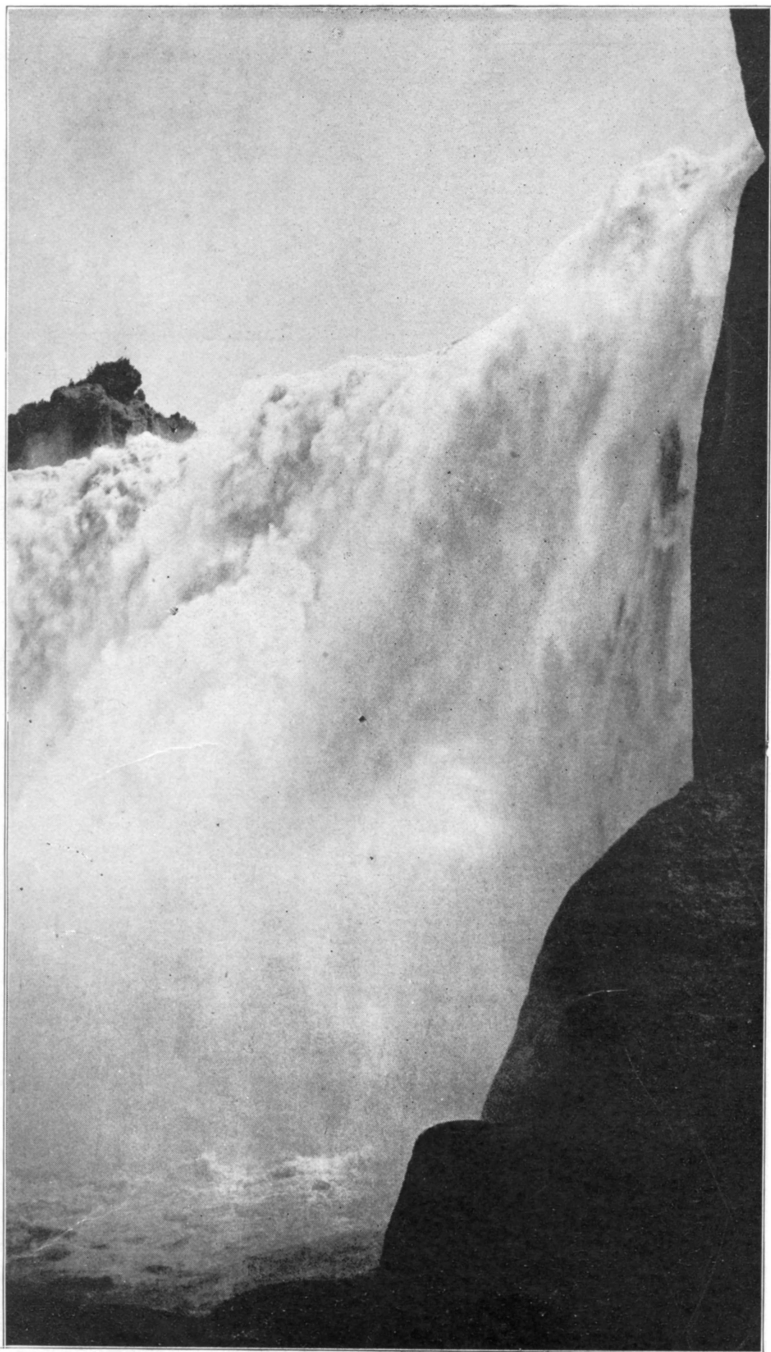


# **Notes about this document**

20181105 Christopher Tate, Idaho Geological Survey

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



SHO-SHO'-NE FALLS, CASSIA COUNTY, IDAHO. MAXIMUM VOLUME 50,000  
SECOND FEET. VERTICAL FALL 210 FEET. HORSE POWER 1,000,000.



Idaho Bureau of Mines and Geology,  
MOSCOW. IDAHO  
SEVENTH ANNUAL REPORT

OF THE  
MINING INDUSTRY  
OF  
IDAHO  
FOR THE  
YEAR 1905

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*By* ROBERT N. BELL  
STATE INSPECTOR OF MINES



Boise, Idaho, January 1st, 1906.

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

Dear Sir—I have the honor to submit herewith my report as State Inspector of Mines for the year ending December 31st, 1905.

Very respectfully,

ROBERT N. BELL,

*State Inspector of Mines.*

# INTRODUCTION.

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The mining industry of Idaho experienced a most prosperous year during 1905, and while another exceedingly light snowfall and consequently light water season and other causes retarded production to a marked degree, especially among the gold mines, the total metal production of the State shows a large increase and proves a record breaker over any previous year, closely approximating the value of the total agricultural products of the State.

The continued prosperity and expansion of the mining industry in Idaho particularly, and the whole West in general, is seriously menaced by the present Federal and State laws which admit of withdrawing vast areas of rich mineral territory from the investigation of the pioneer miner and prospector, hampering and restricting his opportunity for original discovery.

The progress of the agricultural and every other industry of the country at large is dependent on the success of the mining industry. Stop the discovery and mining of iron ore, for instance, and the business of the country would wear out and rust out with its railway transportation facilities and machinery, etc., in a decade, and the same argument applies in a measure to the other useful base metals and the encouragement of their discovery and development, together with the precious and rarer metals, will form a most potent factor in the progress and success of all other business enterprises.

The most vicious Federal law that strikes so hard at the liberties of the pioneer miner is the Timber and Stone Act, which admits of the purchase, for a few hundred dollars, of a tract of timber land (and in Idaho this land is generally mineral land ) amounting to 160 acres, and the timber claimants' purpose in acquiring it is most generally

for the specific purpose of turning it over as quickly as possible at a few hundred dollars' profit, as soon as he acquires title, to some big lumber company. This transfer not only carries with it the right to cut the timber, but also the right to the land and all that underlies it, and has resulted in passing to private ownership hundreds of thousands of acres of mountain territory in Idaho, often rich in mineral possibilities, seriously limiting the prospector's former liberties.

The State selections of vast areas of land are another serious drawback to original investigation and puts the prospector in the position of a trespasser on its holdings. No one appreciates more than the writer the rapidly increasing cost of the administration of State affairs and the constant requirements for additional sources of revenue. The past Legislatures of the State have done good service to the mining industry in their appropriations for wagon road construction to open up the remoter districts of the State, but this purpose is in a measure defeated by the selection of extensive areas of mineral territory as timber land, and the writer would suggest that a law should be passed at our next session, giving the miner and prospector full liberty and encouragement to enter on and prospect the State's holdings, and to work and explore the same with the privilege of leasing, with ample time for an annual improvement requirement, and of buying any portion of it he may prove or consider valuable for mineral in square blocks of not less than 40 acres at the minimum price per acre, restricting his mineral rights to vertical boundary lines, thus setting a rational example for the Federal Government to follow in the amendment of its abortive apex and extra lateral right law.

Such a law would not only encourage the development of our mining resources but would result in the State disposing of a lot of rough land that will otherwise remain an asset of trifling value. This especially applies to

large areas of its timber selections after the timber has been sold off.

The arguments put forth that land is not valuable for mineral because it has been open to exploration for years and no valuable mines have been found upon it is no argument at all against its probable merits as mineral land. We have a number of ore bodies in Idaho that have enriched the commerce of the world with precious and useful metals to the value of millions of dollars, whose highest crests were hundreds of feet under the surface of the ground in the respective veins where they were found, often showing little more evidence of their existence than an iron-stained fracture, containing absolutely no commercial ore at the surface, and in some instances requiring years of hard work and apparent blind faith on the part of their discoverers in finding them.

Nature's processes and methods of placing valuable metalliferous deposits in the earth's crust presents a problem that has puzzled the minds of the most practical and scientific investigators for years, and it is entirely out of the province of the farmer, stockman or business man to assume to be able to classify mineral from non-mineral land, and for good of the industry the pioneer miner should be given the benefit of the doubt, if any exists, and all the encouragement possible to follow any sign he sees fit to work on, especially on land that is not actually adapted for cultivation.

In recent years the miner's liberties and opportunities for original investigation have been seriously hampered in many ways. I confess to being a Roosevelt worshipper, and from a miner's standpoint believe that the President's Forest Reserve policy is right in principle, and will prove a good law if liberally administered. The miners' experience with it so far has been in the nature of its red tape restrictions against cutting timber for actual use in his

operations and objectionable officiousness on the part of the subordinate employees on the reserves.

The restriction of a miner or mining company from cutting timber from the Government land outside of reserves for use in a local mine operation or mining camp without paying stumpage, and the necessity of restricting such cutting to mineral land and the unfair method of classifying the same is a cheap, unwise government policy.

A recent opinion rendered by the Federal Court in a South Idaho case restricted the classification of mineral land to land immediately adjacent to an operating mine, which from the standpoint of a miner or a student of mining history is an unwarranted conclusion, as there are dozens of mines in the west that have experienced reverses through lack of knowledge, good management or appreciation of their possibilities that have been abandoned as exhausted and have remained idle and dead as a wedge for years, that have subsequently been reopened and are today being successfully operated, furnishing employment for thousands of men and paying big dividends. In Idaho, I am going to go to the opposite extreme on this subject and express the opinion that all the mountainous parts of the State, which comprise fully two-thirds of its total area, are mineral lands and good prospecting territory, and I offer in support of my argument the surface production of this area in placer gold, amounting to two hundred millions of dollars, the wide distribution of which offers eminent evidence that the primary sources from which it was eroded by Nature's processes, still contain other millions of gold and associated metals yet to be discovered and extracted.

The progress of mining and metallurgical science in the United States is keeping close pace with the rest of the world, and with every other branch of human industry, and ore deposits are today being worked at a profit on an extensive scale whose merits as a probable source of profit

were ridiculed ten years ago, and the good work seems likely to continue in this line. New minerals and new uses for them are constantly being discovered, and mineral substances and deposits that seem valueless today may prove the basis of important industries a few years hence.

The United States leads every other nation in the production of iron, steel, coal, copper and lead, and it is not from the lack of raw material that we are behind some other countries in the production of the precious metals. In the matter of the encouragement of mining development and original research on mining and metallurgical lines, our Federal laws are defective and crude compared to those of several other prominent metal mining nations, and sadly need adjustment. It seems difficult for the metal mining industry to get a sufficient representation in the National Congress who combine the necessary knowledge of the requirements of the industry and the aggressive legal ability to properly present and press its claims for new laws. Idaho happily possesses one such representative at the national capital at the present time, who seems to be commanding his share of attention, and if our next Legislature chooses right it can readily put its hands on an aggressive associate for him of equal ability.

Idaho leads any other political division of territory in the world in the matter of lead production and is likely to continue to do so indefinitely. Our State still contains enormous undeveloped deposits of low-grade-lead-copper-gold and silver-bearing rock that, in the light of modern metallurgical advancement are likely to form the basis of extensive and profitable mining enterprises in the near future, and their development should be encouraged in every possible way by the State, as the winning of original wealth from the earth puts new life and vigor into every other branch of business.

*FATAL ACCIDENTS.*

It is a difficult problem to get accurate statistics of the number of men employed in the mining industry of Idaho, for the reason that outside of the Coeur d'Alenes producers and two mines in Owyhee County, the operations are very irregular and the crews vary with the season, and, in some instances, from month to month; as near as can be ascertained the total number will approximate 6,000 men; fully half of these are credited to the Coeur d'Alenes.

The total number of fatal mine accidents reported during 1905 was 20, or about 3.33 men per 1,000 employed, as compared with 10 fatalities during 1904, and 20 during 1903, for about the same number of employees.

The causes of the fatal accidents during the past year were as follows:

|                                       |    |
|---------------------------------------|----|
| Explosion of blasting compounds ----- | 5  |
| Fall of rock -----                    | 5  |
| Falling down chutes -----             | 3  |
| Moving cage -----                     | 2  |
| Contact with trolley wires -----      | 2  |
| Moving car -----                      | 1  |
| Caving ground "placer mine" -----     | 1  |
| Gasoline tank explosion -----         | 1  |
| <hr/>                                 |    |
| Total -----                           | 20 |

The above is an awful loss of life, and from the fact that with one exception where two men lost their lives together in a fall of ground, they were all single individual accidents, and in the Coeur d'Alene list, which comprises 14 out of the 20, one of them included a well known foreman and another a well known shift boss of the district. It is evident they were mostly due to reckless personal risk rather than to any unusual surrounding dangerous condition and in most instances might have been prevented had due care been taken on the part of the victim.

Powder accidents again claim a large share of the victims and also includes three serious non-fatal accidents from striking loose pieces of powder in muck piles with picks, which resulted in badly disfiguring three good men and almost ruining their eyesight. This is an ever-present danger in heavy blasting operations, as holes frequently cut off live portions of a charge which is scattered among the muck. However, there is little danger of exploding these stray pieces if the pick is used properly and not jabbed into the muck with unnecessary force.

The method of handling explosives by the big mines in the Coeur d'Alenes, especially at the property of the Federal Company, is commendable. The quantity required for a 24-hour day is thawed in a local outside magazine on wooden shelves by steam or hot water radiators regulated to a very even temperature. It is handled entirely by one man who distributes it through the mine between the night and morning shift, while most of the crew are out, where it is placed in short cross-cuts from the main levels at some distance from the shaft. These cross-cuts are cleaned of refuse daily. They are provided with an incandescent or covered light, and protected with heavy slat wooden doors that are kept locked and nobody carries a key to them but the powder man and shift boss of the level, who hands out the powder, at shooting time, in small canvass sacks supplied with a loop or lap by which they can be swung over the miner's shoulder, giving him both hands free to climb with and handle his light and primer. Caps and fuse are always kept at considerable distance from powder stores.

