the construction of the Pittsburg and Gilmore Railway from Armstead, Montana. This road has been completed as far as Junction this year and will soon be into Salmon City. As near as can be ascertained this line is one belonging to the Hill interests and will be built down the Salmon River, connecting with the Camas Prairie branch, thus reaching Lewiston. This railroad will be the realization of many years of anxious waiting and expectation on the part of mine owners in this section and will place upon the producing list many properties which have been unable to operate, owing to the very long wagon haul to railroad transportation, either by way of Dubois or Red Rock, Montana.

## GILMORE DISTRICT.

The Gilmore lead district, lying 20 miles southwest of Junction, contains some very promising lead-silver properties.

*Gilmore Mine.*—The most important ore development in this district is found at the Gilmore mine. This property has been developed to 400 feet in depth by a vertical winze sunk from a tunnel about 100 feet under the surface. The hoist station at the collar of this winze was lost during the past year by a squeeze of the ground, being in close proximity to the vein, so that it had to be abandoned, but a lower tunnel is being driven which will tap the shaft at the 100-foot level, below the old collar. A commodious hoist station is being excavated, and as soon as this is completed the 12 horse power gasoline hoist which was formerly used will be installed and the property will again

be put on an operating basis. There are drifts at the 200, 300 and 400-foot levels.

The ore manifestation in this property is found in a complex replacement fissure, in blue limestone, between intrusive dikes. The ore occurs in short but thick and rich shoots, and, on the 300-foot level, two parallel shoots were encountered and developed which converged when raised upon. Practically all of the ore of shipping grade has been mined above the 150-foot level, but below this point it remains intact. The ore on the 300-foot level, found in the two shoots, aggregates about 200 feet in length and runs from 3 to 25 feet in width carrying an average value of from 30 to 35 per cent lead and 15 ounces in silver, with about 75 cents in gold per ton. The ore rakes strongly to the south, and on the 400-foot level an additional 300 feet of drift was necessary and the ore shoot has only been encountered.

This property was at one time equipped with a small jig concentrator and considerable ore shipped by way of Dubois, being transported in 40-ton wagons hauled by a steam traction engine. The tailings from this jig plant have been impounded and will undoubtedly be worked when the property is equipped with a concentrator and has cheap transportation. It is estimated that there is over \$300,000 worth of ore blocked out above the 400-foot level. Mr. James E. Walker is the superintendent of the property.

*Latest Out Mine.*—Immediately adjacent to the Gilmore mine, Ralph Nichols is developing a property known as the Latest Out. This property was formerly developed and operated through an incline shaft. From this incline shaft workings it is claimed that over 1,000 tons of high-grade ore was shipped to the old Viola smelter at Nicholia; besides this considerable ore was concentrated by former owners in Texas Gulch and the concentrates shipped to Omaha.



Under the present management a lower tunnel has been driven and connected with the old workings. The vein on this level has been prospected extensively and has opened up two small but promising ore shoots. A 15 horse power gasoline hoisting outfit has been installed, with self-dumping skip, and the sinking of a winze from this level has been commenced. At the time I visited the property this winze was down 110 feet.

The ore occurrence in this property is similar to that of its neighbor, the Gilmore mine, and occurs along a lime porphyry contact. The ore varies from 2 to 10 feet in width and I am informed carries about 35 per cent lead, 15 ounces silver and 50 cents to \$1.50 in gold.

*Lemhi Mining Company.*—Five miles southeast of the Gilmore mine, in Texas mining district, the Lemhi Union group, now owned by the Lemhi Mining Company has, under former operators, it is claimed, made an important production.

The property is developed by a shaft 150 feet deep and several tunnel workings. A lower tunnel is being driven to cut the ledge 200 feet below the present workings.

The ore occurs in fissure veins, in gray lime, which is associated with quartzite. The ore from the lowest workings is claimed to run 45 per cent in lead and 15 ounces in silver.

The company operating this group, while independent of, is controlled by some of the same people who own the Lemhi Smelting Company. This company also controls, in addition to the Lemhi Union, the Iron Mask, Red Bird, Elizabeth and Portland groups, in the same district, which are supposed to be very promising properties.

*Lemhi Smelting Company.*—During the last year an independent smelter has been built in the Spring Mountain district by the Lemhi Smelting Company, an Idaho corporation, in which a number of Boise people are interested. This plant has a capacity of 80 tons per day, is of modern

design, with complete equipment. The company owns an elegant water system and electric light plant. The property was completed in October and a test run of ten days was made, from which 100 tons of silver-lead bullion is supposed to have been turned out from 400 tons of ore treated. Assays from the slag are reported to have shown  $\frac{1}{2}$  of 1 per cent lead, with only a trace in silver.

There is considerable ore in this district which is ideal for smelting purposes, but owing to the expense of transporting fuel and flux the smelter has closed down until spring, when the railroad will probably be constructed into this section.

*Silver Moon Mine.*—Another property of considerable prominence in this neighborhood is that of the Silver Moon, located three miles east of the Gilmore mine. This property carries a high-grade silver ore deposit in limestone, and it is claimed has a record production of over \$50,000, which was shipped from the shallow upper workings in the early days.

*Viola Mine.*—The old Viola mine, located in the Nicholia district, on the opposite side of the valley from the Gilmore at the head of Birch Creek, has a record of producing \$5,000,000 from secondary deposits. There was no important deposit of galena developed, but the fissure in which the ore occurred is continuous and well mineralized with oxidized iron ore and presents a very attractive field for further development.

*Hughes Mine.*—West of the Gilmore mine, about three miles, some very promising lead-silver properties carrying high gold values are located, the most important ones of which are the Hughes and Democrat mines.

*Junction Mines Company.*—Three miles northeast of Junction, at Leadville, the Junction Mines Company is developing a contact fissure in lime and porphyry containing a very promising ore shoot.

The property has been operated through a shaft until re-

cently, when a lower tunnel was started from the creek level, and at the time of my visit the shaft workings had been abandoned and all efforts confined to driving this tunnel, which will be connected with the old workings as soon as the vein is encountered. The new railway from Armstead, Montana, to Salmon City will pass across this property, immediately beneath the dump of this lower tunnel.

*Bohannon Creek Placers.*—Fifteen miles east of Salmon City, on Bohannon Creek, are some extensive placers which have been operated for a number of years very profitably. This property has operated with a good force of men during the season but was closed down owing to the accidental death of the manager, who was also one of the principal owners.

*Salmon City Coal and Land Company.*—Two miles west of Salmon City, at the mouth of Jesse Creek, the Salmon City Coal and Land Company are operating a lignite deposit, which is the only coal property in the county. The coal is of an inferior grade, but in this district, so remotely removed from railway transportation, there has always been a market for this coal. During the past summer this company has supplied the steam shovels working on the new railroad construction.

The coal occurs in flat dipping sandstone, shale and clay deposits, belonging to the tertiary age. The coal seam is approximately five feet in thickness, but includes several bands of bone. A good sample of this coal analyzes approximately as follows:

Fixed Carbon.....	39.2 per cent
Volatile Matter.....	38.3 per cent
Moisture .....	16.0 per cent
Ash .....	5.3 per cent
Sulphur .....	1.0 per cent

The company owns a large tract of land which is supposed to be underlaid by coal of similar grade to that which

is being mined. The coal seam was being mined from an entry up to this summer, but at the time of my visit to this property they were preparing to sink an incline below this level. Mr. H. C. King of Salmon City is the principal owner. The mine has produced during the year about 2,000 tons of coal, having a retail market value of \$14,000.

*Copper Queen Mining and Smelting Company.*—The property of the Copper Queen Mining and Smelting Company, lying about six miles north of Salmon City on Dryer Gulch, has been operating its mine and mill continuously during the year.

The property is equipped with a 15-stamp electric driven mill, power for which is derived from the Anderson power plant at Salmon City, the power line being six miles in length. The current is transmitted at 1,100 volt tension, but is transformed to 440 volts at the plant. The mill equipment consists of a gyratory crusher, 10-stamp battery, amalgamation plates and Wilfley concentrator. This latter, however, is not being used at the present time owing to the fact that the ore being mined now is quite free from sulphides. The mine is equipped with a 5-drill electric driven Rand compressor. The mill, buildings and workings are lighted by electricity.

Two strong fissure veins filled with quartz and altered granite, accompanied by a dark dike rock similar in occurrence to the Trade Dollar vein at Silver City, in a granite formation, are developed in the workings. Five ore shoots have been developed in the property, with an aggregate length of over 1,000 feet. The strike of the veins is nearly north and south. One of these veins was formerly developed by old shaft workings 300 feet deep, which have been tapped by the present tunnel. The two veins developed in the lower workings are substantially parallel in strike but have converged dips, and, as near as can be estimated, should join at a point about 200 feet deeper.

This property was worked in a desultory manner for a

number of years, but under the management of Emmerson Hill, has been put on a substantial paying basis.

The ore runs from \$2.80 to \$60 per ton, 80 per cent of the values are saved in the battery and on the plates. The mill has a capacity of 50 tons per 24 hours, and with the completion of the railroad to Salmon City should operate at a handsome profit for a long time to come.

*Kittie Burton Mines Company.*—The Kittie Burton Mines Company, located on Indian creek about 40 miles north of Salmon City, owning the Kittie Burton and Ulysses mines, operated throughout the year its 15-stamp mill on ores from the Kittie Burton mine, which is transmitted over a Leschen aerial tram 3,000 feet in length.

The ore occurs in a flat dipping quartz-filled vein in schist, the gold values occurring in the native state in combination with iron pyrites. The ore shoot consists of several streaks, totalling in width as much as 30 feet, having a value of from \$2 to \$30 per ton with an average mill feed of about \$5 per ton in gold and silver, and from 2-10 to 7-10 per cent in copper. The concentrates made in the mill average about \$30 per ton.

Regrinding machinery is to be installed, I am informed, so that the concentrates can be reground and the gold values entirely saved, as the gold, associated with the iron pyrites, readily amalgamates when liberated, and it is only a question of fine grinding to make an extremely high saving. The hauling of concentrates in the past has been quite an item of expense, but with the construction of the Pittsburg and Gilmore Railway down the Salmon River this property will be within three or four miles of the line.

The Ulyses mine, situated on the south side of Indian Creek, owned by the same company, is also connected with the Kittie Burton mill by an aerial tramway. This mine has been idle during the year owing to the fact that the ore is of such a low grade that it cannot be handled economically in the present mill, but I am informed that it is con-

templated by the management to increase the capacity of the mill very materially in the near future, when this property will also be operated.

*Grunter Mine.*—The old Grunter mine at Shoup has produced over \$50,000, and it is reported to have at least \$300,000 worth of gold-bearing ore in sight, but has remained inactive during the year owing to its inaccessibility. This property is owned by the Shoup estate of Salmon.

#### YELLOW JACKET DISTRICT.

The Yellow Jacket district has practically been inactive during the present year. Some of the properties, however, have done a little more than the annual assessment work.

*Yellow Jacket Mine.*—The Yellow Jacket mine, which has been idle for several years, has recently been taken over by the Yellow Jacket Gold Mining Company, composed of New York capitalists, and active operation is contemplated in the spring.

The property is equipped with a 60-stamp mill, electric light plant, saw mill and all necessary buildings.

The ore deposit consists of a large low grade fissure, which has been developed for approximately 1,100 feet in length. The ore is claimed to average from \$2.25 per ton near the hanging wall to \$20 in richer streaks near the center, and averages in the neighborhood of \$8 per ton. A number of very prominent men have examined this property and have reported favorably upon it, among whom are Mr. T. A. Rickards, Mr. Edward E. Chase, and Mr. Edmond B. Kirby.

#### PARKER MOUNTAIN DISTRICT.

The Parker Mountain district has experienced an extremely quiet season, practically nothing outside of assessment work being accomplished; but with the contemplated construction of the railway line from Salmon City through to Stanley Basin, this district has been given a new lease on life.

*Parker Mine.*—The most important showing in this district is the Parker mine, located on Parker Mountain. This property, while still in the prospective stage, has an extremely attractive showing. The ore consists of hard quartz, carrying bands of argentite with native gold, and the vein occurs in andesite tuff and breccia. Associated with the main vein are several stringers carrying rich ore. It is claimed that one of these ore streaks, 5 feet in width, will average \$20 per ton.

Another important showing in this district, which adjoins the Parker mine, is that owned by Mr. Ed. Williams, which has a very similar showing, but nothing has been done on this property during the year.

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## NEZ PERCE COUNTY.

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Nez Perce County, which has the distinction of being the birthplace of the mining industry in Idaho, has always been a great gold producer but has at the same time operated at great handicap, owing to the fact that it has been isolated from transportation. With the construction of the Northern Pacific road up the Clearwater River to Stites, Pierce City was afforded better transportation facilities than it had enjoyed in the past, but it is still some 30 miles distant from the railroad by wagon road over a mountain grade, which is in fair condition only a very few months of the year; but with the great railway boom which is on in Idaho at the present time, there is considerable likelihood that this district may be brought in close touch with railway transportation shortly.

### PIERCE CITY DISTRICT.

The Pierce City district has experienced a very prosper-

ous year as the result of several quartz and placer operations in this immediate vicinity.

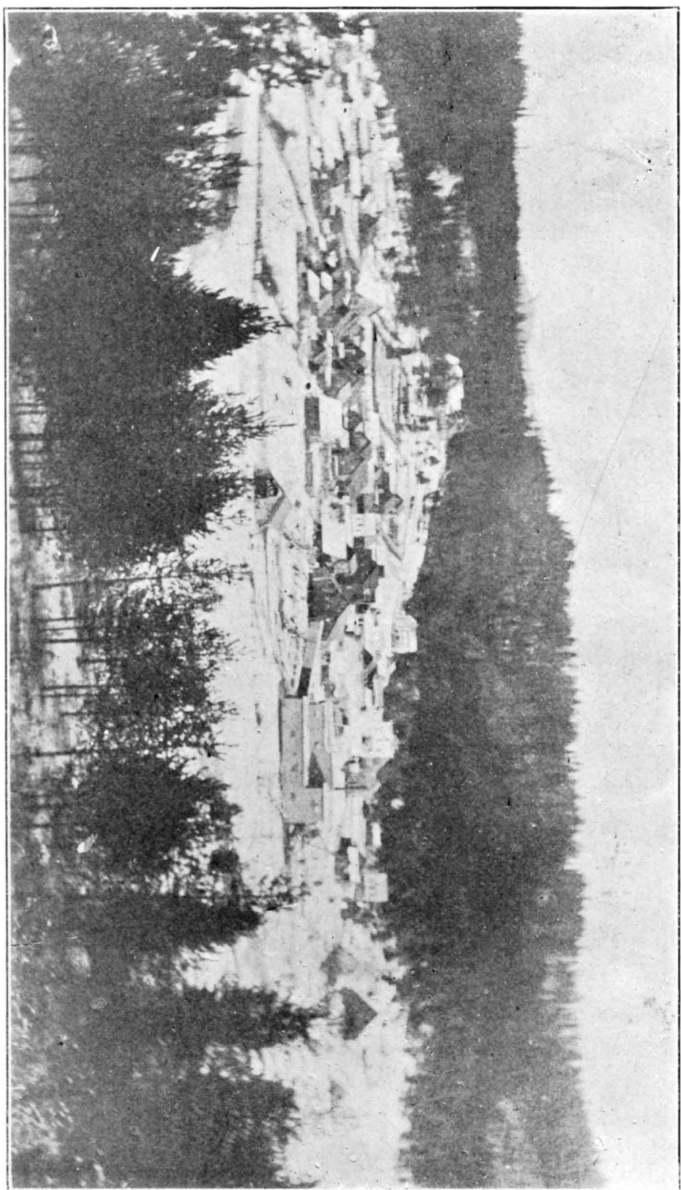
*Idaho Company, Limited.*—The Idaho Company, Limited, which has been operating a Risdon dredge of 1,000 cubic yards daily capacity on the flats adjacent to the town of Pierce City for the past three years, has recently completed a new modern dredge, which was constructed by the New York Engineering Works at a cost of about \$60,000. This dredge has the close connected bucket of the Bucyrus type, and has a capacity of 2,000 cubic yards per day. The ground being worked at the present time contains about 75 per cent tailings from old placer workings, but is now yielding about 19 cents per cubic yard. The ground is being prospected by an Empire hand drill ahead of the dredge and is giving good satisfaction, both as to cost of operation and results. The new dredge was put in operation in the fore part of December and is equipped to operate all winter. The smaller dredge is claimed to have produced about \$45,000 during 1909. Mr. P. F. Hare is superintending the operations.

*Rhodes Creek Property.*—The Rhodes Creek Company, at Rhodes Creek in the Pierce City district, has been operating a Ruble elevator on its placer diggings up to this season, when it was abandoned and an Evans elevator substituted with very satisfactory results. This same elevator.