This method works a great economy in the amount of explosive used as miners are proverbially extravagant in loading holes. It also minimizes magazine risks. Four of the five fatal powder accidents of the past year were among the small mining operations of the counties south of Shoshone and were due, in each instance, to the reck-



lessness of the victim, and as the nature of and danger of handling explosives should be ever in the mind of the operator I shall repeat my precautionary advice of last year on this subject. Nitro-gelatine explosive is now largely employed in the Coeur d'Alene mines. This is a comparatively new compound, composed of nitro-glycerine and collodium or gun cotton that is less liable to explosion by shock or friction and gives off a less objectionable gas, and is giving excellent satisfaction so far. It requires a much stronger fulminate cap to explode it, however, and too much care can not be exercised in handling the caps as they are very sensitive.

In mining such immense bodies of ore as occur in the Coeur d'Alenes, involving the extraction and timbering of spaces varying from 10 to 100 feet wide in sheeted walls that lack the homogeneous coherent standing qualities of limestone and other ordinary country rocks, heavy creeps and movements of large bodies of ground are frequently met with. Conditions of this kind had to be taken care of in the Snowstorm, Hercules, Morning and Bunker Hill Mines last year.

These movements are irresistible in their crushing force and have to be filled with solid cribs of timber or waste filling, and involve a great deal of additional expense in the mining operations. They are seldom allowed to move very far. Their motion is usually slow and gives ample warning, and stoping generally ceases when these conditions are manifested, and the ground is stayed and made safe before it proceeds again.

A great many of the accidents caused by the fall of rock are from barring down small blocks. Three of the fatal accidents from this cause in the Coeur d'Alenes, in 1905, were due to falls of ground that in no case exceeded half a ton in weight, and with due precaution might have been prevented.

Electric haulage has been introduced in several of the

big mines and proves an ideal power for handling the heavy tonnage of ore through the extensive underground levels and tunnels, small motors, using a direct current of 500 volts being employed in this work. This voltage, is supposed to be harmless, but results prove otherwise, as these live wires were the cause of two fatal accidents during the past year, evidently due to the peculiar physical condition of the victims or manner of contact. In such low avenues, as mining tunnels through heavy ground involve, it is impossible to always carry these trolley wires very high above the track and they must be religiously respected and protected as much as possible by guard rails at the most exposed points.

#### *NITRO-GLYCERINE COMPOUNDS USED IN BLASTING.*

More fatal and serious accidents result from the careless handling of nitro-glycerine blasting compounds than from any other single cause in Idaho.

Nitro-glycerine is the principal explosive element in all the ordinary forms of dynamite, giant powder, blasting gelatine, etc. It is mixed with various absorbent materials and chemicals to make it stayable and reasonably safe to handle.

The most fertile cause of accidents from handling this terrifically concentrated force is caused by thawing or softening it. The general run of nitro-compounds freeze or congeal at 40 degrees F., in which condition they are not so apt to explode, and not as effective or dangerous to handle as when soft.

These substances soften slowly at 50 degrees and should never be heated to a temperature exceeding 100 degrees F., and never, if avoidable, by direct dry heat, such as placing it in contact with a hot rock, stove, or metal surface of any kind, or before an open fire where the temperature

of the powder is apt to be raised suddenly, unevenly and too high, for powder will explode by heat as well as by a blow. The safest way to thaw powder is by steam or hot water radiators in a room specially provided, where it should be arranged on wooden shelves with no projecting nails or metallic surfaces, as nitro-glycerine leaking from a case of powder and saturating the wood is liable to explosion by friction on a nail head. The safest way to thaw powder where only a small quantity is being used is by warm water. There are several devices on the market that can be recommended, usually in the form of water-jacketed vessels surrounding a chamber with adjustable drawers or shelves or pan for which the water should be heated to a temperature no greater than in which the hand can be comfortably borne, before being placed in the vessel. Where the manufactured article is not available and convenient, a fairly safe thawer can be made suitable for softening 20 to 40 sticks or cartridges by building a solid oblong box of two or three-inch lumber with a close-fitting lid and adjustable shelves. The box should be deep enough to take in an ordinary, square 5-gallon coal oil can in the center, and long enough for two tiers of loose, wooden shelves, resting on cleats, at each end. Then, if covered with a tight-fitting lid and banked around with dirt, it will hold in good condition the number of sticks or cartridges referred to for several hours. It should be placed in a cellar at the surface, away from other buildings, if possible, or in some out of the way cross-cut. The water should never be heated by candle snuffs in the same receptacle containing the powder, as this is a very dangerous practice. Any thawing device of whatever kind, should be cleansed and kept free from glycerine saturation, as the latter renders wood, cloth, paper or earth on to which it can drip, dangerously susceptible to explosion by either heat or concussion.

Under intelligent handling, nitro-blasting compounds

are safe as black powder. They give off, however, much more deleterious gases, as they consist of changing, unstable compounds that rapidly deteriorate with age, and the older the powder gets the more dangerous it becomes, in the fact that it is more likely to burn without exploding, and more likely to involve missed holes, and the consequent danger of repriming, and the imperfect combustion or burning of nitro-powders produce a very poisonous carbon monoxide gas which is colorless, odorless and capable of supporting the flame of a candle. A very small percentage of this gas, mixed with an already vitiated mine air is very dangerous and should be carefully guarded against.

### *DONT'S.*

The following "Dont's" may be profitably heeded by powder users. Some of them will appear superfluous to the lay reader, or to the careful and experienced miner, but from constant personal contact I know them to be justified.

Don't start to drill in a new face until you have thoroughly satisfied yourself that there are no missed holes or unexploded pieces of powder left in the old butts or cut-off holes. If such are found, reprime and shoot them before starting in to drill, as a slip may connect with the charge that will transmit a sympathetic concussion from the drill, especially if a machine is being employed that may explode a charge while drilling.

Don't depend entirely on reports. It often happens that the upper part of a charge will explode and the lower part remain alive and unexploded without going off.

Don't be in too big a hurry to go back to a burnt hole or "stinker," or to reprime a missed hole, for it is safer to reprime within an hour, say, than to work over a hole that has missed fire for a half shift, as missed holes will remain apparently dead for several hours without any

sign of life, and then, unexpectedly go off. Several cases of this kind have occurred in the State recently with disastrous results.

Don't use any kind of metal tamping bar or tap a wooden one with a hammer when loading.

Don't carry a lighted candle together with powder or a capped fuse in the same hand.

Don't keep caps and fuse in the same place with powder.

Don't store powder in the same room with oils or other inflammable materials.

Don't thaw or keep powder in a blacksmith shop or a dwelling.

Don't jab too hard with a wooden tamping bar, in case a piece of powder fitchers or sticks half way in a hole, when loading, and you can not push it home gently. Never mind your reputation as a loader. Let the hole spoil. If it should result in your losing your job you will have yourself left, anyway.

Don't carry powder about your person to soften it, or attempt to thaw it in the flame of a candle, or crimp a cap with your teeth, or "break" a stick in two. Cut it, no matter how dull your knife is, and if you haven't a knife, go and get one.

Don't jab a pick into a muck pile in the manner of striking a drill with a double hand hammer. You are likely to hit a stray piece of powder that will explode and blow your eyes out. Three such accidents have happened in Idaho during 1905. Use your pick to work the stuff down with more of a raking motion. It is safer, and just as effective.

Don't take a naked light into any warm storage place for powder or sub-magazine, or hang a candle over an open box of powder or scatter particles of powder in making a hole for a primer where they are likely to strike a candle flame.

Don't carry loose powder in your arm. Use a small can-

vass sack which you can swing over your shoulder with a rope loop.

Old powder is dangerous to handle in many ways and hard to explode. Demand fresh powder and strong caps. By practicing the above rules and using ordinary care, you will experience little trouble in handling powder.

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### ***ADA COUNTY.***

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The well defined mineral belt that traverses the Granite Mountains, along the northeast border of Ada County, has received considerable attention during the past year, in the way of mining development, with some very encouraging results.

*Big Giant.*—The Big Giant Gold Mining Company, with a tract of two hundred and forty acres of mineral land, on Big Giant Mountain, near the Idaho City road, ten miles northeast of Boise, have kept a small force of men at work constantly during the whole year.

This extensive group is traversed by several well defined fissure veins. Its principal development at this date is a 400-foot cross-cut tunnel, which taps the main vein at a depth of 175 feet, from which point drifts have been extended along the vein course 360 feet, exposing a handsome ore shoot 180 feet long, and a second ore shoot recently encountered has been drifted in 45 feet that is wider than the first one. This work, together with considerable other development on the ore body, in the shape of raises, etc., has produced 1,000 tons of ore, which now is lying on the dump, that is conservatively estimated to carry an average value of \$10.00 per ton in gold.

The ore is a clean, milk-white quartz, containing straight iron pyrites, and very rarely showing any other objectionable sulphides in the form of lead or zinc. The property is admirably situated for economical operation, both for mining and milling. It is on the timbered north slope of

the mountain, and affords excellent advantages for deep, adit tunnel work.

*New Year Group.*—The same company owns the New Year Group of claims on Shaw's Mountain which carry 200 feet of work, most of which has been done during the past year. This property also has some fine surface ore showings, and, together with the Big Giant, form a proposition of considerable promise. This property is owned largely by local Boise people, and their conservative method of developing it and blocking out a large reserve of ore before entering upon mill construction is commendable and savors of intelligent handling and profitable results.

*Rising Sun.*—The Rising Sun group on the opposite side of the road from the Big Giant property, is another very promising mine and carries some wonderfully rich ore in some shallow surface development. A long cross-cut tunnel has been in course of construction during the past year to tap the main vein of this property, and a very strong water course has recently been cut, which indicates the proximity of the vein.

This tunnel has been driven through very hard granite for several hundred feet and has been a costly piece of work that justifies the rich reward that may be anticipated when the vein is opened and drifted on, as indicated by the showing in the upper works.

*Ironsides Mine.*—At the Ironsides Mine, twelve miles east of Boise, considerable work has been done during the past year. This mine is quite extensively developed, the whole amount of underground work approximating 2,000 feet, and at one point shows an extreme face depth of 400 feet. Its principal fissure can be traced for over 1,200 feet in length, and it carries a pay streak one to seven feet wide, which, according to careful estimates of the management, contains an average value of \$25.00 per ton in gold. The best ore of this mine is a more or less porous quartz, containing iron pyrites, together with a sprinkling of lead and zinc minerals, in common with the ores of the neighboring Neal and Pearl districts. The property has shipped a number of cars of crude ore that have averaged from \$35.00 to \$74.00 per ton in gold, and the whole output of the property since its discovery has approximated something like \$100,000.

The present management is planning the installation of electric power for the operation of the mine and mill, to be supplied from the Barber plant near by. This should afford a marked saving in operating costs, as the mine is situated quite high on the mountain from the river and fuel costs for steam purposes have always been a serious item of expense.

*Twentieth Century Mine.*—In the same district, but considerably nearer Boise, the Twentieth Century Gold Mining Company, Ltd., are developing a group of lode claims, situated on the upper slope of Hot Springs gulch. This company have kept a small force of men employed during the past year and have extended their main cross-cut tunnel 500 feet. This tunnel is expected to strike what is known as the Old Andola vein, a 60-foot fissure, in a porphyry, granite contact, at a further distance of 200 feet from the present face, and at a considerable depth under the apex, as the mountain is very steep in this locality.

The Andola vein produced some fine ore at the surface a number of years ago that attracted a good deal of attention at the time.

The Lucky Hill lode is another important ore course traversing this group that has been developed by a 90-foot shaft and is said to show three feet of ore in the bottom that samples \$32.00 a ton in gold.

The main cross-cut tunnel now being run has passed through 100 feet of mineralized granite that the company's manager feels confident will average \$3.60 per ton in gold, as it is strongly impregnated with iron pyrites. Several laboratory tests have been made on this mineral and are reported to show good results to cyanide treatment, which indicates the possibility of an immense tonnage proposition that will pay a good margin of profit over operating costs.

*The Equitable Group.*—The Equitable Mining Company, with an extensive group of claims on the mountain slopes just north of the Barber Dam, are working a small force of men.

This property carries a big vein which has shown up some good values in a shallow tunnel near its discovery.

The main feature of this company's development is a deep cross-cut tunnel, intended ultimately to be about



3,000 feet long. It has already been driven nearly 900 feet and is expected to tap the big veins above referred to at a further distance of about 1,500 feet, and at a vertical depth of something like 700 feet.

Several other ore courses are known to exist on the line of this big bore that will be intersected by it, and it is not unlikely that other valuable pay veins may be encountered before reaching its main objective point.

A number of other claims on this mineral belt have been worked during the year, and important gold values have been found at several points, indicating that the suburbs of the Capital City will at no distant date bring forth producing mines.

Boise has enjoyed a remarkably progressive year in material development, especially in the building line, which has called for an immense output of building material from its nearby quarries that have greatly exceeded the yield of any former year in value.

The Idaho Vitrified Brick and Pipe Company have again added to their plant, which is being extended into an enterprise of very considerable magnitude.

The new lumbering industry established on the Boise River four miles above the city by the Barber Lumber Company, includes one of the largest, most complete and strictly up-to-date saw mill plants in the United States. It has a capacity of fifty million feet a year, and the company's resources are said to be of such magnitude as to afford a supply of timber that can not be exhausted in 50 years.

The private and public enterprises under way in Boise City and vicinity will call for an outlay of several million dollars a year for the next decade, which shows the high appreciation in which this favored spot and its varied resources are held by conservative investors, and makes the prediction of its rapid expansion to a city of 50,000 people an easy prophecy.

## **BEAR LAKE COUNTY.**

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This county, situated at the extreme southeastern corner of the State, has some extensive manifestations of copper that occur at the junction of fine-grained sandstone or flagstones, and overlying limestone and limy shale. Copper-stained rock can be traced along the anticlinal crest of a ridge northeast of Montpelier for a distance of several miles in length. It appears to have originated as a shore line precipitation of a shallow body of water, and the best values are found replacing the outlines of organic remains.

A number of claims have been partially developed along this belt, which, at one point, includes a vertical shaft 200 feet deep. A recent consolidation of interest into one large company for the purpose of centralizing the development is a move in the right direction, and is likely to sooner arrive at the merits of the deposits.

*Humming Bird Mine.*—On the opposite side of the Bear River Valley the Humming Bird Mine has been developed quite extensively. It was discovered from some immense boulders of high-grade copper carbonate and oxide ore at the surface, from which several profitable shipments were made. No such body of high-grade ore has been found underground as the boulders indicated, yet it is the opinion of the local people that the ore shoot from which it was derived will yet be discovered and contain a valuable resource of rich copper mineral.

A lively interest has been created during the past year or two in the mineral resources of Bear Lake County by the discovery of extensive beds of phosphate rock which have been covered with several miles of locations and have attracted the attention of some heavy eastern and western capitalists familiar with this class of deposits, and, from present indications, are very likely to prove the basis of an extensive and profitable industry in this mineral, which is one of the most desirable elements of high grade fertilizers.

This county contains a variety of useful minerals, including some good deposits of sulphur and mineral water, also evidence of oil, natural gas and coal, and when properly studied and investigated is likely to develop an important industry in the production of useful minerals.

**BLAINE COUNTY.**

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The year's result of mining operation in Blaine County has been marked by some important developments, and adverse experiences, as well.

*Minnie Moore.*—The great Minnie Moore bonanza, while whittling away on its eight million dollars of production, has encountered another aggravating displacement of its ore body.

The disturbance this time appears to be a profound fault movement that has shifted the upper ore horizon out of its normal plane.

The property has been examined and experted by some noted geological talent during the year, whose conclusions seem to have swung off the line of investigation looking to the rediscovery of the rich ore bodies for which the mine has been noted in an opposite direction to that which has been formerly followed. The ore bodies are being looked for in the foot-wall country and several new ore courses have been encountered in that direction, carrying pay mineral, but no important bodies have been encountered so far. The theory is brought from Utah and applied to the Minnie Moore that the solutions which formed the ore ascended through narrow, vertical footwall cracks to the point of favorable precipitation, which is argued to have been in the replacement of narrow dikes of basaltic igneous rock.

This line of investigation and theory of origin is not shared by a good many practical men who are acquainted with the underground conditions of the property. It, however, has many points of probability, and embraces the supposition that the Minnie Moore ore course is simply one of several ore channels in the zone of fissured and mineralized country rock that is estimated at 1,000 feet or more wide, and embracing the Queen of the Hills vein within its limits

The Minnie Moore production for 1905 is cut down materially as compared with 1904, as the shipments since the middle of the summer have been very light. The property has been worked by leasors, and the development feature by contract, employing a force of about thirty men. The

company are fully alive to the freakish action of this famous bonanza, and the present suspension of rich ore production, it is to be hoped, is only one of the temporary interruptions for which the property has been noted.

That such an ore channel should suddenly be cut off and annihilated at such a comparatively shallow depth is contrary to extensive mining experience, and it seems only a question of persistent exploratory work, to bring the property into bonanza conditions again.

*Red Elephant.*—Next to the Minnie Moore, the Red Elephant Mine, at Bullion, has been the most actively operated during the past year of any of the Wood River properties and has shipped quite a large amount of high-grade mineral from its fourth and fifth levels. A new cross-cut tunnel has been run on the property 1,150 feet long which struck a well-defined vein at 575 feet in, on which drifts have been extended 900 feet, and connections are now being driven for with the main stopes above, where the bulk of the mine's early production came from, amounting to over one and one-fourth millions of dollars. ,

The first-class ore of this mine runs 65 per cent lead and 135 ounces of silver per ton and contains considerable gray copper scattered through the galena. Several carloads of this class of mineral were shipped during the past season, together with a number of cars of high-grade concentrates.

The Red Elephant carries three distinct veins, each of which have produced rich ore, but the bulk of the yield has come from the Red Elephant vein, which had some large chambers of very high-grade mineral. The ore occurs in blue limestone, and the stopes at the fourth and fifth levels show a miniature repetition of the buckling fold experienced in the Minnie Moore by the English Company, at the ninth level. These short flexures, however, are closely connected and easily followed out from one to another. The property carries many indications of greatness and its continued extensive exploration is likely to justify its cost in a very handsome manner.

In addition to the Red Elephant, some development work has been started during the year at the Eureka, another well known bullion property, and recent reports indicate the discovery of rich ore.

The Jay Gould, in the same district, is being worked by leasers who are sending down some samples containing high values in silver and lead.

*Nay Aug Mine.*—One of the most important discoveries of the year has been made on the Nay Aug Mine at Deer Creek by Manager Williams, of the Wood River Zinc Company. This is one of the strongest veins in the Wood River District. It is a fissure that cuts the sedimentary formations and the eruptive granitic rock without interruption. Its early production, amounting to \$350,000 in value, was entirely derived from that portion of the vein traversing the sedimentary formations. The new discovery is in the adjacent grano-diorite, both walls, and is entirely independent of the old works.

The vein is found to be seven feet wide and a pay ore shoot has been explored for 350 feet in length that is four and a half inches to three feet in width and from which some very handsome and profitable ore shipments have been made during the closing months of the year, while the condition of the property at this date indicates that it will continue to be a regular shipper during 1906.

The ore is high-grade and compares with the best in the camp in both silver and lead. The strength of the accompanying vein and of the pay ore in this igneous formation, which is a common association of the best ore deposits of the Wood River District, should settle the theory of its pre-mineral occurrence, and the fact that it is not likely to limit the downward or lineal extension of the ore courses.

*Relief Mine.*—The Relief Mine, adjoining the Minnie Moore to the northwest, has been extensively developed during the past year and a large amount of concentrating ore has been disclosed, but no important bodies of shipping mineral so far.

*Con. Virginia.*—The Alturas Mining Company have also operated on the Con. Virginia Mine, adjoining the Relief, but have been unable to unravel the complicated dynamic disturbances they have encountered, and the scene of operation has been shifted by this company to the Bullwhacker Group on Deer Creek, where they are now developing a big, mineralized zone 40 feet wide, in limestone, with a force of 10 men. This great zone has several ore courses.

One of these carries from 2 to 20 inches of high-grade silver-lead mineral, and some old, shallow surface works on this property are reported to have produced \$80,000 in early days.

The new work now in progress is in virgin ground northwest of the old works, and a little first-class shipping ore is being accumulated as the development proceeds.

The mine is in a good locality and is likely to be heard from as an important shipper in the future.

*Edna Mine.*—The Edna Mine, located on Galena Gulch above the old property of the Alturas Company, has been bonded recently to some Portland capitalists, who are preparing to work a force of men during the balance of this winter in development.

This property carries a well-defined fissure in diorite formation. It has produced several shipments of high-grade silver-lead ore from earlier operations that have carried 74 per cent lead and 80 ounces of silver by the car-load lot.

A cross vein running almost at right angles to the main vein on this group also carries very rich mineral and the property is very favorably thought of locally.

*Oswego Mine.*—The Oswego Mine, a short distance north of the Edna, has been undergoing steady development during the past year and several features of its complicated mineralized vein unraveled, and the management feels confident of bringing the mine to a condition of profitable production during the coming season.

*Croesus Mine.*—The Croesus Mine, near Hailey, has not been operated to any extent during the past year, with the exception of keeping out the water and a limited amount of development on the lower level.

This property has an immense tonnage of pay ore, consisting of copper-iron sulphide mineral carrying good values in gold.

It is developed to a depth of 800 feet by a fine three-compartment shaft, and the ore bodies have proven much larger and stronger in the lower levels than they were at a shallower horizon.

*Democrat Mine.*—The Democrat Mine has been steadily operated during the year and made a number of important shipments of high-grade ore. This is another of the lead-

silver properties of the Wood River District whose deposits occur in granitic formation.

*Pittsburg-Allegheny.*—The Pittsburg-Allegheny is another fine prospect that has been undergoing development by a small force for some time. It is situated on the divide between Croy Gulch and Colorado Gulch, on the Minnie Moore ore belt. It carries a big fissure, thirty feet wide in places, richly impregnated with gangue minerals that is in a lime and diorite contact and shows strong evidence of capping good ore bodies.

*Dollarhide.*—At the head of Warm Spring Creek, west of Ketchum, the Dollarhide Mine has been quite extensively developed during the past year and is carrying a good force of men this winter.

This mine is opened on a very strong fissure in which several good ore shoots have been developed. One of these is fully 250 feet long, with an average width of two feet. Another shoot is 150 feet long, and a third one 100 feet long.

The ore is a heavy mixture of zinc, iron and lead sulphides, in a quartz gangue, and carries 40 to 60 ounces of silver per ton. Ore to the value of \$10,000 was shipped from the mine during the past summer, and a jigging plant was erected for the concentration of its ores but wasn't completed in time to make a thorough test before the water supply froze up.

It is the intention of the company to complete this mill in the early spring and put in additional machinery. Its present capacity is thirty tons a day. A new tunnel has been started on the property, which will greatly facilitate its further extensive development and ore extraction.

Most of the silver in this ore is contained with the lead, and when properly separated makes a high-grade product.

The zinc contents of the ore are likely, also, to prove a profitable by-product when the mill is equipped for its separation, which, I understand, is to be a feature of its additional machinery to be added in the spring. This company owns a very large group of claims that carry some magnificent advantages for deep adit tunnel work on both sides of the mountain.

#### ZINC.

Wood River has the distinction of adding an important

new mineral product to Idaho shipping lists during 1905 in the way of zinc ore and concentrates, with a total output aggregating 2,300 tons that would average over 40 per cent zinc.

*Lucky Boy.*—The largest producer of zinc ore has been the Lucky Boy Mine, operated by the Lanyon Zinc Company, on Warm Spring Creek, twelve miles west of Ketchum. Its output has aggregated nearly 2,000 tons of an average value of about 40 per cent zinc. This ore is derived from a body of massive zinc-iron sulphide mineral in a formation of white crystalized limestone near a granite contact.

The ore is shipped crude, without any milling operation, the heaviest iron sulphide being roughly sorted out by hand. This mineral has been shipped to Salt Lake and to Iola, Kansas. The company have a very large group of claims and several gossen showings that indicate other similar bodies of massive mineral. The company has been hampered in its production by lack of wagon transportation, and could have made a much larger yield had the teams for hauling the ore been available.

*War Dance.*—The highest grade zinc mineral shipped from the Wood River District was mined on Deer Creek and consisted of concentrates and crude ore from the War Dance and Nay Aug Mines, which were operated by the Wood River Zinc Company, who built a zinc concentrating mill last summer, but its operation was not entirely successful, as the mill needs additional machinery for the proper separation of the zinc concentrates. However, a number of good shipments of concentrates were made that carried 45 per cent zinc, together with several cars of crude ore of about the same value from the War Dance.

The Nay Aug also produced several shipments of still higher grade crude sulphide zinc ore during the past season that averaged 48 per cent zinc. Other zinc shipments were made from some of the Coeur d'Alene mines, and the total output of the State in gross contents of all crude ore and concentrates shipped during the year will aggregate over 2,000,000 pounds of zinc, which is quite an important initial year for a new branch of production, and the varied resources of this mineral in Idaho are likely to afford a rapidly increasing tonnage, if reasonable shipping rates can be obtained from the transportation companies.



*Summary.*—The output of mineral from the Wood River District, as a whole, will show a slight falling off as compared with 1904, but several new shippers have contributed to the total result. This and other evidences indicate that the output will likely be brought up to the standard of 1904 during the coming year, and probably exceed it, as there are several hundred men now employed in the district in developing the different properties which experience teaches only need extensive exploration to bring results.

If development work were as energetically and extensively pushed on the proportionate ore showings of the Wood River Districts as it is in the Coeur d'Alenes, it is my opinion that the district's production would be doubled and trebled in a very few years, as modern mining history teaches that silver-lead deposits are among the most permanent and deep seated in the mineral world.

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## **BANNOCK COUNTY.**

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### POCATELLO DISTRICT.

*Moonlight Mine.*—Mining development has been continued in this district during the past year on several properties, but no ore shipments have been made from any of the mines during 1905. However, the prospect at the present date is good that the "Moonlight" will again put out some shipping ore, as recent development on that property is showing up some mineral of exceptional value, consisting of copper glance associated with the usual red oxide and rich bornite mineral for which this mine is noted.

The new ore discovery on this property has been made from the extension of a drift in the old workings. A new cross-cut tunnel on the opposite side of the mountain is being driven towards the dip of the vein that has already attained a length of 500 feet and is expected to encounter the vein at a short distance further in and at a depth of several hundred feet below the croppings. This will great-

ly facilitate the development of the mine and the extraction of ore, as it is evidenced from the new discoveries in the old drift above that the rich copper mineral is going to hold out to the deep. In fact, the property is looking so well that the stock of the company has been taken off the market and the development costs are being carried by voluntary assessments of the stockholders.

*Great Western.*—At the Great Western Mine, within four miles of Pocatello, a good deal of work has been done during 1905 and a crew of eight men employed a large part of the time. This work has shown up some excellent copper sulphide ore and the operators have great hopes of developing a shipper.

*Fort Hall Mine.*—This mine, situated south of Pocatello, and about two miles west of Portneuf Siding, has continued an extension of its long tunnel consistently throughout the year, with the exception of the short suspension due to fire in the power house.

This great tunnel has been extended into the mountain 3,200 feet, and recent reports from there say that some valuable copper mineral has been encountered. Such an extensive piece of mining development in such a new district is worthy of success, and it is to be sincerely hoped that the new strike reported will prove to develop into a big resource of shipping ore.

There are several other prospecting ventures in the Pocatello district that have been worked on and kept alive during the past season, but no startling results have so far been reported.

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## **BINGHAM COUNTY.**

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Bingham County affords no particular items of interest in mining development for 1905. The output of gold from this county amounts to 250 ounces, and is mostly derived from small placer operations along the Snake River.