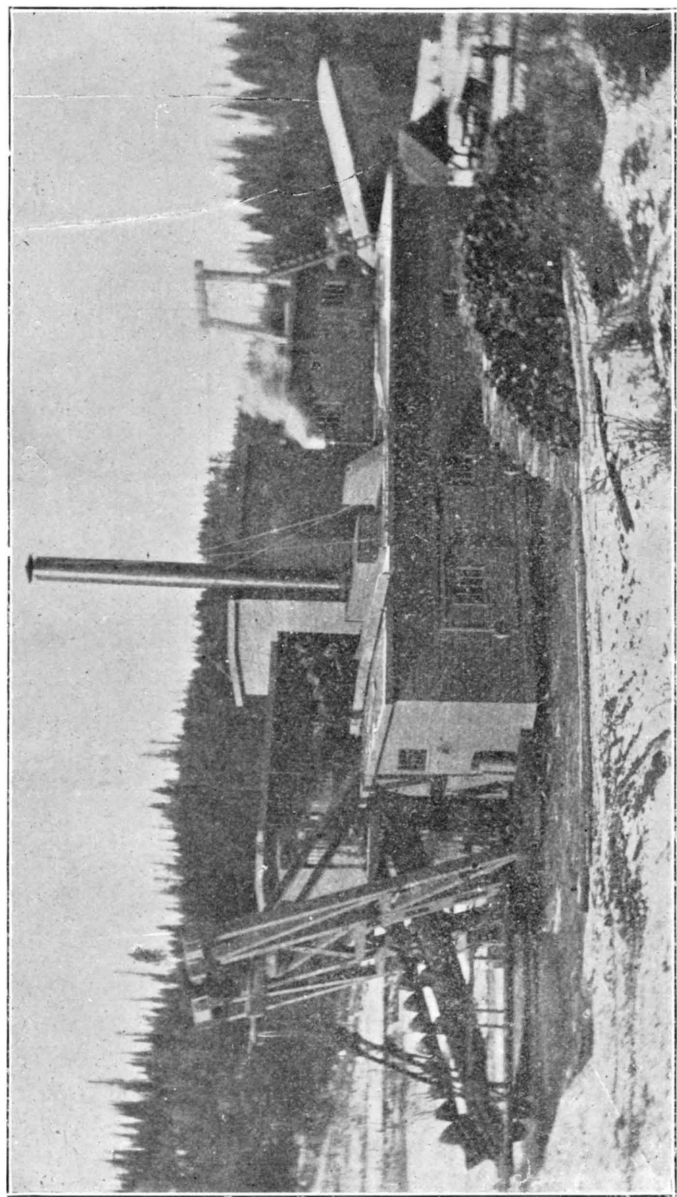
In this same vicinity a group of placer claims has recently been examined by Seattle parties and it is reported that a payment on a bond has been made and that a dredge will be installed on this property next season.

*American Placers.*—The American Placers, operating under a lease by Mr. James M. Porter of Spokane, has been worked throughout the season on its extensive deposit of placer ground, lying seven miles west of Pierce City on Orofino Creek. This property was formerly opened by a bed rock flume, but the grade was found to be too flat for





PIERCE CITY.



BUCKET DREDGE, IDAHO COMPANY, LTD., NEAR PIERCE CITY.

successful handling, but this difficulty has been overcome by the use of the Ruble elevator.

A survey has recently been made for a high line ditch, which will be built in the spring. This will give abundance of water under an additional head for the operation of two Ruble elevators, which will be installed. The property is reported to have paid a fair margin of profit from the operations this year, and with the increased equipment should be a large producer in the future.

*Ozark Mining Company.*—The Ozark Mining Company, owning the Ozark, Wild Rose and several other adjacent properties one and a quarter miles east of Pierce City, has been developing through a long tunnel during the year and has recently encountered a strong vein in this tunnel at a distance of 1,300 feet and at a depth of over 500 feet under the surface. The ore is claimed to have good values, and it is the intention of the company to install a 15-stamp mill shortly. This tunnel was driven by the assistance of a 15 h. p. gasoline air compressor, which gave excellent results. The upper workings of these properties have produced extensively in the past, and, with the development of this vein at depth, the consolidated property has taken on a very substantial appearance.

*Sunrise Gold Mining Company.*—Another property which has operated extensively during the past season is that of the Sunrise Gold Mining Company, which has been developing a very promising surface showing through a tunnel which is now 1,200 feet in length and which will develop the vein at 500 feet in depth.

*Orogrande Placer Mining Company.*—The Orogrande Placer Mining Company, owning 180 acres of placer ground on Orogrande Creek, have this year completed one of the best ditches ever constructed in the district and are operating two Ruble elevators. The work is in charge of Mr. I. D. Cleek of Pierce City.

## ELK CITY DISTRICT.

*Oxford Mining Company.*—In the Elk Creek district, 14 miles east of Pierce City, a very promising copper showing has been developed during the latter months of the year by the Oxford Mining Company, controlled by Senator Jerome Day, Mr. E. N. Brown and other business men of Moscow.

The vein has been opened by cuts on the surface for a very great distance, exposing iron capping, carrying copper carbonate. The vein, which is a pronounced quartz-filled fissure in granite, averaged for 5 feet in width on the surface 6.6 per cent in copper, and from a 5-foot average sample in the bottom of a 40-foot shaft, 18 per cent copper was obtained.

A steam hoist and sinking pump has been installed and a working shaft sunk which had attained a depth of 100 feet, at last report. Work will be prosecuted throughout the winter, and by spring a body of ore sufficient to justify extensive machinery should be placed in sight. The work is being done under the superintendence of Mr. J. B. Collins of Pierce City.

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OWYHEE COUNTY.

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SILVER CITY DISTRICT.

The mining industry of the Silver City district, which is the principal source of wealth in Owyhee County, has been very slow during the past year. However, the two bonanza mines, the DeLamar and the Trade Dollar, have produced nearly up to their normal output and have forced Owyhee County into first place among the gold producing counties, but the reserves in these properties have been greatly reduced.

*DeLamar Mine.*—The DeLamar mine, located five miles west of Silver City, has operated throughout the year, but during the latter months the mill feed consisted principally of fills drawn from the old stopes.

This property, which has been a great producer of high grade silver-gold ore in the past, having a record of over \$10,000,000 to date, has been extensively developed and prospected, but very little new ore has been exposed this year.

The ore occurs in a series of veins in rhyolite, all of which terminate against what is known as the "Iron Dike" fault, which is a clay dike or seam, impregnated with iron pyrites. The ore has never been discovered beyond this dike, and the veins as developed in the lower tunnel, driven from the mill level, have been of extremely low grade and have proven unprofitable.

The vein occurrences, in such close proximity and parallel to each other in the soft rhyolite, necessitates heavy and expensive timbering, so that the cost of operation at the property is extremely high. The scarcity of ore in the stopes, which have been the great producers in the past, has made it necessary to carry on an aggressive campaign of development work, in the course of which several smaller ore bodies have been developed, the principal one of which was being opened at the time of my visit to the property, is located on the south side of the mountain, on the Summercamp ground some distance from the older workings. This vein, while being small, shows extremely high values and will undoubtedly be a source of good milling ore for some time to come.

The ore is cyanided in a mill of 100 tons daily capacity, the process in which has been materially changed at various times, but is at the present time making a fairly high saving. Up to recently the mine has employed about 200 men, but this force has been materially reduced.

*Trade Dollar Consolidated Mining Company.*—The fa-

mous old Trade Dollar mine at Dewey, three miles west of Silver City, with a gross production of about \$20,000,000 to its credit, half of which was paid in dividends, has been gradually reducing its force since the middle of the year, owing to its shortage of ore reserves.

This property is extensively developed, having in the neighborhood of 16 miles of underground tunnels, drifts and cross-cuts. The lower tunnel, which was driven from the mill level, is 13,000 feet in length, of which 8,000 feet was driven upon the vein. This elaborate development was only made possible in this district, where fuel and timber is so expensive, by the construction of a power plant at Swan Falls, on Snake River, and the transmission of the electric energy to the mine. All surface works, including the shops, mill, compressor and underground haulage and lighting, is accomplished by this means.

The Trade Dollar vein is an extremely interesting deposit, and the workings elegantly display the geological conditions existing in Florida Mountain. The original granite core of the mountain, eroded to a rounded relief, has been covered by successive igneous overflows, the first of which was basalt. This was eroded on the east slope of the mountain until the granite base was exposed, then followed a second overflow, which consisted of a light colored rhyolite. This, in turn, was eroded to the present surface, exposing the underlying granite in the gulch, south and east of the mountain. Following the last of these overflows was the vein-forming epoch, during which a fissure occurred in the mountain, probably following the old vent, through which the successive igneous flows poured out, which, in turn, has been replaced in part by quartz, carrying metalliferous values.

This dike rock, which remains in the vein, is a basalt, in many places resembling diorite and varies greatly, from a few inches to many feet. In the lower works it is of greater extent than the width of the drift, giving the impression

that the drift was driven in basalt instead of a dike included between granite walls. This vein has been driven upon entirely through the mountain in the upper works, showing a wonderful continuity and uniformity in all characteristics.

The ore extracted from the rhyolite zone was of higher value than that which came from the underlying basalt area, and, in turn, the values were lower in the granite zone than in the overlying basalt; in fact, the lower tunnel, which is entirely within the granite area, has produced very little ore of commercial grade. The vein is as large and well defined and well filled with quartz, but the values are not present, but Mr. Frederic Irwin, the manager, feels that it is well worth the effort of sinking down several hundred feet below this level in the hopes of passing through this barren area, and preparations to this effect have already been made. The company has a well filled treasury and it is undoubtedly good judgment to give the old property, which has been such a faithful producer, another lease on life.

*Banner Mine.*—The Banner Mining Company's property, located about one mile south of Silver City on Florida Mountain, adjoining the property of the Trade Dollar Consolidated on the west, has been developed on an extensive scale during the year.

A lower tunnel from the mill level has been run to tap the vein, and at the time of my visit to the property was in close proximity to where the vein should be encountered, but I have not learned whether the vein was cut or not. The mine has been opened by several tunnels connected by raises and considerable ore has been blocked out. The mine is in exceptionally fine shape, being clean, well timbered and finely ventilated. A surface aerial tramway of 800 feet in length connects the upper workings with the mill.

The property is equipped with one of the most modern

gold mills to be found in the country, being operated by electricity, with separate motor for each department, the current for which is derived from the Swan Falls power plant, owned by the Trade Dollar Consolidated Mining Company. The process consists essentially of the ore being crushed by four 13,500-pound Nissen stamps, passed over Callow screens, being settled in six Callow tanks, from which the thickened pulp is concentrated upon one Wilfley and three Johnson concentrating tables, from which the concentrated product is ground in six 6-foot amalgamation pans and then passed to three 8-foot settlers.

The mill is shut down at the present time owing to the scarcity of ore of milling grade in the upper works, but it is hoped that by the development through the lower tunnel the property will be placed upon a paying basis.

*Rich Gulch Mining Company*—The Rich Gulch Mining Company, owning a group of claims on the west side of Florida Mountain about one mile west of the Banner property, has developed extensively an area of the regional rhyolite, claimed to carry good values in free milling gold.

No well defined fissure vein is exposed in the workings, but there appears to be considerable silicification along fracture planes in the rhyolite, which is supposed to carry very high values. In addition to this, the rock for a hundred feet in width is claimed to be mineralized, with no definite limits terminating the mineralized area.

The company is, at the present time, driving a lower tunnel, which will be about 4,000 feet in length when a point is reached vertically under the showing in the upper works. An electric compressor has been installed for use in driving this tunnel, the power for which is furnished from the Trade Dollar Consolidated Mining Company.

*Silver City Mining and Milling Company*.—The Silver City Mining Company, operating a group of claims on the other side of the Trade Dollar property, immediately on the edge of Silver City, have installed an electric operated



compressor, driven by a 30 h. p. Westinghouse motor, the current for which is derived from the power line of the Trade Dollar Consolidated Mining Company, a branch of which passes across the property immediately below the tunnel.

There are three veins exposed upon this property, which have been developed by surface cuts, shafts and shallow tunnels, which have exposed well defined fissure veins of fair value, in the typical Florida Mountain rhyolite.

The lower tunnel, which is being driven at the present time, will cut the farthest vein at a depth of approximately 1,000 feet, and will require in the neighborhood of 2,300 feet of cross-cutting. All the other veins will be encountered at lesser distances. The tunnel is being started in the basalt, in close proximity to the underlying granite, which constitutes the core of the mountain, so that, after passing through the basalt for a short distance the granite will be encountered, but, as has been proven in the neighboring property—the Trade Dollar—the veins of this district pass persistently through the successive formations, and there will be a great area of virgin ground opened above this tunnel.

The property offers great possibilities, as the veins are parallel to and belong to the same system of fissuring as is developed in the Trade Dollar, Banner and adjacent properties. Piston and hammer drills are being employed in driving the tunnel, and rapid progress is reported. The property is under the management of Mr. J. F. Cook of Boise.

*Potosi Mine.*—The Potosi mine, located within the limits of Silver City, is well equipped with electric hoist and a small modern mill and has developed a small quartz vein in the regional granite by extensive shaft workings. The property produced extensively from surface workings in the early days, but the ore was of somewhat refractory grade and lay idle for a long time, but it was taken up a

few years ago and developed progressively; however, it was closed down at the time of my visit owing to financial difficulties, but it is hoped these troubles will be properly adjusted and that the property will be given a thorough trial before it is completely abandoned, as the showing justifies considerable development.

#### CASTLE CREEK DISTRICT.

Castle Creek district has some very interesting showings upon which considerable prospecting work has been done during the season and some little production made from free milling gold veins. The district also contains some attractive properties, bearing copper, lead and silver ores, associated with good gold values, and is worthy of thorough investigation.

#### WAR EAGLE MOUNTAIN DISTRICT.

War Eagle Mountain, lying east of Silver City, has been a famous producer in the past, having a record of about \$25,000,000, which was derived from small gold veins in granite.

Among the properties which have been producers in the past are the Cumberland, Lucky Friday, California, Eddie, Dernier Resort, Golden Chariot, Never Sweat, Orofino, Ida Elmore, Mahogany, War Eagle, Illinois Central, Poorman and Imperial. None of these properties, however, are being worked at the present time. The rich values which these veins had near the surface diminished with depth and the veins became so small that they could not be profitably operated, and at the present time very little activity is displayed in this district.

*Village Blacksmith Group.*—Some work is being done on the Village Blacksmith group, under the direction of Mr. B. S. Curtis. This property consists of six claims. The vein occurs in the regional granite, and carries high grade gold values in a decomposed granite and quartz-filled vein,

accompanied by a little copper carbonate stain. About 550 feet of tunnel and several small surface openings constitute the development on this property.

*Pauper Group*.—The Pauper group, owned by R. H. Leonard, Jr., of Silver City, is equipped with a small stamp mill driven by gasolene engine. The property carries a vein consisting of quartz and decomposed granite in granite formation. The property lies south of the old Poorman mine and carries about 1,000 feet of development work.

#### FLINT DISTRICT.

This district contains several likely looking prospects carrying good values in dry silver ore, and with proper transportation facilities or satisfactory metallurgical process should figure conspicuously in the production of the white metal.

*Iva Grace Mine*.—On Twilight Gulch, in this district, the property known as the Iva Grace is being developed on a small scale by Mr. Marcus White, the owner. The property is equipped with a small mill, consisting of 5 stamps, with one Gilpin County concentrator, two Frue vanners and two canvas tables. Some very high grade ore has been shipped from this property in the past few years, totaling about \$12,000, and there is at the present time considerable ore sacked, ready for shipment. The vein, which is from 4 to 5 feet in width, occurring in granite, is opened by surface cuts and a shaft 75 feet in depth. A lower tunnel is being driven from the mill level to tap this vein, which has not as yet been reached.

*Lewis Property*.—Adjoining this property to the west, Mr. Robert M. Lewis has recently discovered a vein similar to that of the Iva Grace and substantially parallel to it. The only work on the vein at the time of my visit was a 10-foot open cut sunk upon the vein, but good gray copper values were exposed in the quartz.

*Perseverance Property.*—The property of the Perseverance Mining Company, lying south of these properties, near the old town of Flint, has been idle for a number of years, but is being unwatered by the manager, Mr. F. F. Bonnell, who contemplates active development of the property at depth.

This property was worked in the early 70's by the Fair, Flood and Mackay interests of California, at which time an elaborate mill was constructed and extensive mine buildings erected, but the venture proved a failure owing to the long freight haul and improper metallurgical process. All supplies at that time were freighted in from Winnemucca, Nevada.

The mine, which is supposed to be 400 feet in depth, is claimed to carry ore of similar character and value as that of the Iva Grace, accompanied by considerable value in ruby silver.

#### SOUTH MOUNTAIN DISTRICT.

The South Mountain district was very actively developed in the early 70's, at which time silver-lead bullion to the amount of about \$350,000 was produced by a smelter located on the ground.

*South Mountain Mine.*—The South Mountain mine, which carries the greatest amount of development work of any of these properties, owned by George A. Sonneman of Spokane, was under option to the Bagdad-Chase Gold Mining Company prior to the financial depression of 1907, and at that time in the neighborhood of \$20,000 was expended upon the property in development work. The panic, however, caused them to cease operations and throw up the bond, since which time the property has remained idle, with the exception of annual assessment work.

The property carries an immense reef of limestone, included between schist and granite. This reef carries an immense iron gossan along its east and west axis, containing copper carbonate and chalcopryite mineralization as-

sociated with actinolite. Intersecting this east and west zone, north and south fissures, carrying galena, are exposed. From one of these fissures much of the ore was derived which constituted the production of this district in the early days.

The property is developed by a long tunnel with numerous cross-cuts and drifts, but which has not as yet reached a point under the best showing on the surface, where a shaft exposes massive chalcopyrite carrying considerable coarse crystalline zinc blende, with good gold and silver values.

*American Standard.*—Adjoining this property to the east, the American Standard Company, owning a large group of claims, has developed its property with a small force during the year by driving a lower tunnel under an attractive surface showing, which is without doubt the continuation of the South Mountain mineralized lime reef. A shaft has been sunk upon this showing, 45 feet in depth, exposing good values in lead carbonate and chloride, with some copper stain.

Still east of this group, Robert Walker and Frank Wise of Silver City have been developing a vein, which carries a strong gossan, and from its position and characteristics is probably the continuation of the same mineralization exposed on the adjoining properties, but the continuity has not been established throughout the intervening distance. The mineralization on this property appears to be narrower but of more defined limits than on the South Mountain Company's property.

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## SHOSHONE COUNTY.

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Shoshone County, the banner mining county of the State, with a gross production to date of approximately \$190,000,000, has enjoyed a very productive season, when

it is taken into consideration that two of the larger properties were shut down for a short time in the early part of the year, and one of the principal mines was operated at a very great handicap, owing to the loss of its mill by fire during the summer; however, the 1909 production exceeded that of 1908 by \$367,027.55, and gave a total of \$13,723,105.70.

#### COEUR D'ALENE DISTRICT.

The Coeur d'Alene district, from which nearly all of the great production of the county has been derived, is bounded on the south by the St. Joe River, on the north by the North Fork of the Coeur d'Alene River, and on the east by the Montana State line, but the productive area is confined at the present time to a very much smaller section.