*Carriboo District.*—Some activity was manifested in the

Carriboo District, where some rich placers and gold ore deposits have been developed to some extent. The copper ore discoveries of that district reported a year ago have so far failed to materialize, and the anticipation of their promoters seems to have been badly over estimated, but the work is still being carried on with strong hopes of success.

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## **BOISE COUNTY.**

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### DREDGING ENTERPRISES.

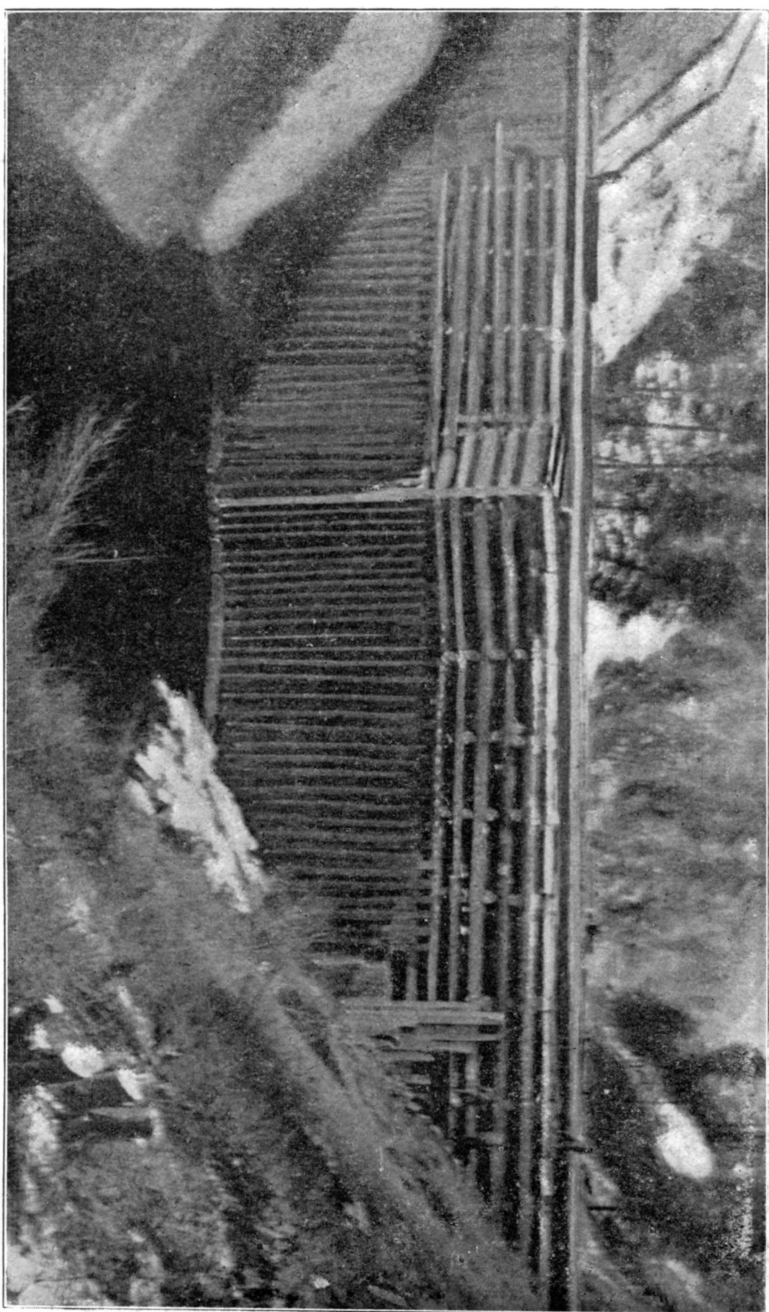
*Moline Mining Company.*—Some important development features have been in progress among the mining resources of Boise County during the past year that warrant the anticipation of a largely increased yield of precious bullion, for which the mines of this particular county are noted.

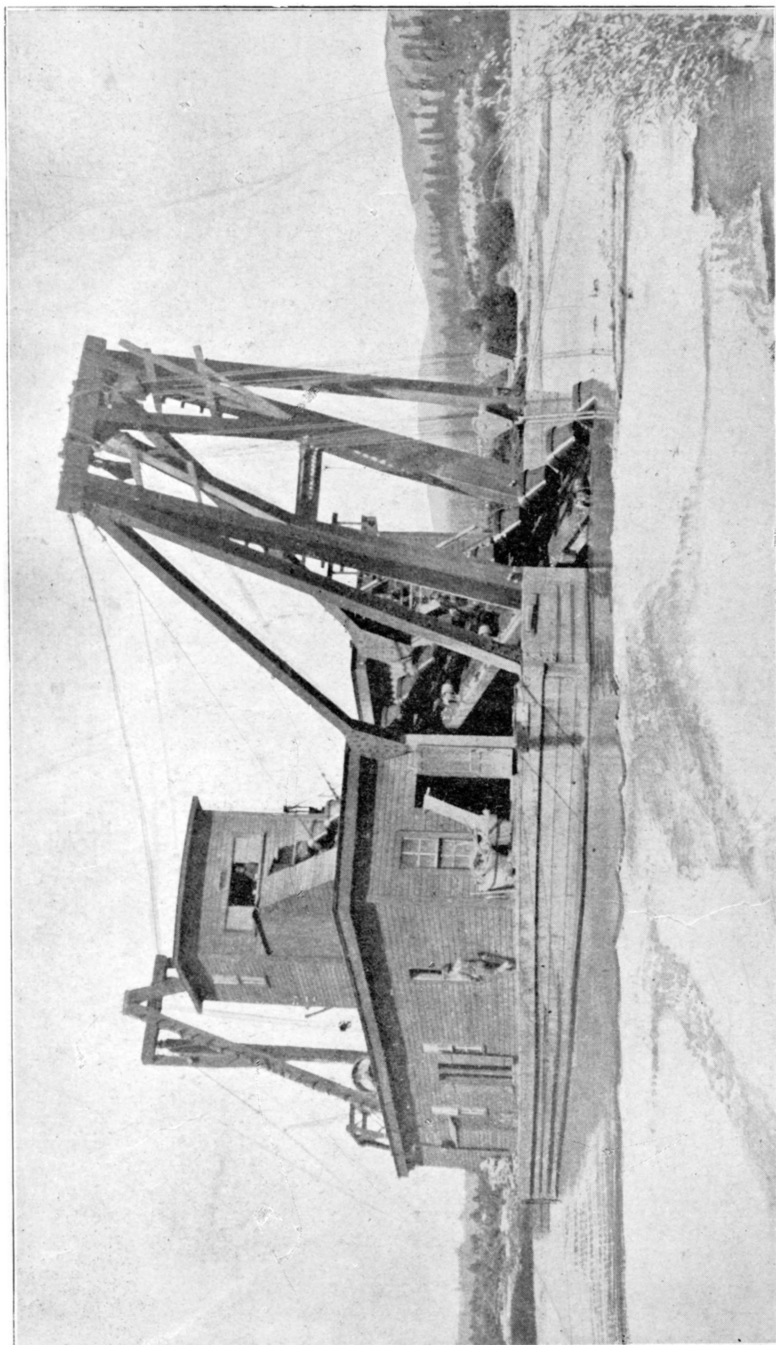
One of the most important installations of the year was the magnificent new dredge boat of the Moline Mining Company. This company own a splendid tract of ideal dredging ground near Placerville that is fully one hundred acres in extent and ranges from 17 to 45 feet deep, containing big, paying values in gold.

The new plant installed on this property during the past summer consists of a modern, strictly up-to-date bucket-elevator dredge of the Risdén Iron Works type shown in the accompanying illustration, with 5-cubic-foot buckets. It is equipped with a new design of steel tumbler gantry, patent distributing box and cocoa matting gold-saving device.

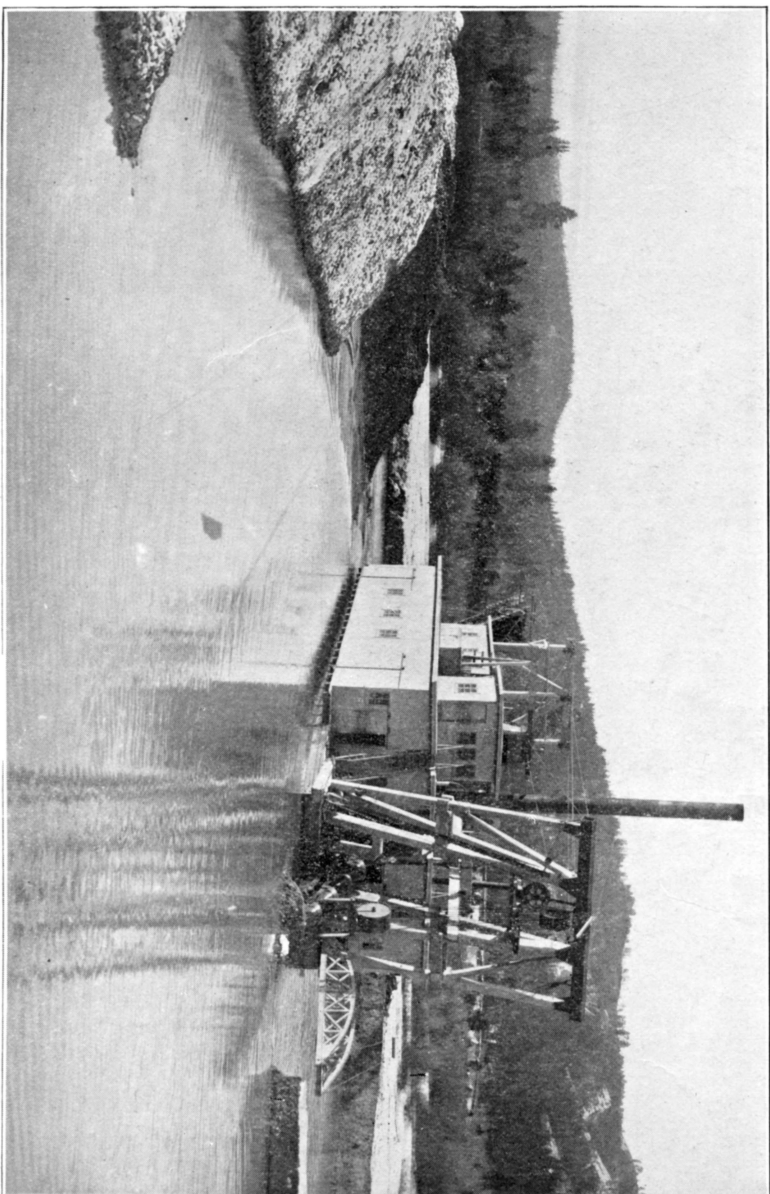
The boat is 30 feet wide by 88 feet long with a 7-foot depth of the hull and has an average working capacity of 2,000 cubic yards per day. It was finished in time to be put in operation and well limbered up when the season closed and will be started early in the spring as soon as the ground thaws out and should make a handsome yield of gold next season.

PAYETTE POWER DAM, IN PROCESS OF CONSTRUCTION.





UNION CO'S. DREDGE NEAR CENTERVILLE. LATELY READJUSTED AND GREATLY IMPROVED.



RISDON DREDGE BUILT BY MOLINE MINING COMPANY IN 1905 NEAR PLACEVILLE.  
DAILY CAPACITY 2000 CUBIC YARDS.



The ground belonging to this company has been very thoroughly prospected and its cubical yardage is such as represents a lease of life that will extend over twelve or fourteen years' successful operation.

*Centerville Dredge Company.*—Another most important and extensive dredging and power enterprise was started on during the past summer by the Centerville Dredging Company, who have reconstructed their dredge plant near Centerville and added a good many new features, greatly strengthening it and increasing its capacity.

This company, or some of its associated owners, have also undertaken a large electric power development enterprise on the South Fork of the Payette River, where a dam is being constructed, eleven miles north of Centerville. This enterprise also includes a well-graded wagon road which connects the Basin with the Payette River from Grimes' Pass that was built last fall.

The dam construction is now well under way. It will give a drop or head of 50 feet for the whole river and be capable of developing 2,500 horse power when the full plant of machinery is installed. It is the anticipation of the management to be able to deliver 1,500 horse power in time for next season's dredging operation, as the foundation features of the dam are completed.

This should prove a very profitable enterprise for its promoters, as the Basin will afford a large market for electric power, which is to be installed and transmitted from the dam. It will greatly facilitate and cheapen the cost of dredging operations, as steam power for this purpose is very expensive and not nearly so well adapted to dredging as is electricity, for these plants have so many small auxiliary engines.

The Centerville Dredge Company have an extensive tract of good ground that is especially adapted for dredging purposes and contains good values.

*Janney Dredge.*—The Janney Dredge, near Centerville, is likely, also, to be started up when this electric power is available. This is also a large 5-foot bucket elevator dredge and the property embraces an extensive stretch of good gravel.

*Boston-Idaho Gold Dredging Company.*—The Boston-Idaho Gold Dredging Company, whose extensive tract of



territory is situated in the vicinity of Idaho City, has been undergoing very careful and systematic sampling for the past year by a drilling machine, with which its pay channels have been blocked out and mapped in a very thorough manner.

The property contains an area of 600 acres and the dredge conditions of small gravel, soft bed-rock, freedom from clay and good values make it an ideal proposition for this line of operation. Their extensive prospecting tests demonstrate that the ground contains an average value of something like 20 cents per cubic yard, and the total contents run up into the millions of dollars.

This property has been operated for several years by a small 3-cubic-foot bucket elevator dredge that has proven very successful and worked a straight stretch of the gravel beds covereing an area of fifty acres in the broad channel of Moore Creek that has yielded 17 to 20 cents per cubic yard in gold.

The ground is from 15 to 30 feet deep, and the assurance of electric power at a reasonable cost will see the commencement of its equipment with two large modern dredges having a combined capacity of 4,000 or 5,000 cubic yards a day, which, together with other dredging enterprises of the Basin, will again swell the stream of yellow metal from this famous old placer district to the proportion of its more prosperous years.

#### HYDRAULIC MINES.

The light snows of last winter and the consequent short water season greatly retarded the production of the old channel hydraulic diggings for which the Basin country is famous. However, by an intelligent trade and division of water interests in the vicinity of Placerville, a good yield was obtained from the Leary Brogan diggings, and from the McMasters-Hawley diggings. The Blain Company and Oaks Hydraulic plant also made good yields and the old channel diggings near Idaho City were also successfully operated for a short season, but several of the other placer operators, owing to the more limited supply of water, had a very poor season.

Boise Basin, in addition to its extensive flat dredge placers, contains millions of cubic yards of old glacial channel deposits in banks from 20 to 100 feet high that

carried values of 10 to 50 cents per cubic yard in gold. The gold in these old channel diggings is higher grade than the modern channel gravels. It is worth, in several localities, over \$19.00 per ounce, and is of a round, shotty shape.

Negotiations were in progress last season, looking to the diversion of the waters of upper Grimes Creek onto some of these immense banks of gravel in the vicinity of Placerville. If this deal should be consummated it would justify an extensive hydraulic operation.

#### LODE MINING.

*Gold Hill and Iowa.*—One of the most notable transactions of the year in lode mining development of the Boise Basin country was the acquisition by eastern capitalists of the Gold Hill and the Iowa groups situated at Quartzburg. These properties have been the largest producers of rich ore in the whole Basin country. The Gold Hill and Iowa are opened on a pronounced fissure vein that stands nearly vertical. It is three to ten feet wide, in a porphyritic granite formation. The ore carries free gold and sulphurets of iron.

*Pioneer.*—The Pioneer vein or zone is another distinct ore course on the Gold Hill group of a different character, and consists of a quartz porphyry dike impregnated with iron pyrites, and a stockwerk of rich gold-bearing quartz seams.

It has been developed with a vertical shaft 400 feet deep, from which four levels have been extended and the ore stoped out in bodies 20 to 60 feet wide that is said to have carried average values of \$8.00 to \$12.00 per ton, and some of the small included quartz veins have yielded ore that was valued by the pound, containing very rich results in coarse, wiry and nuggety gold.

The Gold Hill has also been developed by a vertical shaft 400 feet deep, and the Iowa by a succession of adit tunnels to about a similar depth.

These old properties were formerly equipped with an old-fashioned 25-stamp mill, which was kept in steady operation for twenty-five years, and the combined output of these three claims is conservatively estimated at \$4,000,000, which is a remarkable record for such a comparatively shallow depth in development.

The Pioneer deposit is especially promising as its lineal

development has been very limited and its great size is almost a guarantee of permanency and continued productiveness to a very much greater depth.

The reason for suspension of operation at these old properties was the encountering of a heavy flow of water and a more refractory condition of the ore. The old operators never attempted to save anything but the free gold contents of the ore, allowing most of the values of the concentrates to run to waste in the creek.

The present management have been making some extensive practical tests with a view of finding a treatment to obtain the values from the baser ores and have found that by proper manipulation they yield excellent results to cyanide treatment.

The Iowa group has been equipped with a 20-stamp mill, and an 800-foot aerial tramway. Its old tunnels have been cleaned out and the drifts reopened and put in shape for production, and it is the intention of the company to install a cyanide plant early next season.

I am informed by the management that electric power will be installed to operate the plant and that the unwatering of the Gold Hill and Pioneer will shortly be undertaken. The property is held in very high esteem with local people well acquainted with its history and fully warrants the extensive plan of development now being inaugurated, as there is no physical reason why the next 400 feet below its present lowest point of development should not yield as many million dollars in gold bullion as the first 400 already have done.

*Sunday Mine.*—The Sunday Mine, adjoining the Gold Hill, was operated during the past year with a small force and a test run of 100 tons of the ore was made in a 5-stamp mill, which yielded \$10.00 per ton in free gold, in addition to several tons of clean iron concentrates that carried good values.

*Belschazzar Mine.*—The Belschazzar Mine, near the Jerusalem Valley Road, a little west of Quartzburg, was equipped with a 10-stamp mill last fall, and a successful run of the ore was made, yielding values of \$8.00 to \$12.00 per ton in free gold. This is a mineralized fissure within a big dike of porphyry. It is 5 to 10 feet wide and has been developed by three shallow adit tunnels, which, how-

ever, expose a large reserve of ore. The ore is simply an altered condition of the porphyry dike that is netted up with fine quartz seams. The mineral is quite free milling in the first and second levels and produces some very handsome specimen ore. In the third level it is showing considerable iron concentrates. These, however, are proportionately rich in gold, and appear to yield a high proportion of their value to plate amalgamation and the balance to cyanide treatment.

This mill had to suspend operation late last fall owing to the break in the tramway cable, which has probably been readjusted by this time. The ore showing in the property is of such length and size as to warrant the anticipation of a successful and long continued operation of the mill.

*The Buckskin Mine.*—The Buckskin Mine, situated at the head of a small tributary to Grimes Creek, near Pi-oneerville, was operated during the year and produced 1,000 tons of good gold ore, which was treated in a 2-stamp Tremaine mill on the ground.

This property carries two good strong fissure veins whose erosion was doubtless one of the principal sources of some of the rich placer diggings that lie below it.

It is understood that a deal is on foot for the purchase of this property by Chicago capitalists and that its extensive development will be undertaken, as the result of the work done on it the past season, which showed up the evidence of a successful mine.

The value of the ore treated is not known, but it is understood to have shown a good margin of profit.

*Gambrinus District.*—In the Gambrinus District, near Idaho City, the property of the Gambrinus Gold Mines Company was developed continuously during the past year. This property is being opened through a vertical, three-compartment shaft that is now down 400 feet and from which some extensive cross-cutting and drifting has been done, developing three clean and well defined fissures. Some additional territory has lately been acquired by the company and plans are being formulated for the installation of a water power to run the plant with, which, it is figured, will afford a large saving in operating costs.

A total of 2,500 feet of development has been done on

this property so far, some of it through very tight, hard granite, but the company is not yet ready to enter into milling equipment, as they feel inclined to thoroughly explore the ground and satisfy themselves of the nature of the ore to be handled, and its quantity, before undertaking further expense in this line.

The property is traversed by several well-defined fissures that have each produced high values in their shallow, surface horizons to early operators, and a repetition of similar values at depth would mean big profits by modern methods of treatment.

The present development has been done in a very substantial manner and is intended to solve the problem of permanency of ore values with depth in this district, which was so rich near the surface in placer as well as quartz gold.

*Gold Coin Mine.*—The Gold Coin Mining Company, owners of the Gold Coin group of claims, a short distance above the Gambrinus property and adjoining the Washington Mine, has developed its property to considerable extent, disclosing a strong fissure vein containing some good gold ore.

It is equipped with a hoisting plant and has been opened with a shaft 164 feet deep, together with considerable drifting, and the company is planning its further extensive development, as the values and ore showings so far obtained seem to indicate a profitable mine. The company have also acquired a desirable water power and mill site on Moore Creek, which is being improved.

*Edna Mine.*—Interest was revived in the silver ore resources of the Basin country last season by some work on the Edna Mine near Banner. This is a large deposit of silver ore carrying very fair values, not nearly so rich as the Banner ores, but in large bodies, and of a very simple mineral mixture, which, it is believed, can be readily treated by a leaching process. The values are said to average from thirty to forty ounces and the ore to be 5 to 15 feet wide. The owners have started to equip this mine with a diamond drill with which some extensive preliminary testing of its ore bodies will be done.

*The Banner Mine.*—The Banner Mine has been idle for several years, or since the drop in silver values in the early

'nineties. Prior to that time it was a very successful property and produced over \$2,000,000. It contained very high-grade silver ore, a good deal of which ran several hundred ounces per ton, and the property is said to have fine shoots of this class of mineral in the floor of its lower level now.

The ore of this mine was so rich as to justify its former operators in running a cross-cut tunnel nearly a mile long to gain a lift of 80 feet, as the fissure was very wet, and pumping costs excessive. There is a magnificent cross-cut tunnel site in the vicinity of this property, however, by which it could be tapped at a depth of 1,000 feet or so, by a tunnel 12,000 or 14,000 feet long, and as the group contains a number of distinct fissures, several of which have produced very high-grade ore, in addition to the main producer, it would seem to justify such a method of development as long tunnels when properly equipped with machinery can be very rapidly run.

*Hay Fork District.*—Near the head of Moore Creek, in what is known as the Hay Fork District, some rich gold quartz discoveries were made last season, and quite a little excitement resulting in the location of a large number of claims was worked up.

The district is said to carry some strong fissure veins containing good average values and small pay streaks of very rich native gold ore. Specimens containing sensational values in coarse gold were brought to Boise from this district during the summer and considerable development is likely to be undertaken there next year.

#### PEARL DISTRICT.

A great deal of intelligent development was prosecuted in the gold belt extending from Pearl to the Payette River at Horseshoe Bend. Several vertical shafts were put down to considerable depth and a number of long tunnel enterprises undertaken and extended.

*Cyanide Process.*—The most notable development of the year's progress in that field, however, has been the introduction of the cyanide process for the treatment of its ores.

A cyanide plant of considerable capacity was installed at the Lincoln Mine, but its success has not yet been fully demonstrated. At the Bleack Pearl Mine, however, better results seem to have been obtained, and while it is too early to say how the treatment is going to succeed on the general

ores of the camp, I am reliably informed that a very close saving is being made with this method at the Black Pearl Mine, whose plant is in successful operation at this date and showing an extraction of better than 80 per cent of the gold values on a \$10.00 ore, which is a very satisfactory result and much better than was anticipated by the management. If such results can be maintained, or even a good deal lower percentages of extraction, it will mean big things for the Pearl District, as it has big reserves of fair grade gold ore that won't stand high shipping charges and do not yield their gold values very readily to plate amalgamation.

*Black Pearl Mine.*—The Black Pearl Mine has been very efficiently managed. It is developed with a vertical shaft to a depth of 400 feet and has some fine reserves of ore undercut.

Its mill is of fifty tons daily capacity and is said to be as nearly automatic in its operation as such a plant can be constructed under similar surrounding conditions.

The management has recently encountered an unusual condition in lode mining, in the shape of an excessive flow of what acts like sulphuretted hydrogen gas in its lower level, which has retarded the development at this point and necessitated an extension of the development in other directions. It is believed, however, that this feature will be overcome when further connections are made in the levels above.

The property has a large reserve of ore in sight and if the process continues to handle the ore as satisfactorily as it has started in to it should commence to yield a handsome margin of profit at an early day.

*Leviathan.*—A carload of rich crude ore was shipped from the adjoining Leviathan property, which is extensively developed, on the same vein which traverses the Black Pearl group, and on the Checkmate Mine, adjoining the Leviathan further to the west, some very successful leasing operations were carried on during the year and considerable bullion produced from the upper levels.

*Checkmate Mine.*—The Checkmate has a very large reserve of \$5.00 or \$6.00 ore west of its shaft. This was a class of ore that wasn't considered available for the method in treating the product of this mine by amalgamation and

concentration formerly employed, but if the cyanide treatment will handle it, as indicated by the work at the Black Pearl, it should become available for a good margin of profit as it is already blocked out with several levels and in good shape to mine. The development at the Lincoln has been greatly extended during the year. A vertical shaft 340 feet deep has been sunk and a cross-cut made to the vein together with a long drift at the 300-foot level, where some very rich shipping ore has recently been encountered, and the company is continuing their cyanide tests on the ore and have great hopes of making it yield successfully to this method of treatment in the near future.

Considerable development work has been carried on at the property of the El Paso, I. X. L. and United Mines, also at the Nellie Mine, at the Payette River, where a cross-cut tunnel has been extended 700 feet. This property has recently been equipped with air drills with which the tunnel will be rapidly extended. It is expected to strike the veins that traverse the group at a distance of 1,200 feet from the portal.

There are two distinct fissures on this group that are 9 feet and 30 feet wide, respectively, said to carry average values of about \$8.00 per ton.

*Osborne Mine.*—The Osborne Mine, in the same locality as the Nellie, has also been quite extensively developed during the year and is showing up a large reserve of good ore. There are a number of other claims being operated along this belt and a total of something like 200 men employed at the present time, and the successful introduction of the cyanide process in the treatment of its ores should mean a big yield of bullion in the near future, as extensive reserves of fair grade gold ore have already been exposed at a number of points.

*Deadwood Basin.*—Quite a revival of interest has been made in the quartz and placer resources of the Deadwood Basin District in the past two or three years, which has resulted in the installation of considerable hydraulic equipment on one of the well known placer propositions of that district.

A good deal of ditching has recently been done there and material taken in for an extensive hydraulic plant, which it is expected will be gotten in operation for the season of



1906, and profitable results are almost sure to be obtained, as the placers of this district are known to contain good values.

The gold quartz resources of this basin have also received a good deal of attention of late and a number of fine showings have been made.

#### PAYETTE LEAD DISTRICT.

*Page Group.*—This district, which was prominently mentioned in my last annual report was personally examined during the summer and found to have many interesting features. It is situated at the head of Omaha Gulch, a 3-mile canyon that originates in the Sawtooth Range and empties into the South Fork of the Payette at a point about 25 miles above where the State Wagon Road crosses that stream on the route to Bear Valley and Stanley Basin, via Banner. This is the property that was going to discount the Coeur d'Alenes in extent and resources of silver-lead mineral, and, as a matter of fact, it has superior surface indications of mineral to the surface showings of the Coeur d'Alene lead ore bodies, but it will have to go some to ever match them in importance at depth.

The principal feature of this district is an extensive group of claims covering a series of large fissure veins in eruptive granite or quartz-monozonite.