The development work on the prospects and smaller properties of this district has not been carried on commensurate with the production of the district since the panic of 1907, at which time practically all of the prospects were closed down, owing to the withdrawal of the necessary financial backing. This condition has gradually improved, but the district at the present time justifies very much more systematic prospecting than is being carried on; however, several properties have developed new ore deposits and a few have been added to the producing list.

This district, at the present time, produces one-third of the lead output of the United States, and associated with the lead are silver values, which puts the Coeur d'Alene district in a position where lead can be mined on an extensive scale at low prices which prohibit the operation of mines in many other great lead districts.

The geology of this district is extremely monotonous, as the varieties of rock are confined to two general classes, namely: pre-Cambrian sediments and pre-Cambrian igneous rocks intruded into the sediments.

These sediments have been determined to an aggregate thickness of 17,000 feet and are classified into six groups

by the United States Geological Survey, being named after local geographical points where the best exposures occur. A professional paper upon this district has recently been published by the Survey under the appellation, "The Geology and Ore Deposits of the Coeur d'Alene District of Idaho," by Frederick Leslie Ransome and Frank Cathcart Calkins, designated as Professional Paper 62, which can be obtained from the United State Geological Survey, Washington, D. C.

The rocks of the Coeur d'Alene region have been subjected to great stresses, which is evidenced by much folding and faulting, generally in a northwest and southeast direction, which is also the general course of the ore bearing fissures of the district. Some of these faults are of great magnitude, one which probably has the greatest throw and which has been designated by the Survey as the Osborne fault, named after a village which lies in its course, is a normal fault, with downward throw to the south, has been distinctly traced for a distance of 18 miles northwesterly from Mullan, with reconnaissance observations, indicating that it extends fully 10 miles farther, and in places shows a displacement of approximately 6,000 feet.

Very little mineral has been developed along the entire course of this fault, but recently the Alice mine, near Mullan, has opened some ore bodies of fair grade in close proximity to this gigantic fault.

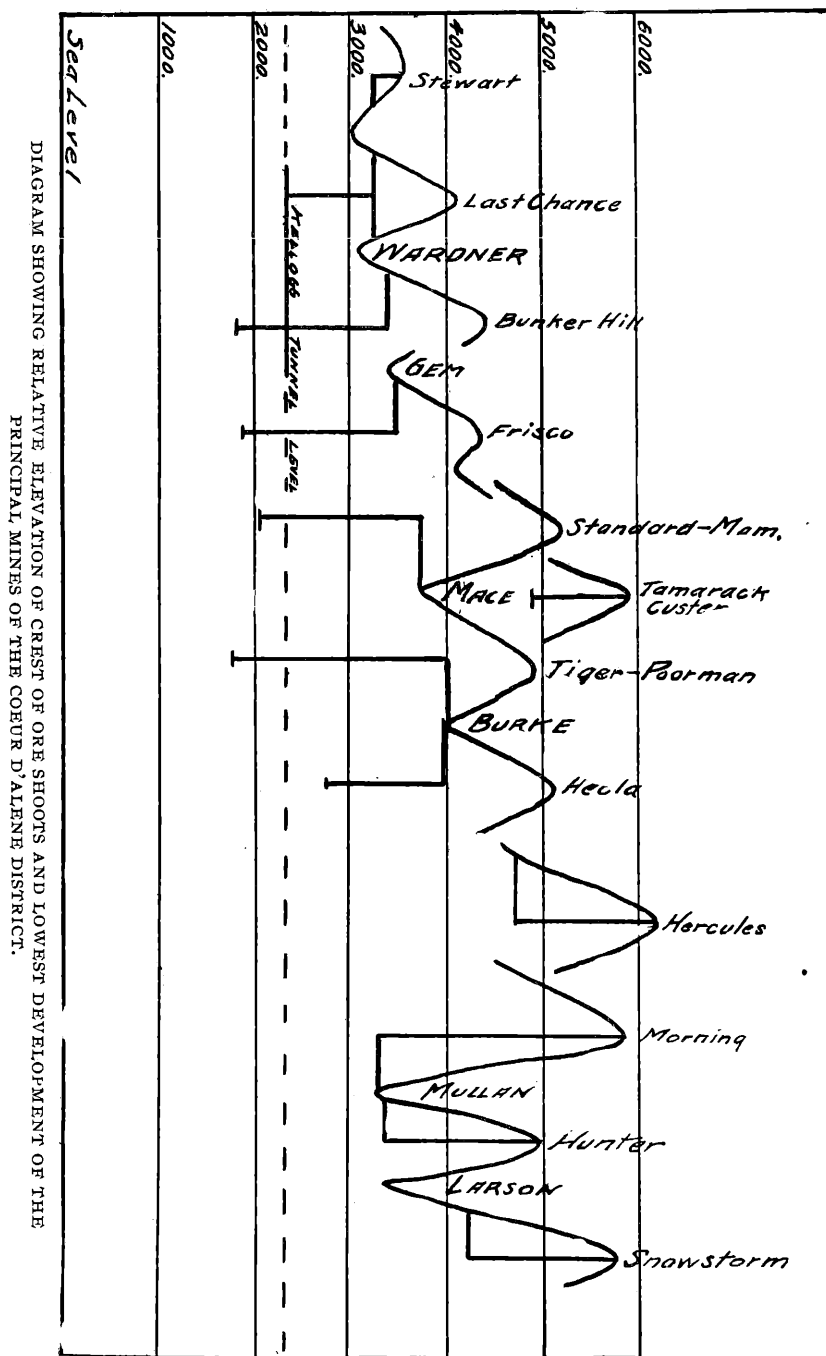
The lead-silver ores of the Cour d'Alenes occur generally in metasomatic fissure veins, mostly in tabular deposits, formed partly by the filling of the open spaces of the fissure and also largely by replacing the regional sericitic quartzite and associated minerals, which have been crushed, sheered and altered by the fissuring.

The veins, generally speaking, have no definite limits, and are rather fissure zones than true fissure veins. This is more particularly true of the Wardner deposits, in which ore bodies occur in a shattered hanging wall country, as far

as several hundred feet from a defined flat dipping foot-wall fissure, which is very persistent and which has been developed for a length of over two miles. This deposit, however, is distinctly different from the fissures of the Mullan, Burke and Murray districts, which are confined to comparatively narrow, steeply inclined fissure areas, with distinct movement planes accompanying the ore and with the sheering of the formation extending beyond the limits of mineralization.

The accompanying diagram shows the relative elevation of the crests of the ore shoots and the lowest development in the several producing mines of the district. The Frisco mine at Gem reached an area of impoverishment of values and has been abandoned. The Tiger-Poorman, which has the lowest development in the district, has also been worked out and abandoned. These are the only deep developments which have passed through the mineralization. The Bunker Hill and Standard lower workings are in close proximity to the same horizon as is developed in the bottom of the Tiger and Frisco, but owing to the relative position of the strata of the formation to the ore bearing fissures these properties are not likely to reach the lower underlying Pritchard slate formation, which has been unproductive in this district and which was encountered in the lower workings of both the Tiger-Poorman and Frisco mines, for some time to come. This is particularly true at Wardner, where the vein more nearly conforms to the bedding planes of the formation, and also as the ore bodies occur in the Revett formation, which is the third oldest in the sedimentary series of this district, most of the Canyon Creek mines occur in the Burke formation, which overlies the Pritchard slate. Several of the Mullan mines and the Wardner mines occur in the Revett, but the Morning mine at Mullan occurs in the St. Regis formation, which is the next higher in the series. No productive mines have been developed in the more recent sediments of this region.





The district is unusually well supplied with water power facilities, but the demand for power has been so great that this source was inadequate and electricity has been brought in from Spokane Falls, over 100 miles. This current is transmitted to several sub-stations, located in various parts of the district, at a tension of 60,000 voltage. The line is built in duplicate and is of very heavy construction.

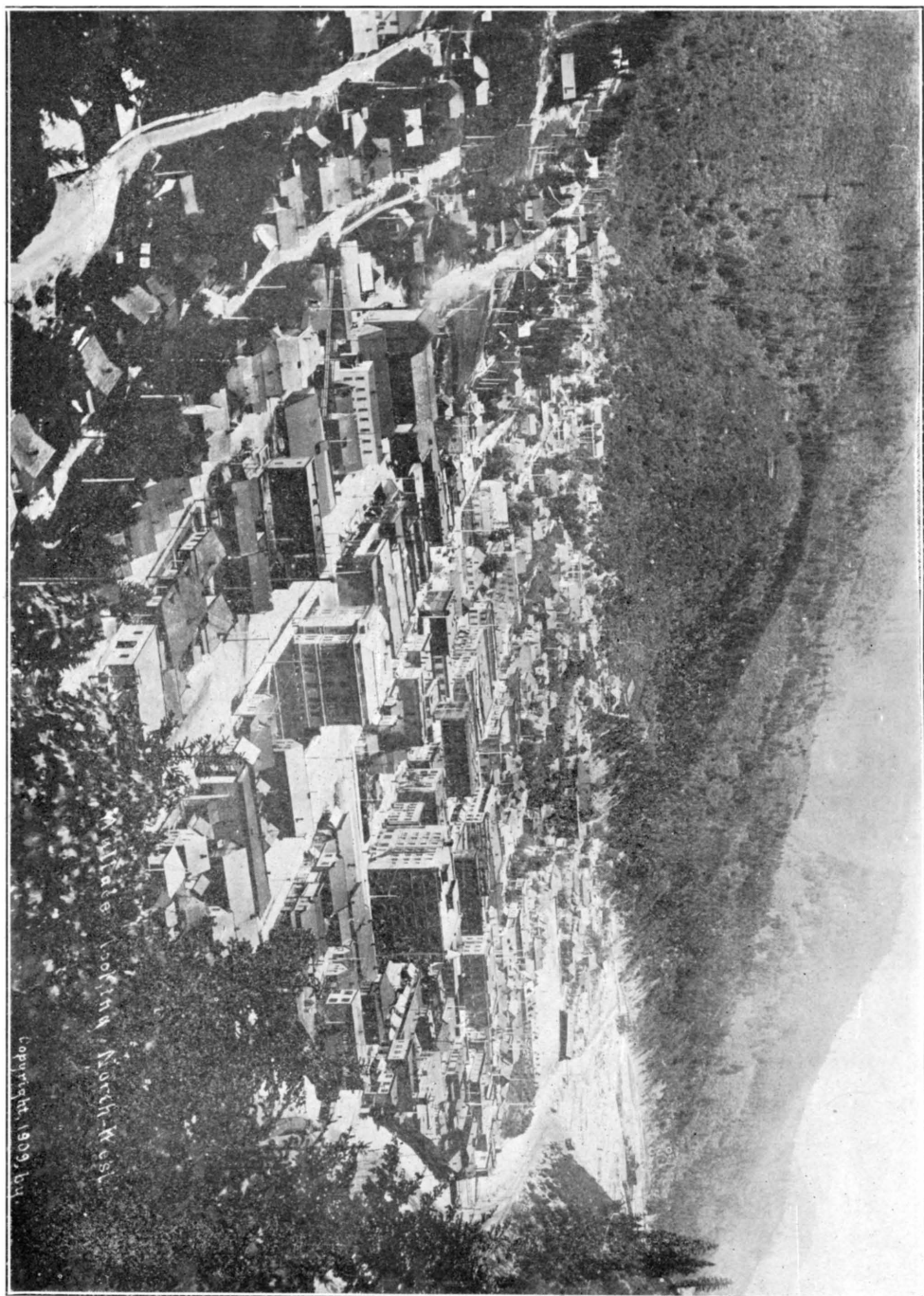
A number of prosperous mining towns are supported by the mining industry of this district, the largest of which is Wallace, the metropolis of the Coeur d'Alene district and the county seat of Shoshone county. Wallace, located at the junction of Canyon, Nine Mile and Placer Creeks with the South Fork of the Coeur d'Alene River, is beautifully situated in a flat bottom, surrounded by high pine clad mountains, is a strictly modern city, with paved streets, concrete sidewalks, a 5-story brick hotel, a \$75,000 reinforced concrete courthouse, many very modern business buildings, and boasts a population of between 4,000 and 5,000 people.

#### WARDNER DISTRICT.

*Bunker Hill and Sullivan Mine.*—The property of the Bunker Hill and Sullivan Mining and Concentrating Company, with the upper works located a short distance above the town of Wardner and the lower tunnel started at a point some distance below the town of Kellogg, owns the first producer in this district.

This property—the Bunker Hill claim—was located in 1885, and with other claims in the consolidated group has maintained a production throughout the intervening years and has a record of total production to date of between \$40,000,000 and \$50,000,000, \$11,241,000 of which it has paid in dividends to its stockholders since the organization of the present company.

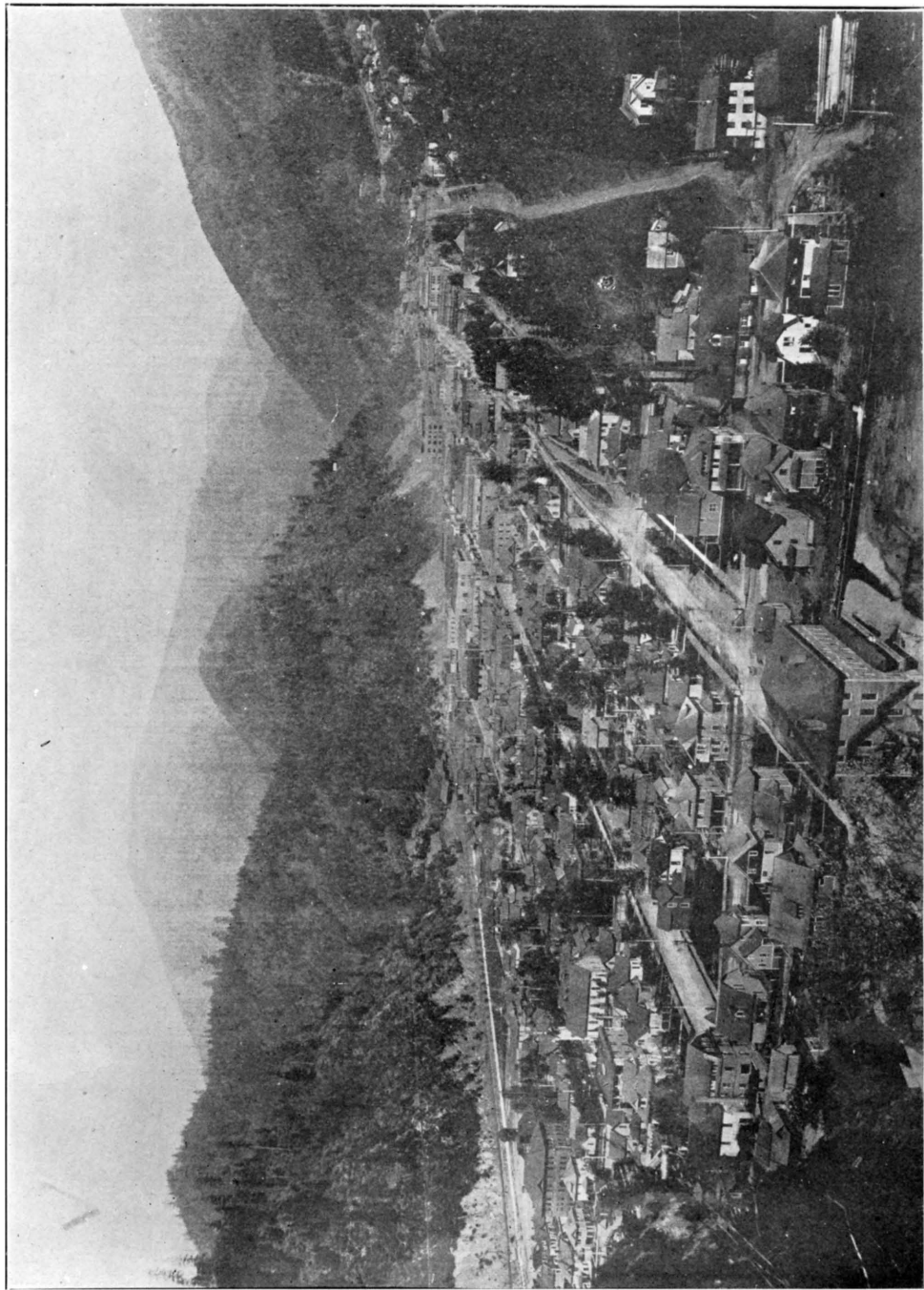
This property has been operated through extensive tunnel workings on both sides of Milo Creek, above Wardner,



Malaise looking North-West.

Copyright, 1909, B. J.

**Property of the  
STATE OF IDAHO  
State Mine Inspector**



until the last few years, when the lower long cross-cut known as the Kellogg tunnel, which is about 10,000 feet to the vein and with its drifts has a total length to date of approximately three miles, was connected with the upper workings. All of the ore from the mine is handled by electric motors through this tunnel, which is on a level with the top of the mill. Prior to the completion of this tunnel the ore was transmitted over an aerial tramway from the upper workings of the mine, a distance of about two and a half miles.

While large ore reserves still exist above this tunnel level, mining operations are being carried on 600 feet below in shaft workings. The vein, which has a dip of approximately 45 degrees, is developed by the lowest level in the neighborhood of 3,000 feet upon the dip of the vein beneath the crest of the first ore body mined, and shows no diminution in the quantity of ore or in the values of lead or silver since the oxidized area of secondary enrichment has been passed.

The annual output of the mine is about 340,000 tons, from which about 71,000 tons of concentrates and first class ore are shipped, which will average 46 per cent lead and 17 ounces in silver to the ton. The ratio of concentration is about 5 to 1, with a milling cost of 38 cents and a total operating cost of \$2.20. The total production for the year was 65,000,000 pounds of lead and 1,200,000 ounces of silver.

This property is involved in extensive litigation with its neighbor, owned by the Federal Mining and Smelting Company. Both sides of the case are putting forth every effort to advance theories which will be to their advantage, and a great array of eminent geologists and engineers have been studying the properties in minute detail. The large sums of money which are being expended in the cases would, from a casual examination of the subject, give one the impression that it was largely being wasted, but the mine is

having the benefit of the observation of these authorities, and by their study they have brought out facts of ore genesis and location of great importance which will undoubtedly lead to the development of ore bodes which might otherwise have remained undeveloped.

The new concentrator recently constructed by the company will take the place of the old mill while it is being remodeled, after which time their combined capacity will aggregate between 1,500 and 2,000 tons per day. This new mill has achieved the greatest advancement in modern concentration practice in this district and is deserving of description at considerable length.

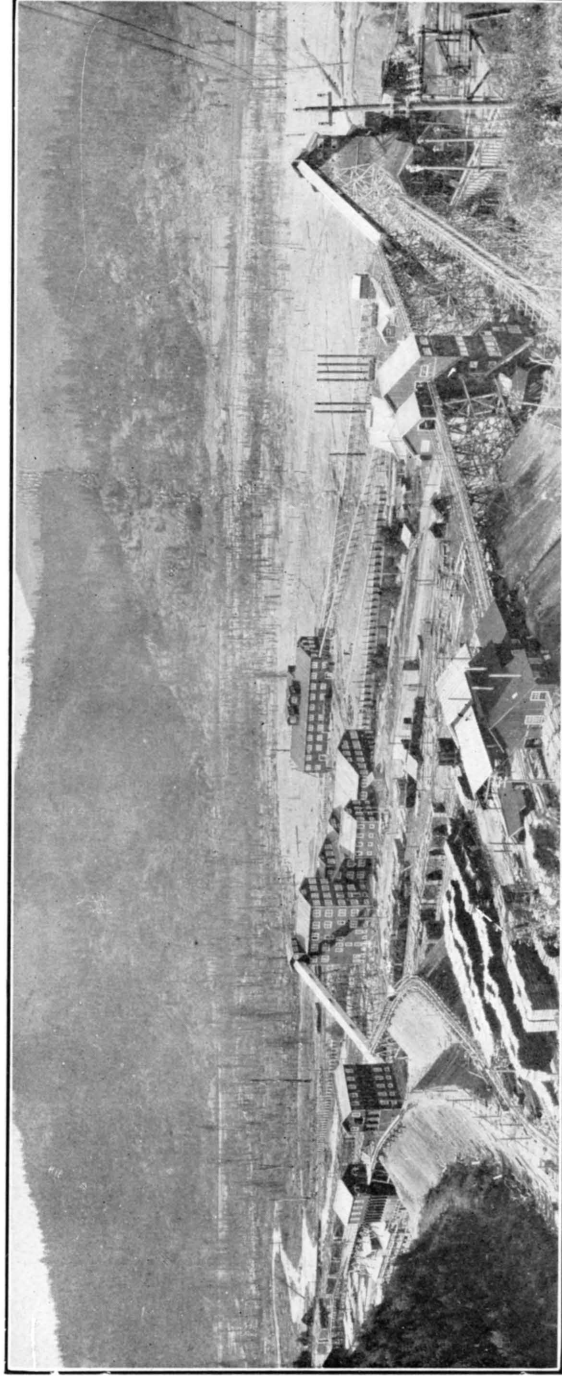
This mill, which has just been completed and put in operation, comprises one unit of 500 to 700 tons daily capacity, with crushing and storage capacity for an additional unit. This plant has many advantages over the old concentrators in the way of construction efficiency equipment. The crushing department and bins are located in buildings entirely separated from the main structure, thus allowing of better foundations at minimum cost, and also leaving space available between the two buildings for railway side tracks, where the coarse jig concentrates are loaded directly into the cars instead of being handled through the entire length of the mill as is done in usual practice.

The crushing department contains a bin of 1,500 tons capacity, the top of which is on a level with the main haulage way from the mine. The ore is brought to the bin in trains of from 12 to 16 bottom-dump cars carrying 4 tons each. From the mine-bin the ore is passed over a grizzly with  $1\frac{1}{4}$  inch openings into a gyratory crusher. The under size from the grizzly and the product from the crusher are passed by a belt conveyor to a 30 mm. trommel, the over size from which goes to 14x36 inch rolls. The product from this set of rolls passes to another 30 mm. trommel, the over size from which goes back to the rolls, the under

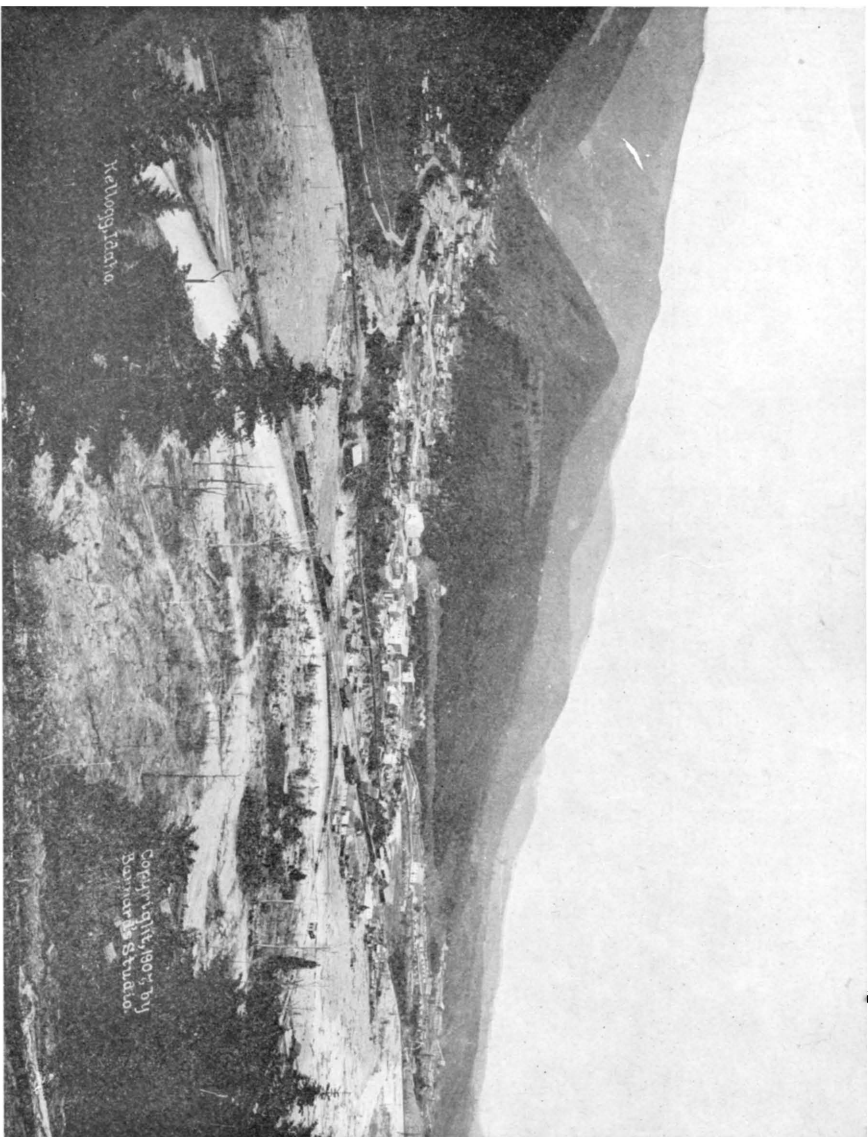
New Mill

Tailings Plant

Old Mill



MILLING PLANT OF THE BUNKER HILL AND SULLIVAN MINING AND CONCENTRATING COMPANY, KELLOGG, SHOSHONE COUNTY.



KELOGG, SHOSHONE COUNTY, SHOWING WARDNER (IN THE GULCH AT THE LEFT) AND THE  
B. H. AND S. MILLS AT THE EXTREME RIGHT.



size of the first and second trommel passing onto a belt conveyor, thence through a Brunton automatic sampler onto another belt conveyor, which discharges the product into the mill storage bin, also of 1,500 ton capacity. This latter conveyor belt is fitted with a Jeffery automatic tripping device, which permits of filling the bin to its utmost capacity.

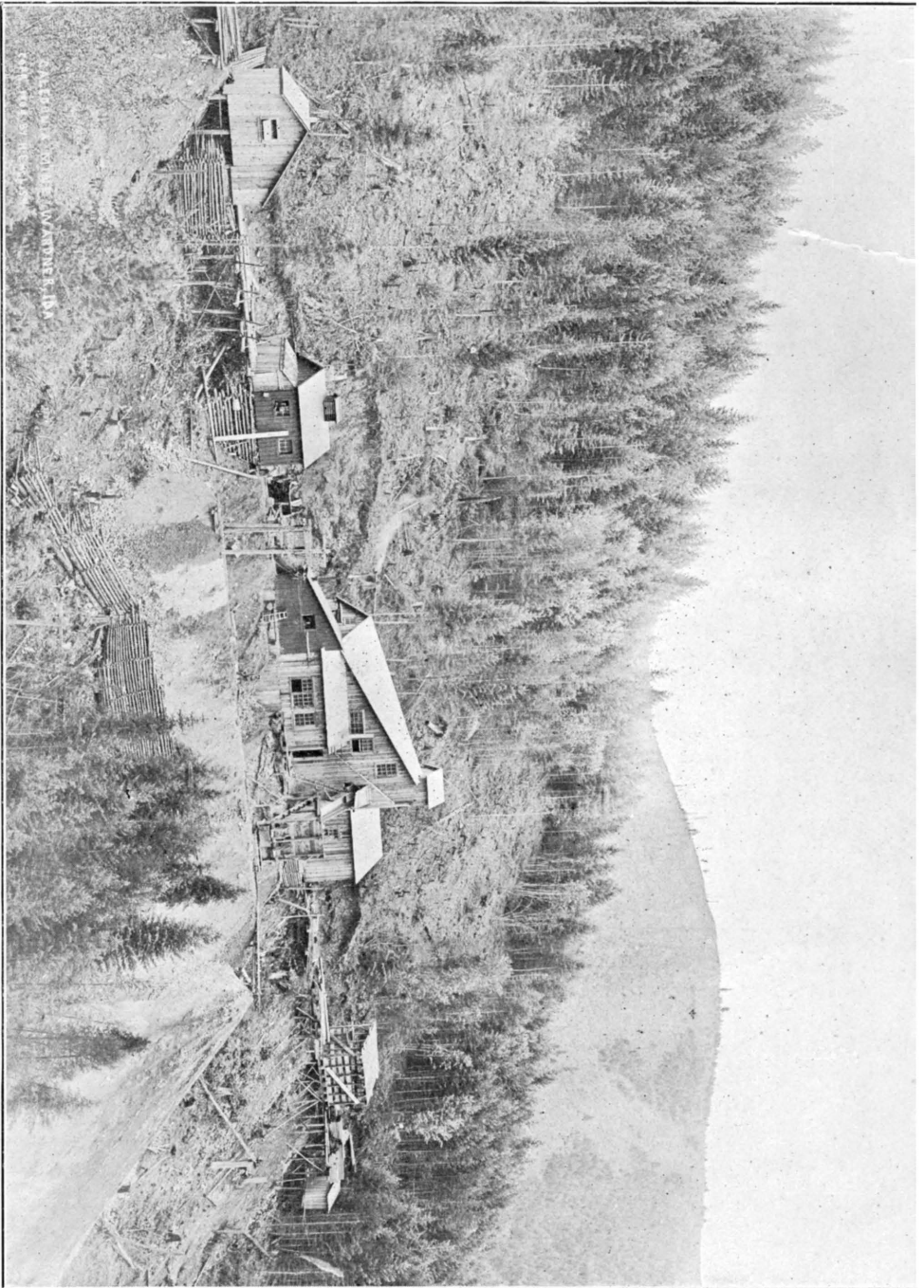
From this mill-storage bin the ore is transmitted to the top of the mill by an inclined belt conveyor, which is in constant operation during the running of the mill. Five belt-driven electrically-controlled Challenge ore feeders supply the ore to this conveyor, the control for which is located in the main mill, thus permitting of perfect adaptation to the mill needs. At the head of the mill the ore is passed directly through a 10 mm. trommel, the over size going to the coarse jigs, the concentrates from which are dropped directly into bins adjacent to the loading track. The middlings are passed through 14x36 inch rolls, the product from which is handled in classifier jigs. The concentrates from these jigs are also dropped to the lower floor. The under size from the 10 mm. trommel at the head of the mill goes to the classifier jigs, working on this product alone. This jig makes four products, concentrates through the cups and hutch, middlings, tailings and slimes. The latter pass directly to the slime department where they are settled, then worked on Frue vanners.

The concentrates through the cups and hutch pass through pipe classifiers before going to the card concentrators. This pipe classifier is an ingenious arrangement gotten up on the ground, and consists of a combination of pipe fittings, whereby a very clean product is taken out of the sands before they pass onto the tables, thus increasing the capacity and efficiency of the tables. The middlings from the classifier jigs are passed through 14x36 inch rolls. This product with the middlings from the first mentioned classifier jigs are passed through 3 mm. trommells, the

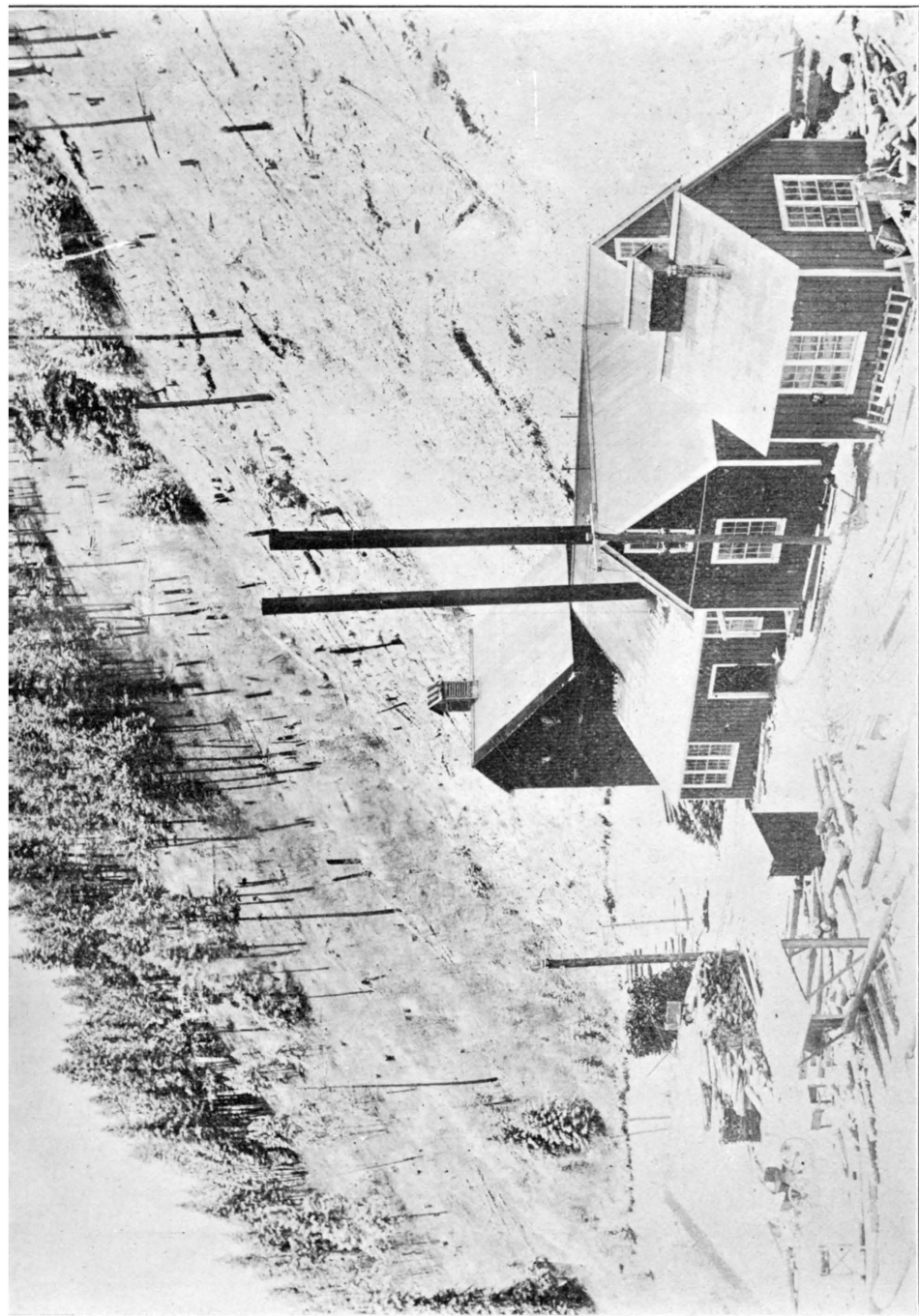
over size going to 6-foot Huntington mills, the under size passing through the Bunker Hill conical screen, 22 mesh, which is also a local production, the over size from which is recrushed in the Huntington mill. This product with the slimes from the classifier jigs is passed through conical hydraulic classifiers, the overflow passing to settling boxes, from which the overflow goes to waste, and the thickened pulp passes to the vanners. The product from the first spigot of the hydraulic classifiers passes to slough off tanks, the overflow from this also going to the settling boxes, the thickened product to pocket launders, and thence to the card concentrators. This latter machine makes four products—concentrates, middlings, slimes and tailings. The middlings are elevated by centrifugal pumps and treated on card tables separately, and the slimes are pumped back to the settling boxes. Mr. G. C. Caetani is the designer of this plant and deserves great credit for its efficiency.

*Federal Mining Company.*—The Wardner property of the Federal Mining and Smelting Company, which is operating several mines in this district, lying adjacent to the Bunker Hill property, is developed to the depth of the Kellogg tunnel of that property and is connected with it. This property, which has been a great producer, has operated for nearly as great a length of time as its neighbor.