Several of these veins are accompanied by a narrow dike of basaltic-looking igneous rock. The veins, of which there are seven or eight in number, are nearly parallel, traversing the rugged south slope of the Sawtooth summit. They are 5 to 15 feet wide, strike east and west, and dip north at an angle of 45 degrees, and have been covered along their strike by continuous location for a distance of three miles. They terminate to the west abruptly, at a big north and south dike of the same kind of basic igneous rock that is found in the narrow dikes accompanying. Before reaching this cross dike several of the quartz veins seem to converge and form one enormous body of massive white quartz 400 feet wide and several hundred feet long.

This immense body of silica is sparsely sprinkled with lead, zinc and iron minerals, and near its underlying wall contains some honeycombed bands in which have been found coarse spots of galena ore, associated with gray copper, rich in silver. The soft, cellular quartz, or honey-

combed bands, are also a pronounced feature of the smaller parallel veins to the east of this big body, and, where they have been dug on, have been found to contain high-grade samples of lead sulphide ore, rich in silver.

The lead ores of this great group of fissures, are invariably rich in silver, usually carrying from two to three ounces of silver for each unit of lead. If these massive surface bodies of silica should give place to even concentrating values in lead, with the highly associated silver values it contains, the property may possibly develop into a phenomenal source of mineral traffic.

It seems likely, from the present conditions at the surface, that a number of pay streaks will be found by following these honeycombed courses down on the dip of the veins at a comparatively shallow depth, say 50 or 100 feet below the croppings, that will prove very heavy in galena, and probably afford considerable crude shipping ore.

The property has fallen into the hands of some wealthy lead smelter people and is being developed at the present time with a good force of men who are running two tunnels for the development of two of the veins at considerable depth, and the results of this exploration, if pushed far enough, are most likely to produce some small pay streaks of shipping ore and possibly an extensive resource of concentrating mineral. The results will be watched with very much interest as the mineral croppings are so extensive and of such enormous size as to indicate the possibility of a very big thing that may alone justify railway transportation.

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## ***CASSIA COUNTY.***

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Cassia County's prominence at the present time is in the line of its agricultural development, embracing as it does the famous Twin Falls irrigation enterprise, the third largest irrigation scheme in the world, which has been successfully inaugurated and put in practical operation dur-

ing the past season, resulting in an immense development and rapid increase of population.

The extension of a 60-mile branch railway from the Short Line at Minidoka, was completed last fall, and the establishment of several prosperous towns along the route resulted the chief in importance of which is Twin Falls.

*Twin Falls.*—This thriving new center of population, a little over a year old, is forging ahead at a very rapid rate and contains fully 2,500 people at this date. It is a strictly up-to-date community which already boasts of a \$75,000 hotel and \$30,000 school house, well graded streets planted with hundreds of shade trees and equipped with water works, electric lights and telephone service, with a postal business already established that justifies its recommendation as a second-class office with a salaried postmaster.

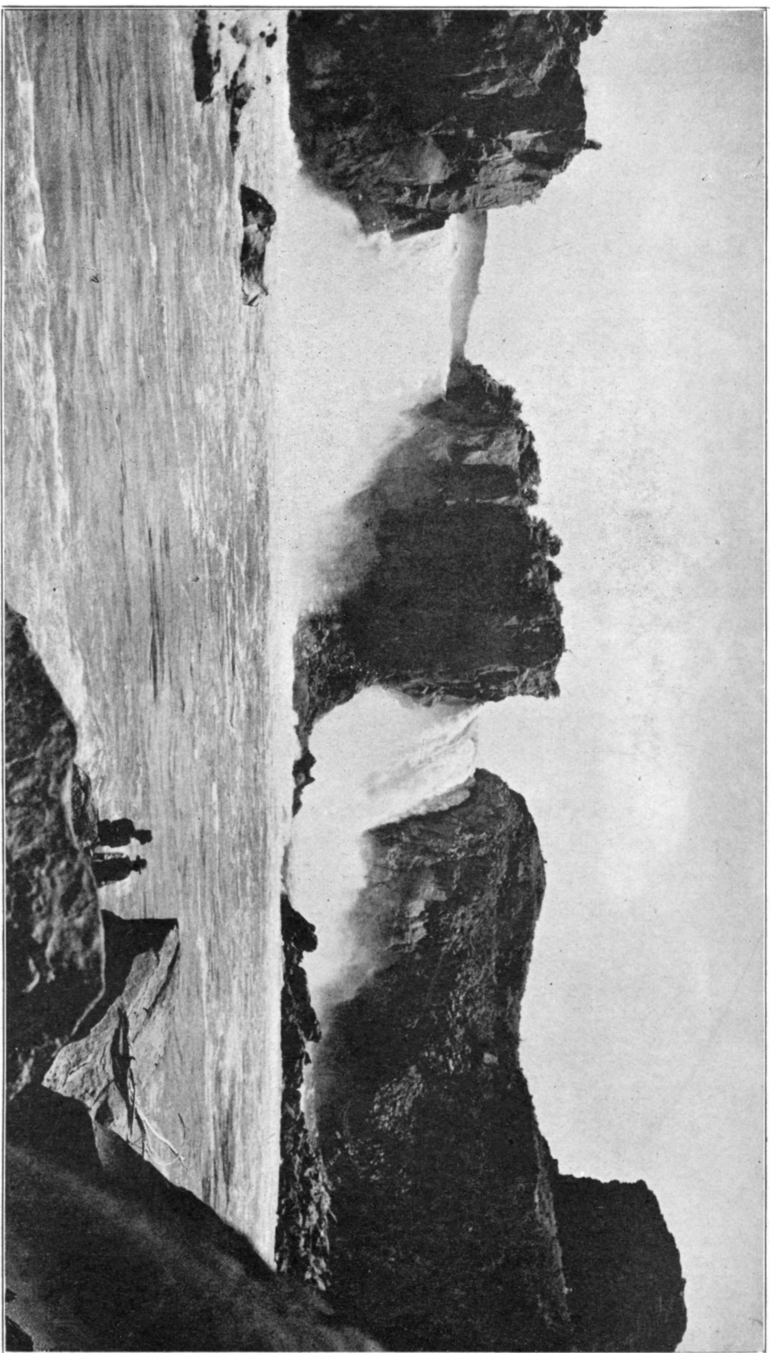
The extensive area of rich soil of the country that surrounds it on every hand, already well settled and under processes of improvement, will form the basis of its future prosperity and continued growth, and it is not an exaggerated prediction to say that it is likely to become a city of 10,000 people within the next five years.

*Power.*—One of its chief advantages lies in its extensive source of cheap water power along the near-by Snake River and its famous water falls.

The Shoshone Falls Company, Limited, an Idaho corporation, have acquired a water right at Twin Falls, Shoshone Falls, Augur Falls, Upper Salmon Falls, Lower Salmon Falls and the Malad River Falls, and is developing all of these properties. The machinery for a very large power plant is already on the ground at Shoshone Falls, and the company expect to be able to furnish a large source of power from this point within a few months.

The properties are capable of an ultimate minimum development of 100,000 horse power, which can be distributed over a wide territory and will form an important factor in the industrial development of the region.

*Cassia County Minerals.*—Cassia County contains a variety of valuable metals and minerals, and some well-defined true fissure veins containing gold, silver, lead and copper have been successfully operated in the vicinity of Connor Creek, a short distance south of Albion, the county seat.



TWIN FALLS, SNAKE RIVER, CASSIA COUNTY, IDAHO.



In the Upper Goose Creek country a wide area of lava plateau has been proven to be underlaid with a series of nearly horizontal beds of sandstone and lignite coal. Several of these coal seams are of good thickness, and while they have been proven very high in ash as far as they have been developed, it is not improbable that further exploration may reveal important areas of these different seams in such a wide field that will be much lower in ash and afford a very important source of domestic fuel.

Near the southern border of the State, on one of the Goose Creek tributaries, some pronounced indications of petroleum have been discovered, and negotiations are in progress for the erection of a derrick and drilling plant to test this formation for oil.

The marble deposits between Oakley and Albion still remain undeveloped and promise an important source of beautiful building material. There are a variety of other excellent building stones along the southern border of the Snake River plains in this county that will in time become an important source of supply. The richness of the soil of this region is indicated by the occurrence in the crevices of the lava bluff along the Snake River, below the Twin Falls plateau, of almost pure soda nitrate, or Chili saltpeter, which has doubtless leached, through ages of time, from the deep soils that mantle the surface of the country and offer the strongest evidence of their fertility, as nitrates are the most important salts of vegetation.

*Gold Production.*—Cassia County reported a total gold production of 22 ounces, which are doubtless derived from small placer operations along the Snake River.

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## ***CANYON COUNTY.***

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Canyon County is noted principally for its magnificent stretches of well-cultivated agricultural land and vast acres of rich land still in sage-brush that will be covered by the Boise-Payette project and add immensely to its growth in property values.

This county embraces a portion of the Pearl Mining District. In fact, the line between Canyon and Boise County traverses one of the best and most productive of the Pearl properties, the Lincoln Mine.

A small amount of placer gold is annually extracted from the Snake River border of Canyon County, and it is reported that extensive beds of old channel gravel are to be found along its foothill areas that it is believed contain enough gold to justify extensive operations by dredging. Some very promising deposits of lignite coal also occur in the neighborhood of Emmett. Evidences of natural gas and petroleum have also been observed in the same neighborhood and may produce results of a commercial nature at some future time.

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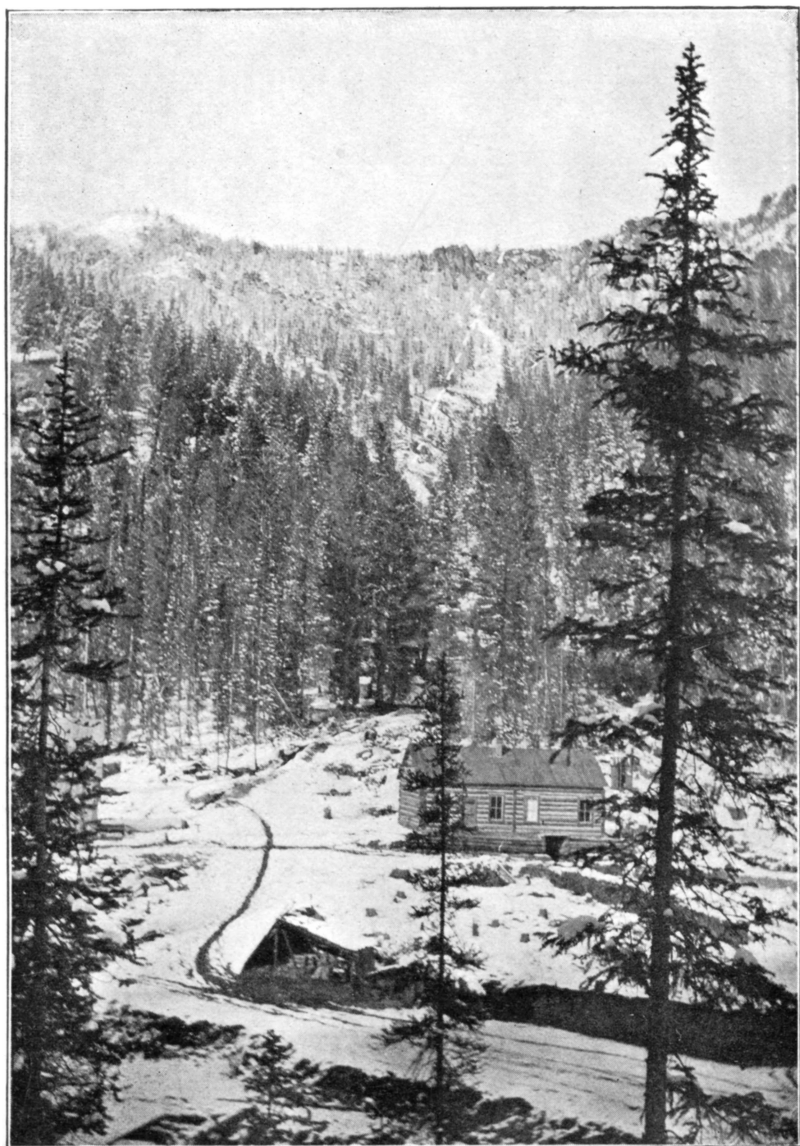
## ***CUSTER COUNTY.***

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### **LOON CREEK DISTRICT.**

*Lost Packer.*—The most notable development of this old mining county during 1905 was at the Lost Packer Mine in the Loon Creek District. This property has developed in a remarkable manner and has one of the best reserves of rich ore in its present young stage of development that has ever been seen in the county, whose bullion record exceeds \$30,000,000.

Loon Creek gained a reputation as a placer district a good many years ago, but its resources in this line that were easily available were very rapidly exhausted. During the excitement of the early days rich float ore was found at different points over the district, accounts of which remained the folk lore of the region for years afterwards, and it was always considered a favorable field for prospectors looking for vein deposits. It wasn't until the district was overrun with prospectors, disappointed in their investigations of the Thunder Mountain District in 1902, that anything of importance was found on Loon Creek in the ore line. During that summer the Lost Pack-



PACKER MOUNTAIN, DOTTED LINE SHOWS COURSE OF LOST PACKER VEIN.





er Mine was discovered; it presented a very slim surface showing, but the ore was rich in gold and several carload shipments were made from the first shallow level that yielded average values in gold of \$150.00 per ton, together with copper values of 7 to 15 per cent.

This property has passed into the hands of some well known mining capitalists of Butte and Salt Lake City whose attention was called to the venture by A. J. Czizek, who handled its development as manager until last fall.

At this date the Lost Packer Mine has a mile of underground development work in the form of adit tunnels and underground connections that exposed a body of ore 10 to 15 feet wide, carrying average values of 2 to 3 per cent copper and \$5.00 to \$7.00 in gold per ton. In addition to this low grade ore this great vein carries a clean rib of pay streak of massive chalcopryite ore, 6 inches to 5 feet thick, that will safely average 2 feet thick, and is proven for a length of 500 feet and a depth of 400 feet, that carries average values of 2 to 5 ounces of gold and 10 to 25 per cent copper per ton.