The bulk of the ore is extracted from a winze below the main haulage tunnel level, which is about 700 feet higher than the Kellogg level of the Bunker Hill. In addition to the large ore bodies developed in these lower shaft workings, recent exploration carried on in the upper ore zones in the Last Chance claim from works which have been abandoned for many years, large deposits of fair grade milling ore have been developed to such an extent that it will require at least two years' time for the extraction. The ore from this property, while perhaps averaging a little lower grade, is substantially the same as that from the



CALEDONIA MINE NEAR WARDNER, ONE OF SHOSHONE COUNTY'S NEW BONANZAS.



SHAFT HOUSE AND COMPRESSOR BUILDING, PAGE MINING CO., FOUR MILES WEST OF WARDNER.

Bunker Hill, the ore bodies being very similar and being a part of the great vein system which has been developed for two miles in length in these two properties.

The ore is transmitted to the mill, located at the mouth of Government Gulch, by railroad train at a cost of 12 cents per ton. The mill has a capacity of 550 tons per day and employs the general concentration methods used throughout the district. The plant is electrically operated, the power for which is supplied by the Washington Water Power Company of Spokane.

*Caledonia Mining Company.*—The Caledonia Mining Company, operating a group of claims located north of the main Wardner fissure but adjoining the properties owned by the Federal and Bunker Hill Companies, during the past year has developed a very flattering ore showing to a depth of 500 feet by an incline shaft sunk in close proximity to a flat dipping northeast-southwest fissure which appears to be a continuation of the old Sierra Nevada vein and which produced phenomenally high grade lead-silver ores in the early days. The Caledonia ore, while very similar to the ores of the Wardner vein in the oxidized zone, carries a much higher ratio of silver to the lead contents.

The property is equipped with an electric hoist and station pump on the 500-foot level, but has no mill, all of the ore shipped thus far being hand sorted in the mine and on the surface. Considerable ore of milling grade has been accumulated and developed, which will justify milling operations in the future. Since last spring the property has produced \$100,000 worth of ore, which was mainly obtained from development work. The property is largely owned by Youngstown, Ohio, people, is locally represented by Mr. Charles McKinnis of Wallace and will undoubtedly be a large producer in the future.

*Stewart Mining Company.*—Farther to the northwest, in the general course of the Wardner zone and in close proximity to the Osborne fault, the Stewart Mining Com-

pany, controlled by Mr. F. August Heinze and associates, owns a group of claims on which considerable work has been expended and a very excellent exposure of ore made just prior to the panic; since which time the property has been inactive, but it is rumored that with the coming year the Stewart will again be operated and equipped on an extensive scale.

*Wyoming Mine.*—Northwest of the Stewart property, on the other side of Government Gulch, the Wyoming Mining Company, owning an extensive group of claims which is also in close proximity to the Osborne fault and apparently in the continuation of the Wardner ore zone, have been developing throughout the year with a fair force of men, but no attempt at production has been made. The property carries considerable ore of low grade value but is in an extremely soft formation, due to crushing.

*Page Mining Company.*—Continuing on to the northwest, the Page Mining Company has developed an extensive area of ground on Silver Creek. The property has been equipped with electric compressor and air hoist capable of sinking 1,000 feet. An incline shaft has been sunk in the foot wall country to the depth of 600 feet, and considerable development work done at the bottom of this shaft. The vein, as exposed in the lower level, carries considerable ore disseminated through the quartzite and is identical with some of the faces in the ore zone of the Wardner deposit, where the ore is not of a shipping grade but carries considerable mineral. The course of this vein is nearly east and west and lies parallel with the Osborne fault and at no very great distance from it.

#### CANYON CREEK DISTRICT.

Canyon Creek district, containing the towns of Gem, Black Bear, Mace and Burke, wherein are located the Hercules, Hecla, Standard-Mammoth and Frisco mines, all of which are or have been great producers, is the district in

which the first discovery of lead-silver ore in the Coeur d'Alenes was made, at the old Poorman mine. Tiger Peak, which lies northwest from Burke, contains on its east side the Hercules, on its southeast the Tiger, on its south the Standard-Mammoth, and on the northwest the old Custer and Tamarack mines.

*Hercules Mining Company.*—The Hercules mine, lying one and a half miles north of Burke, suffered the misfortune of loosing its fine concentrating plant in September, and since that time has confined its production to first class ore which has been sorted underground.

Just prior to the close of the year, however, arrangements were made with the Federal Company for the use of the old Tiger mill at Burke, which was remodeled and a haulage way arranged from the ore bins at the foot of the Hercules' tramway, which is fortunately located at the proper elevation, so that the ore can be carried from this bin into the top of the Tiger mill, the distance being only about a quarter of a mile.

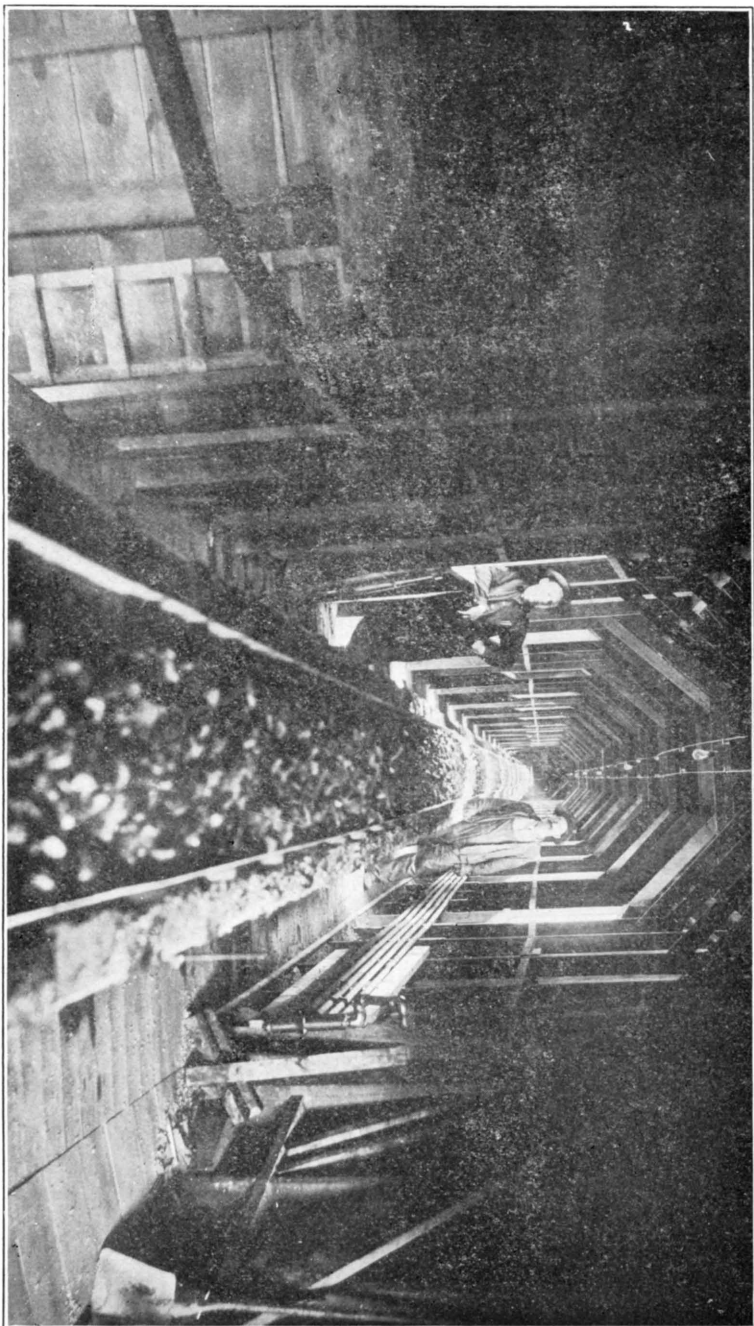
A modern sorting plant has been constructed on the site of the mill which was destroyed by fire near the mouth of the No. 4 tunnel, the present lowest working of the mine. The ore is trammed from this tunnel by means of electric motors and is dropped upon the grizzlies at the head of the sorting plant from side dumping cars. These grizzlies are placed at an angle of about 45 degrees and are constructed in two sections—the upper section having the bars placed about an inch apart and the lower section about three inches apart.

The material which passes through these grizzlies is collected in separate bins, the fine material passing directly to a belt conveyor, which carries the crushed ore to a bin at the head of the aerial tramway. The material which passes through the second grizzly is carried along a belt conveyor, with convenient chutes arranged for hand picking of waste and first class ore, which are connected

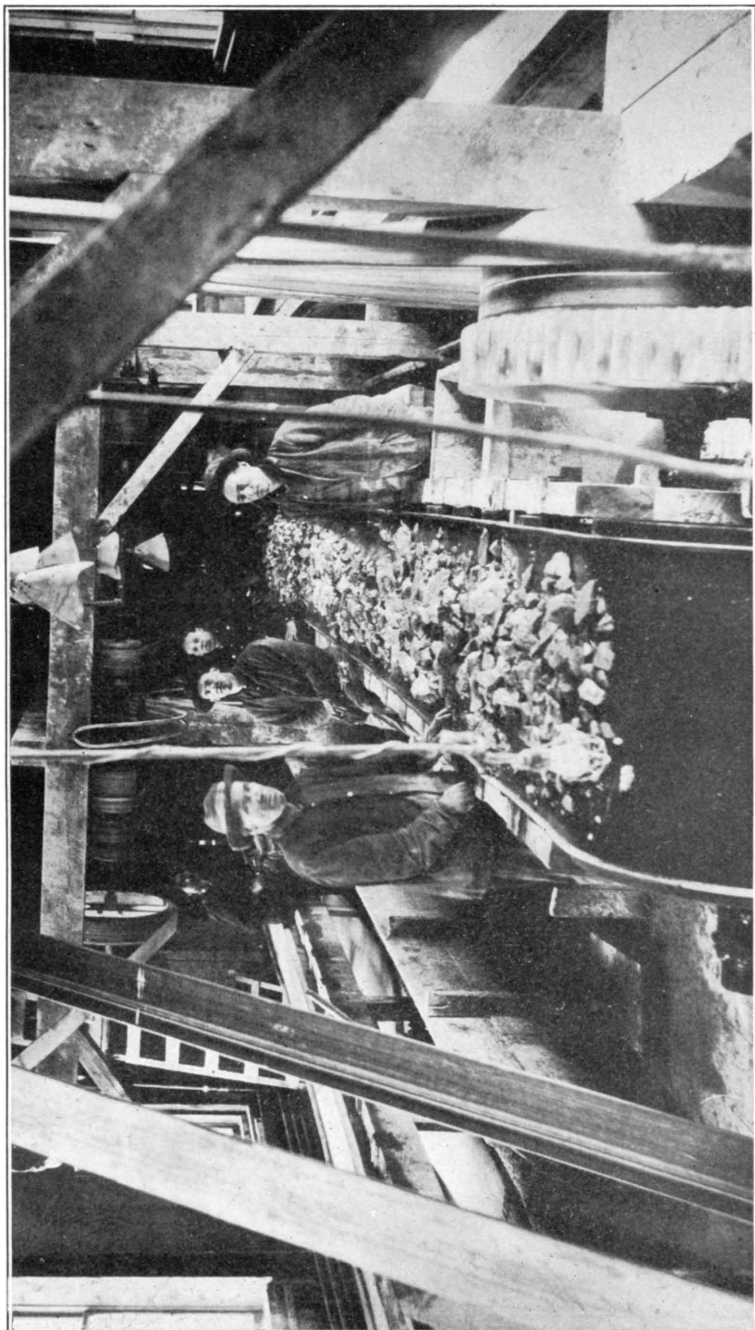
with bins, one being carried out on the dump and the other shipped. This material from the low grizzly which has been picked over passes through a rock breaker and on to a conveyor belt to the main bin. The larger pieces of waste and ore which fail to pass through the grizzly are stoped on a horizontal platform, which is hinged at one edge and arranged with a counterbalance and locking device, where a man picks out the large pieces of waste and first class ore, putting them in their respective chutes, and the residue which is left after sorting is dropped directly, by unlatching the hinged platform, into the bin, which contains the under size from the coarser grizzly, and then passes to the crusher as described. On the sorting platforms, of which there are about half a dozen, the ore is washed by a stream of water from a hose prior to the hand picking process, and is a very efficient arrangement, as a clean grade of first-class ore is sorted and all large pieces of undesirable waste are kept from the mill.

The Hecules mine, which contained one of the most phenomenally rich ore bodies in its upper works and which has made all of its owners independently wealthy, has been developed by four tunnels, the lowest one being about 1,700 feet under the crest of the ore shoot on the dip of the vein. The ore shoot in No. 1 tunnel was extremely short, but has increased in length as depth was gained. On No. 3 level, which is nearly 1,000 under the surface, the main ore shoot was 285 feet in length and in places 50 feet wide. There was also on this level a small shoot varying from 2 to 6 feet wide and 125 feet in length, but the ore did not extend very much above this level. Between this latter shoot and the main ore body was 300 feet of barren vein but on the No. 4 level, 700 feet below, the intervening barren area has been mineralized, and, as the ore shoot has very little rake on either end, the ore deposit at this lower level occupies the entire distance, making a shoot over 700 feet in length, and is of good grade milling ore with first





CONVEYOR BELT, SORTING PLANT OF THE HECLA MINING COMPANY, BURKE, SHOSHONE COUNTY.



SORTING BELT, IN THE SORTING PLANT OF THE HECLA MINE, BURKE, SHOSHONE COUNTY.

class ore associated with it throughout, and in places is fully 50 feet in width.

The country rock in which this ore deposit occurs is of extremely dark color, very much resembling the lower strata of the Burke quartzite or the upper strata of the Pritchard slate, with which it conforms in this district and is an unusual occurrence, as nearly all of the bonanza ore bodies of the Coeur d'Alenes have occurred in the light colored Burke quartzite.

This vein, which has been drifted upon for hundreds of feet outside of the ore shoot, shows a persistent fissuring of small dimensions, of extremely unattractive appearance, and, after seeing these wonderful ore bodies in close proximity with such an inferior vein showing, one is loath to condemn any of the well defined fissures exposed in numerous prospects in this district of wonderful ore deposits.

*Hecla Mining Company.*—The Hecla mine, which is developed through a shaft located in the heart of the town of Burke, has opened its vein and ore bodies to a depth of 900 feet and recently the shaft has been sunk to the 1,200-foot level and a drift begun to the ore deposits. The shaft, while being in close proximity to the vein, is a great distance from the ore bodies, which necessitates long drifts through barren vein on each level prior to the development of the ore, so that the levels are run 300 feet apart instead of 200 feet as is ordinarily done in this district.

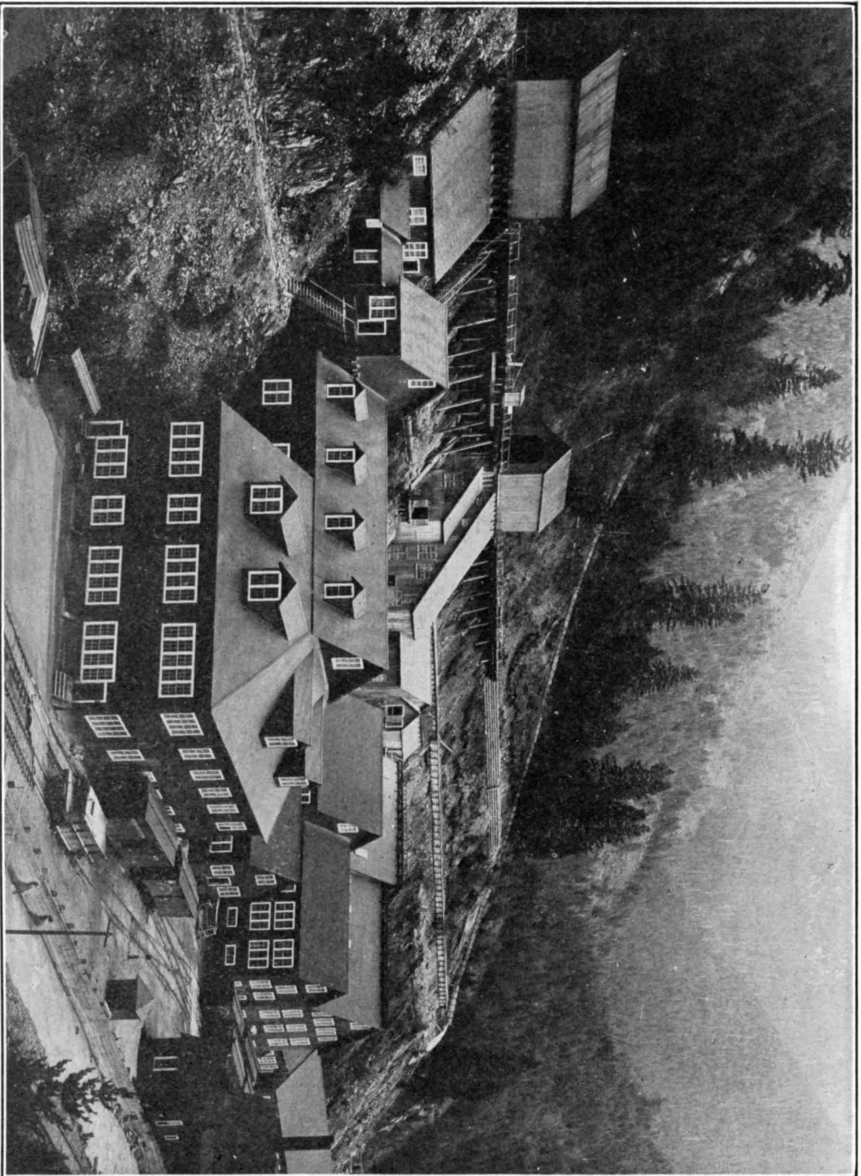
The ore shoot in this vein is always accompanied by a black basic dike rock resembling very much in occurrence the dike which accompanies the vein of the Trade Dollar mine at Silver City. The ore deposition is probably largely that of replacement of this dike rock, which is at times on one wall, then on the other, then in the midst of the ore, and again the ore lies between two streaks of dike rock.

This is the only vein in this district which carries such a dike with it at all times, but nearly all of the productive

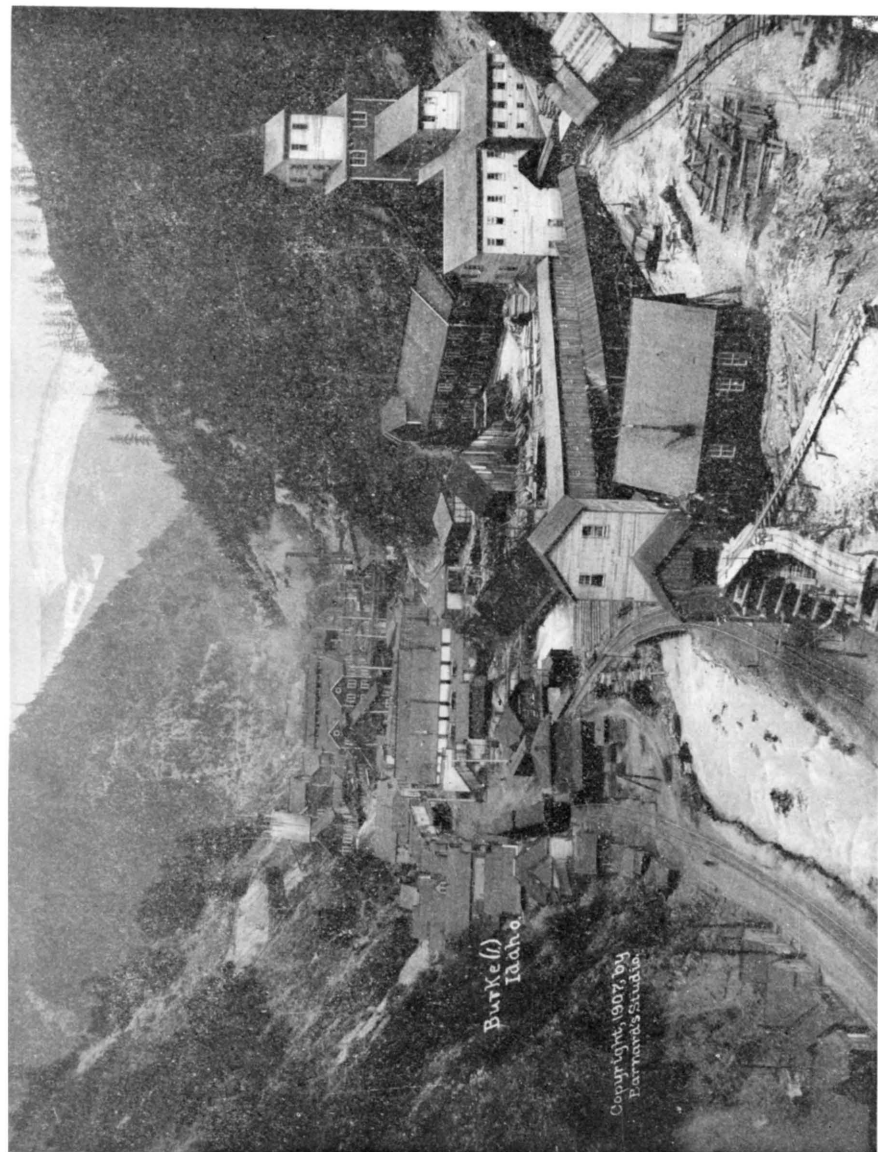
mines have somewhere in connection with the ore deposits, either cutting directly through the ore bodies or intersecting the vein at no very great distance from them. The Standard-Mammoth mine, at Mace, has developed two such intersecting diabase dikes. The Morning has an extensive development of this rock on the west end of its ore shoot, east of the Star deposit, which is on the same vein. At Wardner none of these dikes have been developed in the workings, but the geological survey has determined one a little farther to the east, approximately in the continuation of the Wardner ore zone, and evidences of such dikes are seen in various parts of the district. The Hercules and Tamarack mines have dikes of similar character, but of a lighter colored rock, which intersect the veins in the best ore shoots, and while in places these dikes pass directly through the ore without apparently affecting the richness of the ore deposits, they certainly bear a very important relation to the ore deposition.

The ore shoot on the 900-foot level is approximately 1,100 feet in length and has slightly elongated at each successive level as depth has been attained. Very little ore was encountered above the level of Canyon Creek. The ore on the 900-foot level is of good grade, 900 feet in length, and in places the deposit is 25 feet in width.

The property is equipped with the only electric first motion hoist in the district, which is quite an innovation in hoisting practice, is extremely sensitive to the operator's touch and can be handled as quickly and positively as any of the steam hoists. Flat cables are used upon two reels, with a center diameter of five feet, capable of holding 2,500 feet of rope. These reels can be operated independently or in counter-balance, and will handle a skip holding three tons of ore. This hoist is directly connected to a direct current motor, which is operated by a direct current generator, the armature shaft of which is directly connected to an immense fly wheel which in turn is at-



STANDARD-MAMMOTH MILLS, WALLACE, IDAHO. CAPACITY, 1,000 TONS PER DAY.



BURKE, IDAHO—SHOWING THE HECLA SHAFT HOUSE IN FOREGROUND TO RIGHT, AND TIGER-POORMAN PLANT IN BACKGROUND

tached to the armature shaft of an alternating current motor. The object of this fly wheel, which weighs 29,000 pounds, is to carry the peak load in starting and by an automatic device the speed of the alternating current induction motor is reduced at the time of the peak load, so that the fly wheel has a chance to impart its energy to the direct current generator, and, as soon as the cage is started, the speed is automatically increased on the motor. As this motor runs continuously during hoisting operations considerable loss is necessitated by keeping the fly wheel running at high speed, and for that reason is not very economical unless the hoist is quite continuously used; but where the hoisting requirements are sufficient to nearly approach the maximum capacity of the hoist; this arrangement will be extremely efficient as electric energy in this district is very much cheaper than steam power.

Each level in the mine is supplied with ore pockets, under the level, into which the ore from the tram cars are dumped and from which the ore is dumped into the skip, by the use of gates operated by compressed air, which allows of very rapid handling of ore. The skips are automatically dumped in the gallows frame upon a grizzly, the fine material going directly to the mill and the coarse rock and ore is hand sorted on a platform at the foot of the grizzly, similar to the arrangement described in connection with the Hercules sorting plant. After the waste and first class ore has been picked out, the platform is dumped, the material passing to the sorting plant, where it is washed and sorted in passing over the sorting belt; thence it passes through a crusher onto a conveyor belt which drops it into the mine bin, where the railroad cars are loaded which carry the ore to the mill, located at Gem, some four miles distant.

In sinking the shaft at this property from the 900 to 1,200-foot level, an ingenious arrangement for "spitting" the fuses used in the blasting was successfully employed.

This arrangement was found to very materially aid the progress of sinking, as no missed holes were had, which always necessitates great delay and also submits the miner to great risk in extracting the powder from the holes, which is always under the most trying conditions, as the shafts in this section are extremely wet and the country rock is highly silicious and very apt to cause premature explosion in the extraction of powder.

This arrangement consists, essentially, of cutting the fuses in lengths twice as great as is required, but using only half the number of pieces, and passing a small iron wire through the center point of each fuse. This is accomplished by forcing an awl through the center of each fuse, all of which are then strung on a short, fine iron wire, to which insulated copper wires are connected, the whole wrapped with electric tape for a distance of about one and a half to two feet on each side of the center of the fuses and then the taped portion is smeared over with tar. The caps are also water proofed after being placed upon the fuses, so that the whole arrangement can be submerged in water without dampening the fuse in the least.

These fuses are placed in the different holes, according to their lengths, so as to cause the blasts to be fired in their proper order. When all is in readiness, the shaft miners are hoisted to the station level above, and by closing a switch, which is contained in a locked box, to which only the shift men have access, the fine iron wire is fused off by an ordinary electric light current, lighting the powder contained in each of the fuses, and in this way insuring a perfect "spitting." Shortly after the fuses have been "spitted," the electric wires can be pulled from the shaft ready for use when the next round is to be fired.

*Mace Mine.*—The Mace mine, owned by the Federal Mining and Smelting Company, which is a consolidation of the old Standard and Mammoth mines of Mace, is developed by a three-compartment vertical winze sunk from



the Campbell level, which is a cross-cut tunnel 3,000 feet in length, driven from Canyon Creek.

This winze, which is the main working shaft of the mine, has levels opened up to 1,650 feet below its collar. This lowest level at the present time has not reached the limit of the ore on either end, but develops the vein over 3,000 feet below the apex and has ore of an equal grade and of an average width which is encountered in the levels immediately above, where the ore shoot was developed approximately 1,800 feet in length, and the ore from which was taken out continuously through its entire length, with the exception of one short barren area. The ground extracted varies from 6 to 40 feet in width, and will average 12 feet throughout.

The ore is sorted in the stopes, the waste being left for filling. In addition to the filling thus obtained, waste drifts and raises are run in the walls, and the filling kept within a few sets of the back of the stopes, as the ground is heavy and enough timber can not be placed in the stopes to hold them open without the aid of the filling. The timbers are kept close to the working faces of the floors in the stopes and every precaution is taken to prevent the slabby walls from falling in, but as the sheer zone of the vein extends beyond the limits of mineralization it is a constant menace to the safety of the machine men and muckers. This condition is responsible for many of the accidents which have occurred in this and the other mines in this district, and accidents can only be prevented by persistent care on the part of the miners engaged in the extraction of the ore. Careful watching and constant barring down of the stopes is the only means of keeping the working faces in safe condition, and any amount of diligence on the part of the foremen or shift bosses will not prevent accidents, unless the miners themselves keep the ground in safe condition.

A long cross-cut tunnel constructed by the old Mam-

moth Mining Company, which is also driven from the Canyon Creek one and a half miles below the portal of the Campbell tunnel at an elevation of approximately 135 feet lower, is used as a main haulage way for the ore from the mine.

From this tunnel a cross-cut was driven to within 60 feet of the main shaft, from which a large incline raise was put up to intersect the shaft a short distance below the Campbell level station—the collar of the shaft—and, by an ingenious switching arrangement, the self-dumping skips, which are used in the shaft, drop the ore into this large raise and also can be taken through to the collar of the shaft at the engineer's will. From the bottom of this raise the ore is loaded by means of air lift gates into 4-ton bottom-dump cars hauled by electric motors, from which it is transmitted to ore bins at the mouth of the tunnel, thence hauled by railway cars to the mill located at Wallace.

At the mouth of the tunnel an elaborate sorting plant has been constructed in connection with the ore bins, where the ore is passed over a sorting belt. The waste, which is picked out, is hauled back into the mine for filling, the first class ore shipped and the residue placed in the bin to be taken to the mill.

This plant produces between 1,200 and 1,300 tons of first class ore per month, averaging about 38 per cent lead, carrying silver contents of between three-quarters and seven-eighths of an ounce of silver to the unit of lead and saves approximately 150 tons of metallic lead per month over and above what would be saved if this ore were passed through the mill, and nets between \$10,000 and \$12,000 per month over the expense of operation. Twenty-three men and boys are employed in this plant at an average wage of \$3 per day.

Another economical arrangement has been put in operation at this mine in connection with power generation,

The hoist which is used at the main shaft is of a first motion Corliss type, the steam for which has been generated until recently by Sterling water tube boilers in a plant near the mouth of the tunnel, the steam line being covered by asbestos packing, but the loss in radiation was extremely high. By this new device air furnished from electric driven compressors is passed into the boilers through the mud drum, the water being maintained the same as if steam were being generated, and a small fire is kept under the boilers. This heated air is passed to the hoist engine in the mine and works extremely satisfactory, interfering in no way with its efficiency, and the saving in power amounts to about \$1,000 per month. In addition to this, the air pressure which is supplied to the mine independent of this heating arrangement but from the same compressors, has been raised from 90 to 100 pounds per square inch, which is a very great item. This arrangement should be patterned after at many mines where cheap electric energy is available and where large steam hoisting engines are installed.

The men and all timbers for the mine are handled through the Campbell tunnel, and the hoist besides handling 1,000 tons daily capacity of the mine, is required to place these timbers and men on the different levels, but no great difficulty is experienced, although, in addition to this regular work, considerable time is required in keeping the shaft in condition, as it passes through a fault near the 400-foot level, and this section of ground is continually encroaching upon the shaft, but by an ingenious arrangement in timbering, an extra set of timbers is employed, outside of the regular shaft set through this bad ground, whereby miners can be employed at any time, relieving the pressure on the timbers around the shaft without interfering with the hoist operations. This set has about two and one-half foot clearance outside of the shaft timbers, with butt caps and breast boards against the swelling for-

mation. Chutes are provided at the levels so that this material can be drawn off as taken out in relieving the pressure.

*Marsh Mining Company.*—Adjoining the Poorman mine, on the east, the Cooney group, owned by the Marsh Mining Company, which is a very recent organization, is being developed on what appears to be a continuation of the north split of the Tiger Poorman vein system and has developed a very attractive ore showing. Machine drills have been installed, air for which is obtained from the Hecla mine, and extensive development work will be carried on. This property has been held in high esteem in the district for a great many years, but the owners have valued the ground at such a high figure that it has not been purchased by anyone until recently, and should contain some very valuable ore deposits.

*Imperial Mining Company.*—East of the property of the Marsh Mining Company is a group of claims owned by the Imperial Mining Company on which a vein carrying some lues in lead carbonate was developed last year by a shallow surface tunnel. A compressor has been installed and lower long cross-cut is being driven to develop this ore manifestation at great depth, and this property is very likely to figure conspicuously in the future production of the camp.

*Anchor Mining Company.*—On the west end of the Hecla property, and lying between the Hecla and the Standard mines, the Anchor Mining Company is developing an extensive group of claims which undoubtedly contains the continuation of the Hecla-Standard vein system. Two veins have been developed in this property, both of which carry ore in small quantities but not of sufficient grade to justify mining operations, but as considerable virgin ground remains large ore bodies should be encountered, which will be developed, either by a continuation of the drifts on the present level or by drifts from shaft workings

at greater depth, which was found to be the case in the Hecla, immediately adjoining to the east.

*Black Bear Fraction Mining Company.*—The Black Bear Fraction Mining Company, owning a group of claims adjoining the property of the old Frisco at Black Bear, has been developing continuously for the past three years through a long cross-cut tunnel, 2,400 feet in length.

From this tunnel extensive drifts have been run, which have developed a vein carrying two ore shoots, one of which is approximately 500 feet in length, which, in places, carries four or five feet of ore. This vein had a very flattering ore showing on the surface, in which rich carbonate ore was developed by a winze sunk from the upper tunnel. The showing in the lower tunnel, while disappointing in that it was expected that ore in great quantities would be encountered, is 1,200 feet lower than the upper tunnel and undoubtedly carries ore bodies between these levels which will be very productive. All of the veins of the Coeur d'Alene district have barren horizons, and probably, either by sinking or raising from the lower tunnel level, rich ore will be encountered, for similar showings to that encountered in the upper workings, in the oxidized zone of the producing veins of the country, has never failed to overlie rich ore bodies.

The property is equipped with electric driven compressor plant and active developing is being carried on under the management of Peter Bernier of Wallace.

#### MULLAN DISTRICT.

*Snowstorm Mining Company.*—The Snowstorm Mining Company, operating the only producing copper property in the district, located at Mullan, has produced almost continuously through the entire year, the only cessation in shipments being occasioned by the dearth of market for the highly silicious ore, which it produces and which is used by the smelters for furnace lining. This market,

while uncertain in general, has been quite steady during the past year. The production of the mine, while falling a little short of that of 1908, exceeds the production of 1907 by several hundred thousand pounds of copper. The production for this year was 7,668,484 pounds of copper and 5,766,674 ounces of silver, having a total value of \$1,294,303, which is an exceptionally fine record for a mine operating with as small a force as is employed.

The mill has not been operated during the year, as the mine produced ore of sufficient grade to justify shipment direct. Large ore reserves are blocked out above No. 3 tunnel which will supply the shipping requirements for a long time to come. No ore of commercial value has been developed below No. 3 level, but the vein has recently been encountered by No. 4 cross-cut, which is 500 feet lower than No. 3 tunnel. This development has exposed some very interesting geological conditions. In No. 3 tunnel a fault was encountered which was considered by the U. S. Geological Survey as the limit of the vein, as the two fissures were converging in dip and should intersect a short distance below No. 3 level, but by the driving of No. 4 tunnel it has been demonstrated that the fault and the vein have straightened materially in their dips and the fault has changed its course strongly to the north, tending to conform to the bedding planes of the formation. On No. 4 level this fault has been developed as well as the vein, which contains low grade ore, some 100 feet to the north of the fault. However, the trend of the ore shoot in the upper level is to the east, which will necessitate the driving of the drift on No. 4 level some distance easterly before this ore shoot is encountered, if it extends to this level. As to this point, there is considerable room for speculation, but there is no reason why the ore shoot is not likely to straighten in its pitch and follow down the intersection of the fault with the vein.

This property is exceptionally well equipped with power

plant, in which all the available water power in this district is harnessed to electrical machinery. In addition to this the current from the Washington water power plant in Spokane is used as an auxiliary. One of the finest and most commodious boarding houses in the country is available for the accommodation of the employees; in which there is room to house 240 men as comfortably as at any modern hotel, the building is plastered throughout, electric lighted, steam heated and very modernly and substantially furnished.

Very little progress has been made in the development of adjacent properties in this district. However, considerable work has been expended upon the Calumet, Missoula, National and Copper King, also Pandora and East Snowstorm to the east. Great flows of water have been encountered in the workings of the Calumet and the Copper King, but as both of these properties are opened by tunnels, they have been able to cope with the adverse conditions. But at the National mine, this extremely wet condition has resulted in the drowning of the mine, which was opened by a shaft.