This rib of bonanza ore is very clearly defined and strong in the bottom of the work and at both ends. It has a free cleavage, with slicken-sided surfaces that in places are polished like a mirror on the massive mineral.

The vein has been opened carrying the same high values at a point 800 feet distant and 300 feet vertically lower down the mountain.

The property of the Lost Packer Company, of which this development is the central feature, covers the course of this bonanza ore channel for 6,000 feet through a vertical range of fully 1,800 feet, all of which is available for adit tunnel development.

The vein is a true fissure, cutting the general bedding of the formation. The deep adit tunnel has been started by the company which will be run by machine drills as soon as an air plant can be gotten in that should rapidly undercut an immense reserve of rich ore, for the fissure is of such a pronounced character that there can be hardly any question of the staying qualities of the ore to great depth and length along the strike of the vein.

The Lost Packer property was equipped with a 100-ton smelter late last fall, built by the Colorado Iron Works

of Denver, but the finishing touches were not put on it until the winter closed in and shut out wagon transportation. All the machinery was gotten in, however, and was put in place, and the plant is ready to blow in as soon as the roads are open in the spring.

The smelter is a strictly modern plant of 100-ton daily capacity, jacketed to the feed floor. It is intended to use a compromise hot blast, pyritic process, using coke and wood fuel, and by the introduction of the hot blast the fuel element of sulphur in the ore is taken advantage of, giving a ratio of 5 to 8, as compared to coke.

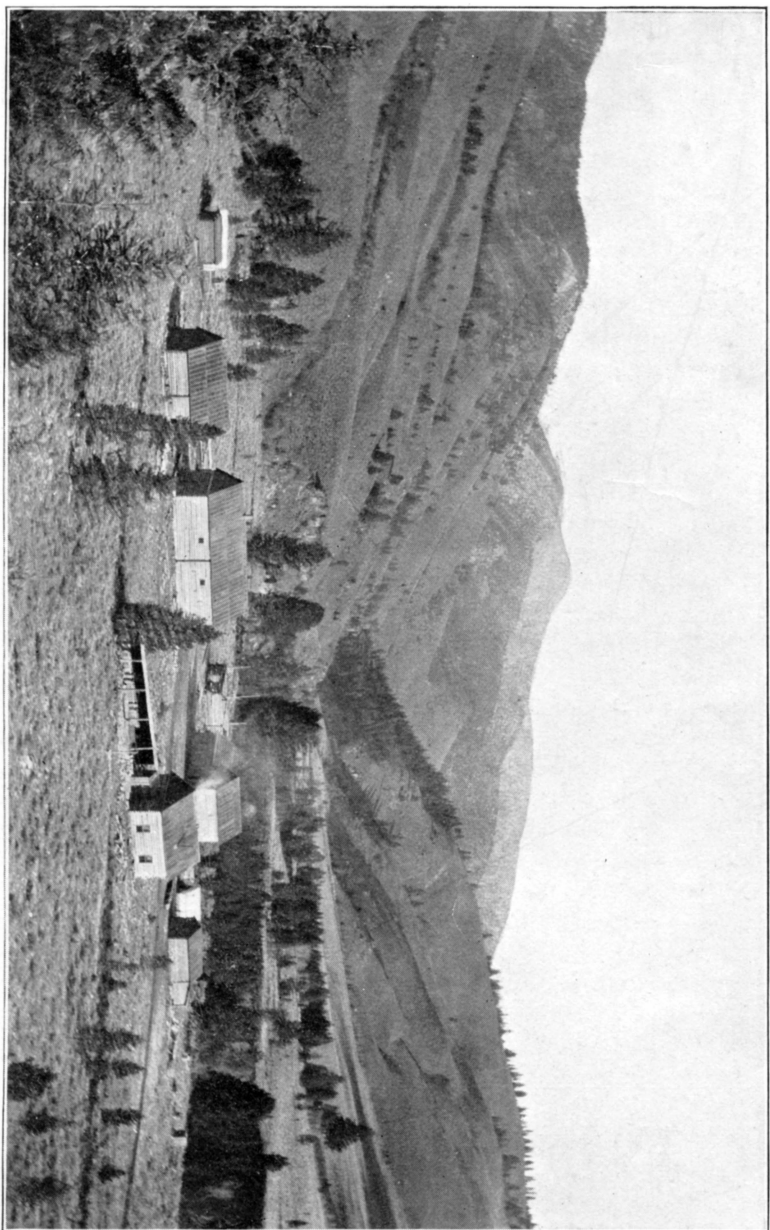
The air before being supplied to the tuyeres is heated in a separate stove or furnace, using cord wood fuel, the gases passing through an arrangement of massive hanging "U" shaped pipes. This feature of the stove is walled in by common brick, lined with fire brick, and covered with fire tile. The air is heated to 300 degrees C. before entering the smelting furnace proper, where it produces an oxidizing as well as a reducing effect. The pay streak ore to be used in the initial run of this smelter is high in sulphur and also carries about 5 per cent lime, and with this process admits of a high silica charge.

The matte to be made from the quality of ore intended to be used should contain about 50 per cent copper and 10 to 15 ounces of gold and 50 ounces of silver per ton. The general formations of the Loon Creek District are eruptive granites and immense dikes of acidic intrusive rocks, together with some narrow belts of higher metamorphose sediments and blue limestone.

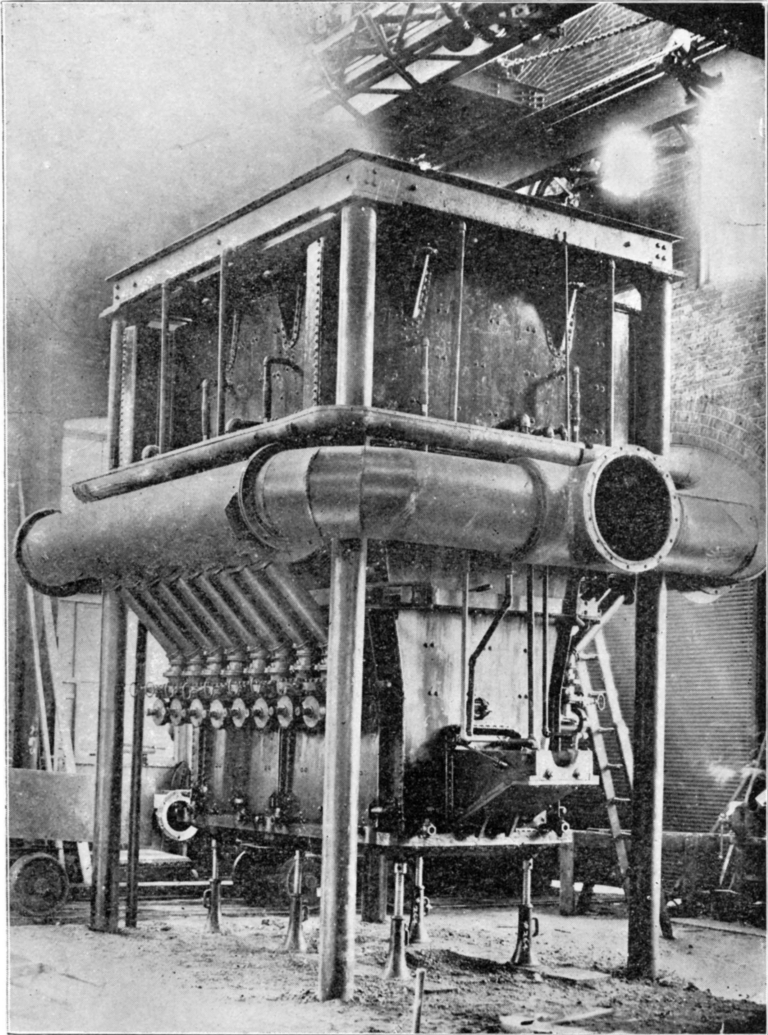
The district is well watered and affords numerous excellent opportunities for the establishment of water power plants. It is also well timbered and while the topography is rather rugged it softens down at the forks of the Loon Creek, where a settlement called McGowan has been established among some gentle slopes that afford good pasturage for live stock.

The accompanying illustrations will give an idea of the surroundings and the tunneling advantages of the Lost Packer vein.

The Lost Packer is situated on a small tributary of Loon Creek called Canon Creek. At the site of the company's operations a settlement has been established, which in-



MCGOWAN, AT THE FORKS OF LOON CREEK, THE NATURAL CENTER OF THE LOON CREEK DISTRICT.



HOT BLAST PYRITIC COPPER FURNACE. DAILY CAPACITY 100 TONS.  
LOST PACKER MINE, LOON CREEK.

cludes a postoffice that is named Ivers. Another settlement and postoffice has also been established at the mouth of Canyon Creek, near the head of the old placer diggings that is named Castro. Each of these settlements have good camp accommodations and some well stocked mercantile establishments.

A great many claims have been located in the district during the past two years and a number of them have shown up similar evidences of rich ore sources to those found at the Lost Packer at the same stage of development. These ores are almost invariably gold and copper bearing, with a rusty gossen ore at the surface that rapidly changes to yellow copper sulphide at a comparatively shallow depth.

The gold values of many of these surrounding properties run high and are generally figured by ounces in place of dollars per ton. Specimen assays running ten to twenty ounces in gold are of common occurrence.

The Lost Packer plant will afford a local market for outside ores in addition to those of its own property. Several new companies have been incorporated and considerable development work is in progress on the different groups this winter. The interest in this line will doubtless be greatly extended as soon as spring opens and the high-grade product of the Lost Packer Smelter commences to find its way to the market. The field offers some exceptional advantages for the investment of capital and it is most likely from present appearances to become a producer of very considerable importance. It is reached from Mackey, the terminus of the Lost River Branch of the Oregon Short Line Railway, then by daily stage over a good road to the mine via Challis and Custer.

The Lost Packer Company have built an excellent wagon road from Custer to the mine, a distance of 25 miles, which makes the district quite accessible.

#### ESTES MOUNTAIN.

*Montana Group of Mines.*—Between Loon Creek and the old camp at Custer, at Estes Mountain, a deep cross-cut tunnel enterprise has been rapidly pushed during the past year for the purpose of developing the Montana group of mines at great depth.

The Montana was a famous producer of very high-grade

ore in the early history of the Yankee Fork District. It produced a shipping mineral of gold and silver-bearing quartz, carrying values from \$100 to \$1,000 per ton.

An air compressor plant has been installed on this property and the tunnel has already attained a length of 1,100 feet and should soon encounter the principal fissure that it was designed to tap at a depth of several hundred feet below the old workings, where a handsome shoot of ore is still exposed.

The tunnel will also intersect several other important fissures that parallel the Montana and ore bodies containing bonanza values may be anticipated by drifting along these channels as they are encountered.

The formations of Estes Mountain are almost entirely of igneous origin, principally rhyolite porphyry and altered diabase rocks. The fissures are well defined and traceable for long distances.

*McFadden.*—On the opposite side of Estes Mountain, and on the strike of the Montana vein system, to the north, the McFadden Mine has been developed during the past year, at its lower level, known as the Bellamy, or No. 5 tunnel, where a good pay streak of rich ore has been disclosed, and values of \$39.00 gold, and 500 ounces silver have been encountered in a pay streak several inches wide, contained in an ore shoot that is said to be 300 feet long and 5 to 7 feet wide that carries an average value of \$7.00 in gold, accompanied with good silver values also.

*Golden Sunbeam.*—To the south of the Montana, across Jordan Creek, the Golden Sunbeam Mine was operated during the year, and several mill runs made. The property is undergoing development with a small force of men at the present time. It embraces a mountain of altered rhyolite carrying low-grade gold values all through, together with stringers and pay courses that contain high assays in both gold and silver. The concentration of values in some of these more pronounced pay streaks is anticipated with further development, and it will not be surprising if a body of high-grade ore is developed on this property in the near future.

Very little was done at the Custer Mountain mines during the past year. The Lucky Boy property, with its 30-stamp mill has remained idle. This property has been

a famous producer in past years and has a precious billion record of \$10,000,000. It affords one of the hand-somest opportunities for deep cross-cut tunnel undertaking that is afforded anywhere in the West.

*The Lucky Boy.*—This claim is traversed by a large, well-defined fissure vein, and some handsome ore reserves are still in evidence in the deepest workings. The ores are good grade gold-silver silicious milling ores and are very economically treated by amalgamation, concentration and cyaniding.

Negotiations are reported to be pending for the undertaking of a 6,000-foot tunnel to cross-cut this great vein system from the level of the Lucky Boy mill. A tunnel of this length would cut six important fissures at a depth varying from 1,000 to 2,000 feet, and such an undertaking would doubtless result in the development of an immense reserve of pay mineral and presents a speculative mining investment of great merit and prospective value.

*Greyhound Mine.*—At the property of the Greyhound Mountain Mining & Milling Company a good deal of development was done during the past year and a small smelting plant erected with which a test run of the ore of this property was made late in the fall. It was found, however, that the plant needed additional machinery which could not be gotten in, as the season for wagon transportation was too far advanced. This property has an immense reserve of pyritic smelting ore developed that carries high values in gold, and some silver; and it is the intention of the company to increase its equipment and put the plant in operation next season.

The Greyhound Mountain District, and the adjacent Seafoam District, have dozens of very handsome deposits of smelting ore that carry high values in both gold, silver and lead, and the region would unquestionably become a great producer of mineral traffic if railway transportation were afforded. A large corps of surveyors were employed running a line for a railway from Butte to Boise last fall, and are understood to have found a very feasible route with easy grades. This survey passes within seventeen miles of the Greyhound and Seafoam Districts, and should it result in the construction of a road, it would find very important mineral traffic resources at this point.