This property had an extremely flattering lead, silver and copper ore showing on the surface and in the upper works, but as the only available tunnel site necessitated the driving of a tunnel approximately 4,000 feet in length, the management deemed it advisable to sink upon the ore showing. The shaft was sunk to the 200-foot level, where considerable drifting was done which looked very promising, but the ore was not of shipping grade, so it was considered advisable to sink another lift before any effort was made to produce ore. When the 400-foot level was reached it was found that the air-driven sinking pumps would not handle the water, so an electrical driven Triplex Plunger pump, with a capacity of 175 gallons per minute, under a 400-foot head, was installed.

When all was in readiness and the pump was operating

successfully, the development work was again taken up on the vein. This had no sooner been started than a flow of water entered the drift which drowned the pump and nearly caused the loss of the life of two men engaged in attending the pump. The flow of water was so great from this level that it mounted the shaft and succeeded in drowning the two Cameron sinking pumps stationed at the 200-foot level.

The shaft, at the present time, stands full of water, but the company, undaunted by this misfortune, are driving a tunnel which will tap this vein approximately 1,000 feet below the collar of the shaft. This tunnel will be slightly over 4,000 feet in length, is in over 100 feet at the present time, and will be driven with all haste until the vein is encountered and prospected.

*Morning Mine.*—At Mullan the Morning mine, owned by the Federal Mining and Smelting Company, has experienced considerable difficulty in making a high saving in its elaborate milling plant. The ore, which is highly ferruginous, is finely disseminated through the gangue, and the iron and the lead values are so intimately associated that high milling losses occur whenever the concentration product of the mill is raised to the most economical shipping grade.

A great deal of experimental work has been carried on during the year and additional slime machinery added, but recently the Hancock jig has been thoroughly tried out and has proved to be one of the most successful innovations made in the general milling practice which has been in vogue in this district for many years. This jig has an exceedingly small floor space, when the capacity is taken into consideration, being 25 feet in length by 4 feet 2 inches in width and stands 5 feet 9 inches high and will handle 500 tons of ore per day. Two jigs are installed at the present time, handling the ore product from the mill, and I am informed that two more are to be installed short-



ly, to be used as a reserve in case one is clogged for any reason.

The mine, which is developed by a long cross-cut from the mill nearly 10,000 feet in length to where the vein is intersected, has immense reserves of milling ore. This mine was operated until the last two years through the next higher tunnel, which is 830 feet above. A narrow gauge railway was constructed from the mill to the portal of this tunnel, the cars being handled by Shay engines. From this level a winze was sunk and considerable of the ore mined out beneath the level prior to the completion of the lower tunnel.

The vein in this property has been developed for several thousand feet in length and carries ore bodies which will aggregate over 1,000 feet in length, varying from 8 to 40 feet in width and averaging about 12 feet. The stopes are filled back with waste, the filling being kept close to the working backs. The vein filling is extremely soft and requires constant watching to prevent the falling of the slabs into the workings.

In strong contrast with the other ore bodies of the Canyon Creek and Mullan districts, this deposit carries extremely low silver values.

South of the main vein, at a distance of about 1,000 feet, the You-Like vein has been developed, and has produced ore through the past years containing a high silver ratio, and when mixed with the Morning ore greatly improves the values of the concentrates.

This property has one of the best equipped surface plants and more yard room than any of the properties in the Coeur d'Alene district, outside of the Bunker Hill.

Preparations are being made to sink a working winze from the lower tunnel, and a very extensive opening has been made in the foot wall of the vein adjacent to the drift, where the hoist, ore bins and station will be located.

It was the intention of the company to install an electric

hoist—a duplicate of the one at the Hecla—but since the “hot air plant” at Mace has been so successful, it is now contemplated to use the old first motion steam hoist which formerly did service at the Tiger-Poorman mine and install a similar arrangement to that used at Mace and previously described.

The property is equipped with electric haulage, and, among other modern improvements, has one of the best powder thawers and magazines in the district. The two being in separate buildings located several hundred feet apart, are built of concrete, with no combustible material used in the construction. The powder thawer, with a maximum capacity of about half a car of powder, is heated by hot water, the heater for which is in a separate building, 25 feet distant from the main building, the water being transmitted in pipes under the ground. The economy and efficiency of this device is surprising, the expense of keeping the powder thawed, even in cold weather, is practically nothing, as one shovelful of coal per day will thaw the powder in ordinary cold weather.

*Gold Hunter.*—The Hunter mine, located one mile east of Mullan, has recently developed through a winze 100 feet below the lowest tunnel level one of the ore bodies which was worked in the upper levels. This body of ore is of about the same dimensions as it was upon the main tunnel level; the values carried in the ore are a trifle higher than encountered above, and the ratio of silver to lead in the ore is about 2.6 ounces to the unit of lead. This ore body is about 200 feet long, and from 16 to 20 feet in width. The lower cross-cut tunnel, which is 4,381 feet in length, has developed six distinct ore bodies varying from 2 inches up to 20 feet in width, but in the shaft level only one of these shoots thus far has been disclosed.

The mine is equipped with a concentrating plant at the mouth of this tunnel, but was operated at a handicap dur-

ing the year owing to the fact that considerable overhauling has been carried on in the mill.

The property has produced 18,358,000 pounds of lead and 482,500 ounces of silver during the year.

*Star Mining Company.*—Immediately west of the Morning mine a large group of claims has been extensively developed, during the past year by the Star Mining Company, operating through a long cross-cut tunnel over 2,000 feet in length.

Three distinct parallel veins have been encountered, the first one, the San Jose, is being developed at the present time. This vein carries a very strong gossien on the surface and was developed by a shallow tunnel, but which did not open the vein at sufficient depth to demonstrate whether or not ore bodies existed. The second vein, known as the Iron Crown vein, has been drifted upon for many hundred feet, but nothing of material value was developed. The third vein, which is undoubtedly the continuation of the main Morning fissure, has developed an ore body of similar grade and character to that exposed in the Morning. The ore shoot in this vein is 800 feet in length and at places is from 12 to 15 feet in width and will average probably 7 or 8 feet. An extremely heavy flow of water was encountered when this vein was cut which greatly retarded the progress and for a time seemed to forbid further exploration work, but gradually the water drained off sufficiently to permit of further development.

I am informed that the company contemplates driving a lower tunnel to open these veins at greater depth and build a mill in the vicinity of the railway track at the mouth of Grouse Gulch, in which gulch all of the workings are located. The property is largely controlled by Messrs. Finch and Campbell of Spokane and Mr. E. H. Moffatt of Wallace is the manager.

*Alice Mine.*—South of the Star property, on Ruddy Gulch, the Alice Mining Company has been developing its

property extensively through the past few years and has sunk a working shaft to a depth of 600 feet, from which cross-cuts and drifts have been run, opening up several shoots of ore in a soft, crushed zone, lying in close proximity to the Osborne fault. A mill has been constructed on the property and recently regular shipments have been made. Active prospecting work is being carried on, which will undoubtedly open up other ore bodies of even better grade. The property is under the management of James F. McCarthy of Wallace, who is also the manager of the Hecla mine.

#### NINE MILE CREEK DISTRICT.

*Success Mining Company.*—The Success Mining Company, operating the only productive lead-zinc property in the district, located on the East Fork of Nine Mile Creek, has developed great bodies of lead and zinc ore, from which extensive shipments have been made. Since the panic of 1907 and the drop in the price of zinc, this property has remained idle until this past summer when regular shipments were again made but with this late start its 1909 production was 300,000 pounds of lead and 1,600,000 of zinc.

This mine is operated through a cross-cut tunnel which taps the ore bodies 400 feet under the old upper workings, from which it is claimed that about \$600,000 worth of ore was shipped in the early days, most of which was lead.

After the completion of the milling plant which this property owns, at the mouth of the tunnel, a steady ore production was maintained, for some time prior to the shut down, and as large bodies of ore are developed it should continue to produce for many years at a fair profit, if the present price of zinc is maintained.

Several extensive irregular shaped ore bodies have been developed, one of which is 40 feet in thickness, carrying an exceedingly good grade of zinc blende. The ore bodies oc-

cur in quartzite, closely associated with an immense monzonite and syenite intrusion, which extends from near the town of Gem, northeasterly, to a point slightly beyond Sunset Peak, a distance of about five miles, where the intrusion is veiled by the Pritchard slate formation, but again exhibits itself in several irregular patches farther to the northeast, on both sides of Pritchard Creek. The margin of this intrusion is extremely irregular and in places includes peninsular areas of quartzite, and it is in one of these quartzite tongues that the ore bodies of the Success mine occur. The property is controlled by Mr. H. F. Samuels of Wallace.

*Tamarack and Chesapeake Mine.*—Immediately north of the old Custer mine, on Custer Peak, lies the property of the Tamarack and Chesapeake Co. which has remained practically inactive during the entire year. A few men have been employed on development work from the lower Custer tunnel, but no production has been maintained. The property, however, has blocked out, ready for shipment, immense bodies of high grade galena ore and it is rumored that a consolidation is on foot between the Tamarack and Custer Peak Companies, after which time the Tamarack ore will be handled through the Custer tunnel workings. Mr. Harry L. Day of Wallace and associates own the control of this property.

*Pittsburg Lead Company.*—The Pittsburg Lead Mining Company, owning the old California and Black Cloud properties on Nine Mile Creek four miles above Wallace, from which large shipments of ore were made in the early days, and from which, under recent management, a new ore body was developed and extracted, has remained idle during the year. This company, however, owns a large group of claims, and, on the other side of Nine Mile Creek, a very promising lead showing has been developed on a claim in which this company owns a seven-eighths interest. Recent reports from this district state that a lease

and bond upon this property has been given by the company and that extensive operations will be carried on in the future under this option.

*Lead-Silver Mining Co.*—The old Sixton-to-One mine, at the present time owned by the Lead-Silver Mining Company, under the management of Mr. B. M. Frances, is developing its ore showings through a winze from the lowest tunnel level.

This property has had a rather checkered career owing to the fact that large bodies of ore were mined under the early management; later the property was tied up in litigation and remained idle for a number of year; later it was operated, but owing to the caving in of the principal stope the property was shut down and has been operated only in a small way since. However, under the present management, it is contemplated to sink 400 feet below the lowest workings and prospect the vein extensively on the lower level.

A very fine body of ore, at one place 15 feet in width, was opened, and there are also several smaller ore bodies which, with depth, are likely to consolidate into one long shoot. This vein is very similar in character and is in a direct line with the Standard-Mammoth vein, but is located about two miles farther to the northwest. A diabase dike cuts the vein on the west end of the principal ore shoot and has approximately the same course and dip as the dikes which were encountered in the lower Standard workings.

*Callahan Mine.*—A little farther to the northwest the Callahan group has been operated under a lease during the past year. The property developed a very beautiful ore shoot in the upper workings, from which shipments of high grade mineral were made which paid a handsome profit. This shoot, however, was short and as yet has not been developed by a lower tunnel, which his being driven at the present time.

*Surprise Mine.*—The property of the Surprise Mining Company, located on the North Fork of the East Fork of Pine Creek, has been operated by a small force of men during the year. An ore shoot in the neighborhood of 150 feet in length has been developed carrying fair values in lead and zinc. The property is equipped with a small mill and compressor plant; however, the mill has been run very little during the year, but with proper transportation facilities should operate at a fair profit. At the present time the property is located ten miles from the railway, at the mouth of the creek, the wagon road is very bad and the freight rate is extremely high.

#### MURRAY DISTRICT.

The Murray district has exhibited greater mining activity during the year than has been experienced for many years past. The construction of the Idaho Northern Railway from Enaville to Murray, twenty-eight miles, and from Murray to the Monarch mine, five miles further, has given this section the transportation facilities for which it has been anxiously waiting since the early days, when the camp was a placer gold producer of phenomenal value. In after years quartz gold mining was carried on to a considerable extent, but in the more recent times all development activity has been confined to the lead properties, of which this district contains several very meritorious showings.

*Coeur d'Alene North Fork Mining and Smelting Company.*—The Monarch group, located on Pritchard Creek five miles above Murray, at the present terminus of the Idaho Northern Railway, has been operated under bond by the Coeur d'Alene North Fork Mining and Smelting Company.

A lower long cross-cut tunnel, 3,100 feet in length, which cuts the vein 1,400 feet under the surface, has developed little ore of commercial value, but a cross-cut is being

driven at the present time from a drift on this level, which had been following out a fault or fissure which would form an acute angle with the general course of the vein, and is expected to open the ore which has recently been exposed in a raise above this level. This raise, which is being driven to connect with the 600-foot level is up, at the present time, about 860 feet and has encountered good ore, at one point 8 feet of solid first-class mineral was displayed, with 6 feet of milling ore accompanying it. In the upper works an ore shoot 180 feet in length, carrying good lead values, was developed, which will be mined through this lower tunnel as soon as the raise is completed.

The formation in which this ore occurs is apparently Burke quartzite, similar to that in which the Standard-Mammoth vein occurs on Canyon Creek, and, contrary to the general belief, is not the Pritchard slate, into which classification all of the rock in this neighborhood has been placed by the Geological Survey. This rock is of a very much lighter grade than that accompanying the ore in the Hercules and has all of the characteristics of the mean strata of the Burke quartzite series.

The property is equipped with a 75-ton concentrating plant which is being operated, half time, on ore taken from the raise, but it is the intention to increase this capacity in the spring. The first class ore from the mine runs from 60 to 70 per cent lead, the coarse jig concentrates from 62 to 65 per cent and the table concentrates from 60 to 65 per cent, the ratio of silver being about 0.15 of an ounce to the unit of lead. This property is under the management of Mr. E. P. Spaulding of Murray, who is also president of the Idaho Northern Railway Company.

*Bear Top Mine.*—North and east of the Monarch property, about four miles, the Bear Top Mining Company is operating its property and making steady shipments from its mill. The ore occurs in a broad but short lenticular deposit, in dark argillaceous shale or slate. The ratio of



silver to lead is about the same as that of the Monarch ore. The property is developed by several tunnel workings, the ore from the lower one of which is transmitted to the mill by an aerial tramway. The mill has been operated during the greater portion of the year and has made about a \$21,000 production.

*Other Properties.*—In this same vicinity there are several other properties which are and have been extensively developed, among which are the Orofino, Paragon, the Chicago-London and Black Horse mines. This latter property is being developed through a lower cross-cut tunnel at the present time and some ore has been exposed; however, the showing is rather disappointing, as the upper tunnel, which was entirely within the carbonate zone, had a very flattering showing.

*Jack Wait Property.*—Several miles below Murray the Jack Wait property has recently been optioned to Paddy Burke and associates, who are also operating the Orofino and Black Horse properties. This property is claimed to have a great surface showing, but I am informed that little development work has been accomplished.

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## WASHINGTON COUNTY.

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### SEVEN DEVILS DISTRICT.

*Peacock Mine.*—The Peacock mine was operated under lease and bond during the early part of the year in a desultory manner with insufficient equipment. It shipped one car of ore containing 15 cent copper but was closed down during the summer and has since been idle. This is one of the most meritorious properties in the Seven Devils district and has a shipping record of several thousand tons of 10 per cent and better copper ore, carrying several dol-

lars per ton in gold and silver. This property has been repeatedly subjected to abortive attempts at development, which have failed to produce profitable results through mismanagement, but with intelligent development at depth is likely to supply large quantities of rich shipping ore. Its surface manifestations present a gossen outcropping 400 to 500 feet long by over 100 feet wide, composed of garnet and associated metamorphic minerals, with copper carbonate and bornite ore throughout its mass. Extensive diamond drilling operations have been carried on at this property in the past that are reported to have disclosed rich sulphide ore bodies at considerable depth. The Peacock has probably had as much capital expended on it as all the other properties of the district combined, but 90 per cent of this great outlay has been wasted and the merits and importance of its great surface showing of mineral still remains unproven.

*Arkansas Mine.*—The Arkansas mine, located at Landore, owned by the Seven Devils Copper Company, is reported to have recently contracted its output to the Salt Lake Copper Company. This property was the most actively and successfully developed mine in the Seven Devils district during 1909. It employed a crew of 20 men during the year and shipped three carloads of 20 per cent copper ore, carrying in addition several dollars in precious values. During this year's operations, 1,000 tons of 10 per cent ore was put on the dump. In addition to the first class shipped, the reserves of rich mineral put in sight are estimated at from 30,000 to 50,000 tons.

The Arkansas mine is one of several properties which developed and produced good ore near the surface in the early operations of the camp and subsequently laid idle for a number of years until taken over by the present company, and the results of the operations give a very flattering indication of what may be accomplished by several of the other well known properties on the belt if their de-

velopment is undertaken in the same intelligent manner. The great ore showing at this mine is only 210 feet below the surface. A new tunnel is being driven at the present time to drain the mine and tap the ore body at a further vertical depth of 135 feet, which should greatly increase the ore resources of the mine, as it shows the strongest manifestation of rich mineral in the bottom of the tunnel at the 210-foot level.

*Hancock Copper Company.*—The second most active mine operation of the Seven Devils district during the present year was that of the Hancock Copper Company, who have carried a force of 10 to 15 men during a large portion of the year, doing development work on their several groups of claims. Recently this company has taken a bond and lease on the Weton gold quartz properties at Placer Basin near Landore, from which they have shipped three carloads of ore for testing purposes, which are reported to have yielded an average value of \$25 per ton, principally gold. This company is now erecting a 25-ton capacity Huntington mill and concentrating plant and are anticipating active milling operations by early spring. The Weton group carries a series of gold-bearing quartz-filled fissure veins in slate, that contain excellent free milling values and are likely to afford a profitable mining enterprise. Colonel Drake of Weiser represents the company as manager.

*Blue Jacket-Queen Group.*—The Blue Jacket-Queen group has recently been taken over under lease and bond by Messrs. F. H. Kleinschmidt and P. H. Miller and is now being developed at considerable depth by a cross-cut tunnel. This property has the distinction of shipping the highest grade crude copper ore of any mine in Idaho. It has made an output in past leasing operations from comparatively shallow depths, of between 30 and 40 carloads of ore that average from 20 to 40 per cent copper as mined, with good gold and silver values, and other lower grades,

which has brought up the total production of the mines to over a quarter of a million dollars. The ore occurs in a rather pockety form, in a contact of white limestone and diorite, which is the main contact carrying all the more prominent properties of the Seven Devils district and is readily traceable for three miles. These pockets or lenses of ore in this instance, however, are usually nearly pure bornite mineral, associated with garnet gangue and when encountered run into money very fast.

The development on this property at the present time is comparatively shallow and the present undertaking is very likely to result in new ore resources of considerable importance. The citizens of the Seven Devils district and their outside neighbors have, during the past year, completed a wagon road from Landore to Cuprum down Indian Creek, which, in connection with the famous Kleinschmidt grade, gives the camp a winter outlet to the new railway, now constructed to Homestead, on Snake River, only 15 miles from the mines, which will afford a cheap outlet for their ores. In addition to this, surveys have recently been made for an electric railroad to connect the new Short Line extension down Snake River with Landore by way of Indian Creek, there is a very encouraging prospect that this connection may be constructed, if the ore development of the camp continues to expand as it has during the past year.

In addition to securing a long time contract on the output of the Arkansas mine, owned by the Seven Devils Copper Company, the Salt Lake Copper Company, which is said to be a Lewishon enterprise, are becoming extensively interested in this neighborhood and are reported on good authority to have obtained control of the famous Iron Dyke mine at Homestead, on the Oregon side of Snake River, fifteen miles from Landore, and also of the McDougal group, another good copper showing on the Oregon side, and the Iron Mountain mine, 25 miles north of Weiser

in Washington County, which has a phenomenal tonnage resource of high-grade iron ore, containing important values in copper, gold and silver, affording a very desirable fluxing mineral.

It is part of the prospective plans to combine the outputs of these different properties to supply a large smelter to be erected at Homestead in the near future, which, from the magnitude of the resources of these combined properties, is likely to have a capacity of 1,000 tons per day, and prove the salvation of the extensive copper belt of Washington County and of the neighboring Oregon side of the river. It will also result in providing a railroad tonnage traffic that will well warrant the construction of the Short Line extension from Huntington, recently completed, aside from its prospective extension through the canyon to Lewiston as a main line route to the coast. In addition to its ore resources, this new railroad affords an outlet to some very valuable and extensive deposits of gypsum, limestone and marble further up the river, and to numerous shoestring ranches of exceedingly valuable and productive fruit land that border the Snake River on both sides of the stream. In connection with these resources of traffic, the new line is already enjoying a considerable source of tonnage from the construction material required by the immense power plant now being installed by the Idaho-Oregon Electric Light and Power Company of Boise, whose operations at Ox Bow, on Snake River, four miles above Homestead, have afforded employment for the past two years of a crew of men varying from 200 to 500. This great enterprise will, when completed, afford a resource of 30,000 horse power and will cost, when completed, fully \$2,500,000. It has already been connected by a magnificent transmission line 120 miles long to Boise, Idaho, and this system is to be extended in several other directions, covering the power requirements of a very extensive region.

## HEATH DISTRICT.

*I. X. L. Mine.*—In the Heath district the most promising transaction of the year was the taking over of the I. X. L. group of claims by two of the big porphyry-copper interests of Utah and Nevada. The I. X. L. group comprises the large area of lode claims covering a mineralized zone of monzanite 2,000 feet square that carries a surface dissemination of copper carbonate mineral, which changes at a very shallow depth to copper sulphide, and presents the possibilities of developing into an immense deposit of concentrating material of 1 1-2 to 3 per cent copper, which should pay handsomely if handled on a big scale.

This copper-bearing formation varies from rather fine grained brown spotted and sericitized porphyry rock to a coarse crystalline structure resembling granite. It is part of a great eruptive uplift known as Cuddy Mountain and is bordered by a fringe of altered limestone and garnet formation with associated rich copper values in a rather pockety form. These formations are in turn entirely surrounded by the horizontal sheets of the Columbia lava flow of this region, and the bordering formations between the older igneous uplift and the lava also contains some lead-silver ores associated with immense manganese gossens. On the I. X. L. property the coarser grained rock contains yellow sulphide ore wherever it has been dug into to the shallow depth of 10 feet. No chalcocite so far is in evidence, but the schisty joints of the numerous minute movement planes contain local concentrations of richer yellow copper ore that carry from 15 to 20 per cent copper, when assayed separately, and also associated values of from \$7 to \$9 per ton in gold, together with a little silver.

This deposit is geologically similar to the famous copper-bearing monzanite deposits of Bingham, Utah and Ely, Nevada, and probably has a better surface showing of copper minerals than does either of the mentioned deposits,

but whether the mineral will be as uniformly disseminated through the rock at depth remains to be proven.

I am informed that this property was passed on by Mr. Duncan McVickey of Salt Lake, which is a guarantee that it will be properly financed and intelligently investigated.

The I. X. L. group is only six miles from the new Short Line extension down Snake River at the mouth of Brownley Creek, to which point it is connected by a good wagon road, and sixteen miles in another direction from Cambridge, on the Pacific and Idaho Northern Railway. Over the latter route a very easy grade could be had for railroad construction.

#### BLACK LAKE DISTRICT.

*Idaho Gold Coin Mining Company.*—At Black Lake the Idaho Gold Coin Mining Company has been doing some extensive development on its principal fissure vein, which is a pronounced gold ore course in greenstone of remarkable strength and persistency in length and depth. It has been operated through a cross-cut tunnel 1,400 feet long, at a vertical depth of 500 to 700 feet below the crest of the vein.

This property is equipped with a first class 50-ton cyanide mill and aerial tramway. It was formerly operated through some short surface tunnels and is said to have produced bullion to the gross value of \$50,000. The new cross-cut tunnel taps a section of the vein where the apex is covered with debris, but it has been successful in the fact that it has encountered two important independent ore shoots in the fissure, in addition to the former ore channels on which the mine was opened. A raise is now being put up to connect with the bottom of the old workings and develop the old ore shoot. This raise will, it is anticipated, be completed by next spring, when the mine will be fully drained and the old and new ore resources will be rapidly put in shape for stoping, so there is a definite prospect at this time that the property will be again in the producing list by next summer.

## MINERAL PRODUCTION.

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The State's mineral production for the year, basing the figures upon the average New York metal prices, aggregates \$15,606,862, or \$45,730 greater than the 1908 production. The greatest source of revenue was from lead mining, which produced \$9,356,571. The next metal in point of importance was silver, the silver production for the year aggregating \$3,625,317. Gold ranks third, with a production of \$1,465,481; copper fourth, with \$1,034,651; zinc fifth, with \$104,841, and coal sixth, with a value of approximately \$20,000.

A great deal of activity has been displayed by the competing railroad systems of the country and considerable actual construction is in progress. Numerous surveys for railroads are being made in various parts of the mountainous sections of the State, which, if constructed, will materially aid the mining industry and increase the production, as Idaho possesses many promising base and precious metal properties which at the present time are so remotely located from transportation facilities that it is impracticable to carry on operations, but which would become productive if brought within a reasonable distance of a railroad.

Since the depression of 1907 Idaho has suffered severely from lack of financial assistance in prospecting and developing the smaller properties. The larger properties, which were on a producing basis prior to that time, have been able to operate almost continuously, as the metal prices have been fairly good, but there has been a great lack of interest shown by the investing public, and it is only within the latter part of the past year that the renewed interest in the development of unproductive properties has mani-



fested itself. The fact that the tendency toward the development of prospects is on the increase is a very encouraging sign for a bright future, and during the coming year many of the properties, which have the ear marks of mines, and which have been idle for several years, are likely to again resume operations.

### *Lead.*

During the year 1909 Idaho produced 217,594,679 pounds of lead with a value of \$9,356,571, of which 99 per cent came from the Coeur d'Alene district in Shoshone County.

The State of Idaho produces about 30 per cent of the total lead of the United States, and with the associated silver values occupies a very conspicuous place in the metal production of the world.

### *Silver.*

Every mining county in the State produced more or less silver, the bulk of which, however, was derived from the Coeur d'Alene galena ores, which produced 88 per cent of the total production of the State, which was 7,039,451 fine ounces with a market value of \$3,625,317. The next district of importance in the production of silver was the Silver City district, in Owyhee County, which produced between 9 and 10 per cent of the State's total production. There are many properties in several sections of the State with large tonnage of dry silver ores in sight which are lying inactive owing to the lack of metallurgical processes and transportation facilities, but with the advancement in the price of silver and railway activity, the silver production of the future is likely to be increased.

### *Gold.*

Idaho produced 70,898 fine ounces or \$1,465,481, of gold during the year. The Silver City district ranks first in production with \$404,983, Boise Basin second with \$241,-

277 and Elmore County with \$209,106 third. The greater portion of the production of this county was derived from the quartz mining operations in the Atlanta district. Custer County ranks fourth in gold production, with \$101,901 to its credit for the past year.

Dredging operations which are contemplated for the future will undoubtedly increase the gold production of the State in years to come, for with the successful operation of a number of dredges which have been working during the past few years, increased interest is manifest in the opening up of large deposits of dredgible ground in various sections of the State.

### *Copper.*

Several of the copper properties which have been productive in the past have remained practically idle during the past year. The State produced 7,759,887 pounds of copper, with a market value of \$1,034,651, of which 98 per cent was produced by the Snowstorm mine in the Coeur d'Alenes. The other districts of importance were the Seven Devils district, Custer and Lemhi Counties. The Seven Devils district, which has been developed in a desultory way for many years, has during the past few months taken on the appearance of a healthy development, as the Salt Lake Copper Company, which is controlled by the Lewisons, has taken options on some of the more important properties with the expectation of developing them to the productive stage and with the idea of ultimately installing a smelter in the immediate vicinity of Homestead, which is the present terminus of the Huntington-Lewiston branch of the Oregon Short Line.

### *Zinc.*

The zinc production of Idaho, which amounts to 1,906,200 pounds, was derived from two districts, namely, the Coeur d'Alene and Wood River districts. The Success

mine of the Coeur d'Alenes produced 84 per cent of the total production. This property was inactive during the fore part of the year but made a very creditable showing during the months of operation.

### *Coal.*

Idaho contributed very slightly to the coal production of the country, there being only two districts in which coal was mined during the year and these were operated to a very limited extent.

The only deposit of importance which contains good grade of bituminous coal is found in Fremont County. The Brown Bear coal mine in this section produced about 1,500 tons of high grade bituminous coal during the year, which averaged approximately as follows:

	Per Cent.
Fixed carbon .....	55.65
Volatile carbon .....	36.62
Moisture .....	3.13
Ash .....	4.10
Sulphur .....	.50
With a total actual fuel contents of a trifle over .....	92.00

This property has 12 coal measures exposed upon it, varying from 1 to 10 feet in thickness, but it is so remotely located from transportation at the present time that its production has been confined to supplying local demands. There are no difficult engineering feats to be accomplished in the building of a railroad to this district, as a water grade could be obtained with no heavy work. The coal measures are contained in an unaltered sedimentary formation of the cretaceous age, are a continuation of the series being mined farther to the southeast in Wyoming, and if properly opened and equipped could supply the total demands of the State for years to come.

The only other producing coal property in the State is

at Salmon City, which has sold during the year about 2,000 tons of lignite coal, all of which has been consumed locally, a large portion being used by the Pittsburg and Gilmore Railway in the operation of steam shovels.

Numerous showings of lignite coal are found at various portions of the State, but upon which little development work has been expended.

### *Phosphate Deposits.*

The San Francisco Chemical Company of Montpelier, Bear Lake County, owns the only productive deposit of phosphate rock within the State. From this property 735 tons of rock were shipped during the past year, averaging from 60 to 70 per cent calcium phosphate, but it is contemplated by the company to produce extensively in the future.

### *Other Mineral Resources.*

Idaho possesses many surface manifestations of a number of the commercial yet rarer minerals, including antimony, nickel, cobalt and cinnabar.

From the heavy sands obtained in the placer operations of the Boise Basin, Warrens and other placer camps, monazite and other valuable minerals have been discovered which, with the proper process of separation, will be commercially valuable.

Wolframite, hubnerite and scheelite are found in several districts but upon which little development has been undertaken, but with the increased demand for these tungsten minerals present prospective value.

In Idaho County asbestos has been mined during the past year on a small scale, the product being shipped for the manufacture of pipe coverings and boiler jackets. The asbestos, which is of the short fiber amphibole variety, is extremely clean and free from injurious minerals and has been tested to 4,000 degrees Fahrenheit.

Platinum is also found in connection with the fine gold of the Snake River. Opals and sapphires are also known to exist in various portions of the State.

*Statistics.*

The accompanying statistical tabulation of the mineral production of the counties is based upon the gross metal contents of the mineral shipped, and the values are figured from the average New York quotations for the year. Owing to the fact that I have not received authentic reports from several properties, and the production of many others are based upon eleven months' output, also as the gold and silver shipped from the State to outside assay offices was credited to the State as a whole, and not to the individual counties, considerable room is left for the occurrence of slight discrepancies, but, on the whole, the figures are as accurate as can be obtained at this time.

<b>ADA COUNTY.</b>		
Gold, fine ozs.,	533.477	11,026 97
Silver, fine ozs.,	213.78	110 10
Total value		11,137 07
<b>BANNOCK COUNTY.</b>		
Gold, fine ozs.,	14.752	304 90
Silver, fine ozs.,	0.83	43
Copper, lbs.,	2,400	319 20
Total value		624 53
<b>BINGHAM COUNTY.</b>		
Gold, fine ozs.,	4.938	102 07
Silver, fine ozs.,	2.30	1 18
Total value		103 25
<b>BLAINE COUNTY.</b>		
Gold, fine ozs.,	1,855.992	38,363 35
Silver, fine ozs.,	115.565.1	59,515 00
Lead, lbs.,	1,700,479.0	73,120 60
Zinc, lbs.,	306,200	16,841 00
Total value		187,839 95
<b>BOISE COUNTY.</b>		
Gold, fine ozs.,	11,672.816	241,277 10
Silver, fine ozs.,	14,602.59	7,520 30
Total value		248,797 40
<b>BONNER COUNTY.</b>		
Gold, fine ozs.,	360.468	7,450 88
Silver, fine ozs.,	95.84	49 35
Total value		7,500 23
<b>CANYON COUNTY.</b>		
Gold, fine ozs.,	38.652	798 93
Silver, fine ozs.,	86.60	44 60
Total value		843 53
<b>CASSIA COUNTY.</b>		
Gold, fine ozs.,	2,434	50 31
Silver, fine ozs.,	0.41	03
Total value		50 34
<b>CUSTER COUNTY.</b>		
Gold, fine ozs.,	4,929.922	101,901 49
Silver, fine ozs.,	4,612.38	2,375 37
Copper, lbs.,	36,000	4,800 00
Lead, lbs.,	120,000	5,160 00
Total value		114,236 86
<b>ELMORE COUNTY.</b>		
Gold, fine ozs.,	10,116.398	209,105 95
Silver, fine ozs.,	15,872.09	8,174 13
Total value		217,280 08
<b>FREMONT COUNTY.</b>		
Coal, tons,	1,500	6,000 00
Total value		6,000 00
<b>IDAHO COUNTY.</b>		
Gold, fine ozs.,	5,687.046	117,551 24
Silver, fine ozs.,	1,026.78	528 80
Total value		118,080 04

**LEMHI COUNTY.**

Gold, fine ozs., 5,961.541.....	\$ 123,725 05
Silver, fine ozs., 35,297.5.....	18,178 20
Lead, lbs., 191,000.0.....	8,213 00
Copper, lbs., 8,000.0.....	1,066 00
Coal, tons, 2,000.0.....	14,000 00
Total value .....	\$ 165,182 25

**LINCOLN COUNTY.**

Gold, fine ozs., 26.595 .....	\$ 549 72
Silver, fine ozs., 15.09 .....	7 77
Total value .....	\$ 557 49

**NEZ PERCE COUNTY.**

Gold, fine ozs., 2,457.030.....	\$ 50,786 81
Silver, fine ozs., 568.63 .....	292 83
Total value .....	\$ 51,079 64

**ONEIDA COUNTY.**

Gold, fine ozs., 74.140.....	\$ 1,532 46
Silver, fine ozs., 4.80.....	2 47
Total value .....	\$ 1,534 93

**OWYHEE COUNTY.**

Gold, fine ozs., 19,592.787.....	\$ 404,982 90
Silver, fine ozs., 647,747.97.....	333,590 20
Total value .....	\$ 738,573 10

**SHOSHONE COUNTY.**

Gold, fine ozs., 7,155.555 .....	\$ 147,905 30
Silver, fine ozs., 6,203,715 50.....	3,194,913 50
Lead, lbs., 215,583.200.....	9,270,077 60
Copper, lbs., 7,668,487.....	1,022,299 30
Zinc, lbs., 1,600,000 .....	88,000 00
Total value .....	\$13,723,105 70

**TWIN FALLS COUNTY.**

Gold, fine ozs., 149.227.....	\$ 3,084 52
Silver, fine ozs., 8.46.....	4 35
Total value .....	\$ 3,088 87

**WASHINGTON COUNTY.**

Gold, fine ozs., 165.168.....	\$ 5,481 02
Silver, fine ozs., 14.55.....	7 49
Copper, lbs., 45,000.0.....	5,998 50
Total value .....	\$ 11,487 01

**TOTALS FOR THE STATE OF IDAHO.**

Gold, fine ozs., 70,898.938.....	\$ 1,465,481 05
Silver, fine ozs., 7,039,451.20.....	3,625,317 40
Lead, lbs., 217,594,679.0.....	9,356,571 20
Copper, lbs., 7,759,887.0.....	1,034,651 50
Zinc, lbs., 1,906,200.0.....	104,841 00
Coal, tons, 3,500 .....	20,000 00
Grand total, 1909.....	\$15,606,862 15
Grand total, 1908 .....	15,561,131 64
Increase .....	\$ 45,730 51