*Alturus Mine.*—The great lead-bearing quartz discoveries made at the head of Omaha Gulch, a tributary of the South Fork of the Payette River, extend over to the head of Stanley Lake Creek, south of Stanley Basin, where the Alturus Group of claims are situated near the summit of the Sawtooth Range, which forms the dividing line between Boise and Custer County at this point.

The central feature of the Alturas Group is the claim named the Bunker Hill. It has a large quartz vein 5 to 15 feet wide that crops out almost continuously for a mile in length. It is contained in the normal, eruptive granite of the region, and accompanied with a small igneous dike of basaltic habit. It has been prospected by more than a dozen open cuts at short intervals and one short tunnel. The quartz is well mineralized and shows a grayish yellow stain characteristic of silver chloride. It contains some streaks and patches of honeycombed and cellular quartz and bunches of galena associated with grey copper, also iron pyrites and evidences of antimony. The vein is low-grade on the average as it occurs at the surface, but it is not unlikely that the honeycombed or cellular quartz will fill with massive mineral as depth is attained in sinking on the vein.

Some of the choicer galena specimens when concentrated down give assay results of 60 per cent lead and several hundred ounces in silver. It is handsomely situated for deep adit tunnel development work and is likely to contain some pay shoots of shipping mineral when explored at depth.

#### STANLEY PLACERS.

*Wormaks Dredge.*—At Stanley Basin the Wormaks Dredge was successfully operated during the past season for several months.

It is rapidly approaching a point on Stanley Creek below Buckley Bar where some high values in coarse gold are known to exist, and its bullion yield should be very materially increased as the boat works its way up the stream from its present situation.

At the close of the hydraulic season, on Joe's Gulch, a short distance east of the dredge, a very important pay streak was discovered last summer on the old ground-sluice claim owned by Smith, Murphy and Bowen.

This new pay streak has been thoroughly prospected since its discovery and found to contain values that seem to indicate a yield of \$700.00 to each sluice box length of 12 feet. Single pans of gravel were taken that yielded from 50 cents to \$1.50 in coarse gold to the pan, and the fortunate owners seem to be in line for a very handsome yield of precious bullion next year.

*Casino Creeks.*—On the opposite side of the Salmon River from Joe's Gulch the Big and Little Casino Placers, better known as the Hershey diggings, were bonded last fall to eastern capitalists who are planning their equipment with hydraulic machinery.

These diggings carry coarse, high-grade gold and extensive beds of gravel. They have been worked in a small way by the original owner who has never had sufficient capital, however, to open them and equip them properly.

From the statement of the values obtained from these gravel beds they should form the basis of a very profitable hydraulic mining enterprise if properly equipped and handled.

Considerable prospecting has been done in this vicinity on quartz veins and gold-bearing porphyry dikes, of which there are a number of large size and containing important gold values in many instances. Some of these porphyry dikes carry specimen gold in pieces that weigh as much as 25 cents. One of the most interesting of these properties is the Iron Crown, which carries two large dikes of rhyolite, or quartz porphyry. It is situated at the head of Fool Hen Gulch, a small tributary putting into the rich Joe's Gulch placer diggings, and has recently developed big ore shoot carrying average values of \$10 to \$12 per ton. A crew of five men are employed on its development this winter, and a large tonnage of this grade of mineral is expected to be undercut by spring.

*Valley Creek Mine.*—The Valley Creek Mine, a short distance above Stanley Basin, was poorly handled by its operators a year ago, and got into financial difficulties with the result that it was sold at sheriff's sale late last fall. This is considered a very valuable property by competent mining men. It has an immense body of \$8.00 to \$10.00 gold ore and it is understood that the new owners will undertake its further development and operation next season.

The property is equipped with a good mill, and if intelligently handled should be operated at a good profit.

CLAYTON DISTRICT.

*South Butte.*—Some important shipments of high-grade silver-lead ore were made the past season from the South Butte Mine on Squaw Creek near Sullivan's Hot Springs, which was operated successfully by leasors. This property is located on the same zone as the Redbird Mine, which has a bullion record of nearly \$1,000,000. It has some great surface manifestations of mineral in the way of big lead-bearing iron deposits and is worthy of extensive development at depth.

The property of the Clayton Mining & Smelting Company was idle during the year, and the smelter at Clayton was not operated, although the mines are reported to be showing up some fine ore reserves and the prospects are that a run will be made with the smelter next season. Its idleness has been due to the pending sale and consolidation with some adjacent properties and not for a lack of ore.

Clayton and vicinity have some fine resources of silver-lead and high-grade dry silver ore that are worthy of much more extensive development than they have received. The operation is retarded a good deal by lack of railway transportation facilities. The new line recently referred to would pass right through this camp and would surely result in adding new and important life to its resources.

The mountain slopes in the immediate vicinity of the town of Clayton have been noted for the very high-grade silver-bearing gray copper ore float for a number of years, and during the past season the source of one of these flows of rich ore was discovered at a point about half a mile below the town, when it was traced into a good strong fissure vein and some small shipments of ore were made that yielded very rich returns in silver, running to several hundred ounces per ton.

*Bayhorse District.*—At the famous old Bayhorse District very little was done during the year, aside from some small leasing operations, from which several good ore shipments were made. This district is also hung up in the line of development through a pending deal that embraces a consolidation of all its important mines.

It shows some extensive resources of silver-lead and sil-

ver-copper ore, including one of the most extensively developed mines in the State, the Ramshorn, which has ore reserves approximating \$2,000,000 in value blocked out.

#### PARKER MOUNTAIN DISTRICT.

Some sensational rich gold-silver silicious milling ore was discovered in the Parker Mountain District during the past year, just over the Custer County line in Lemhi County twenty-five miles west of Challis, the county seat of Custer County, that brought a good deal of trade to Challis, by whose citizens it was first discovered.

This new district is in a porphyry formation and is situated near the head of Warm Spring Creek, a tributary of Loon Creek. Its principal discovery is known as the Parker Vein, which is 8 feet wide, carries average values of \$30.00 per ton for that width in gold and silver, and in addition a pay streak 10 inches wide, in ore that carries average values of \$350.00 per ton, while selected samples from the same streak have yielded results as high as \$2,365.00 per ton, and several sacks of this high-grade mineral were brought to Challis last fall by the packers who took in supplies.

The ratio of values in this ore is about two-thirds silver and one-third gold, and gangue material of the vein seems to be an altered rhyolite or andesite that carries veinlets of quartz and silicious facings on the shrinkage and cleavage planes of the rock that are associated with concentric and agaty lines of black argentite mineral spotted with light colored native gold. The ore is very similar to the bonanza mineral that produced such rich results in bullion from the Custer Mountain veins in early days, and the igneous formations in which it is contained are a continuation to the north of the same series in which the Custer deposits occur.

This discovery, included with a group of ten claims, was bonded last fall by representatives of the United States Mining Company of Bingham, Utah, who have established a camp there and are working a small force of men in the development of the property this winter. About fifty claims were located in this new district, and rich values were found at other points, and it is likely soon to be the scene of a considerable influx of prospectors and capitalists. The district is situated in very rugged surroundings

and is purely virgin territory, as it has never been prospected to any extent before this discovery, and it will not be surprising if some bonanza mines are opened there in the future. It can be readily reached by way of Mackay and Challis, or from Red Rock by way of Salmon City, and Singiser, as the trip involves not to exceed ten miles of horseback travel, and this can be readily transformed into a wagon road at no great expense as there is a very low pass over the range from Challis.

MACKAY DISTRICT.

*White Knob.*—The White Knob Copper Mine, at Mackay, experienced one of the most interesting years of its checkered career during 1905.

This property was originally developed by Mr. Wayne Darlington, ex-State Engineer of Idaho, who did some extensive exploration work on the immense bodies of low-grade ore that the property carries and opened up a big resource of copper carbonate and oxide mineral near the surface. He built a 50-ton smelter and made several test runs of the ore from different parts of the property, producing a total of something like 200,000 pounds of base copper bullion by direct smelting.

This demonstration of handling the low-grade ore of this mine was so successful that its extensive equipment with a 600-ton smelter was undertaken and about half completed when one of the principal backers of the enterprise died and the control of the property passed into the hands of others who were antagonistic to Mr. Darlington's plans. This resulted in the management being turned over to other people who changed his plan and design of the big smelter, transforming it into a matte plant, which, in the hands of a number of high-priced operators, proved unsuccessful from lack of sufficient sulphur in the ore to make matte and save the values, with the result that last spring the property was turned over to a practical operator from California, Mr. Frank Leland, who was instructed to junk the plant and wind up the affairs of the company.

Mr. Leland found several thousand tons of low-grade ore on hand, and thought he could make a success of smelting it. He sold off all the superfluous supplies and equipments, put the company's assayer in charge of one of the furnaces at the smelter and put the mine into the hands

of some intelligent leasors, who went to mining on the best ore and sweetened up the values of the mineral he had on hand, with the result that one of the big furnaces was kept running for several months and successfully handled the material on hand, producing twenty-five carload shipments of high-grade gold and silver-bearing copper matte, and slag result containing considerably less than one-half of 1 per cent copper. The smelter was shut down late in the fall and the leasing system at the mine extended.

Under Mr. Leland's leasing system the mine is now furnishing employment for about one hundred men, and recent reports show that they are putting out ore of a far better grade than was ever before produced from the mine, and the prospect seems bright at this date for the White Knob to become a profitable source of copper bullion after all its vicissitudes.

The White Knob ore deposits occur at a contact between limestone and porphyritic granite, or rather between an immense body of garnet rock, mixed with other contact metamorphic minerals and the overlying limestone.

The ore occurs in big, irregular shaped bodies 50 feet wide by 100 feet in length in some instances. It has continued in a largely oxidized and carbonated condition to a depth of 700 feet below the apex, where it has been tapped by a cross-cut tunnel.

The ore bodies seem to favor the limestone rather than the garnet rock. The deposit is distinctly of the Arizona variety, and the extensive leasing system now employed in the exploration of its ore bodies is not unlikely to lead to very valuable deposits of massive sulphide ore at further depth, as the ore is commencing to show some very handsome bodies of chalcopyrite mineral in the lowest opening.

The mineralization of this property is very extensive and justifies considerable further development. Mr. Leland has replaced the expensive electric haulage system between the mine and smelter with a Shay engine, which it is expected will handle the material off the mountain at one-fourth of the former cost.

#### UPPER LOST RIVER DISTRICT.

Among the tributaries of the Upper Big Lost River some extensive mineral deposits occur that are generally of the

smelting ore varieties, consisting of zinc-lead-copper-gold-silver combinations.

At the Phia Kappa Mine a force of ten men are employed in development work for a strong syndicate of eastern capitalists. This mine carries an immense zone of concentrating mineral that runs about \$10.00 or \$12.00 per ton in combined values.

The zone proper is 150 feet wide and can be readily followed along its strike for a mile and a half in length. It consists of a succession of veins or belts of gangue minerals richly impregnated with sulphides of lead, zinc, iron and copper. These ore courses are 10 to 15 feet wide, with intervening spaces of limestone which forms the local country rock and presents the possibility of developing into an immense resource of concentrating mineral.

The ore carries very fair values in gold and silver, as well as the baser metals. It is being developed by drifting and sinking on the best ore courses, and if it shows sufficient encouragement by spring the operation will be greatly enlarged and an extensive plan of underground work undertaken.

*American Group.*—The American Group is another property in the same region that was bonded last fall to eastern capitalists, and is being developed with three eight-hour shifts. It carries a vein 10 feet wide that shows average values of 10 per cent copper in places, together with 26 ounces of silver and 80 cents to \$1.00 in gold per ton.

There are a number of other very handsome mineral showings in this region that, in some instances, carry high values in lead and silver, also high values in copper and zinc sulphide, together with big bodies of copper-iron ore, and the region offers some splendid inducements to capitalists. It is readily accessible from the Big Lost River Valley and could be easily approached on very light grade for railroad construction. Investors looking for zinc and copper properties can certainly find something to interest them in this Upper Big Lost River region. Custer County mines generally are suffering from lack of railway transportation facilities. Its ore deposits are numerous and of large size and are contained in very favorable formations for permanency. Many of its properties have been practically idle that were famous producers prior to the

drop in silver, and if the Mackay branch of the Oregon Short Line were extended to Salmon River or a new north and south railway should be built from Butte to Boise it would certainly result in developing an extensive mineral traffic in this county and opening up one of the most populous and profitable mining fields in the State.

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## **ELMORE COUNTY.**

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*Franklin Mine.*—Elmore County, of which Mountain-home is the county seat, has enjoyed some successful mining development in spots and shows quite an increased yield of precious bullion over 1904, which is largely due to the increased production of the famous Franklin bonanza at Pine.

This property, with its little 10-stamp mill, yielded gold bullion during 1905 to the amount of very nearly \$100,000 and has today a larger tonnage of ore in sight than at any time in its history.

The year's work has shown up some fine ore bodies in its lowest tunnel, 500 feet below the apex of the vein. The mine proper carries an average crew of about sixteen men and there are eight men in the mill, which has recently had a large cyanide plant addition put on to it.

This cyanide plant is of 100 tons daily capacity and was built for the purpose of working up a tailings dump of 15,000 tons that has accumulated from the operation of the mill during the past two and one-half years. This great dump of tailings has been systematically sampled a number of times and shows average values of \$7.00 per ton. The capacity of the plant will be such as to take care of the current tailings from the mill and work up seventy or eighty tons a day from the dump in addition.

The preliminary tests on this ore for cyanide treatment were made by Mr. J. B. Eldridge of Boise, who advised the construction of the plant. The plant was gotten in operation about December 1st, and as usual with all such



new ventures it has required considerable adjustment. The cyanide operation has been considerably hampered by frost, due to lack of preparation at the start for such cold weather as was experienced. It, nevertheless, has made a good run and demonstrated, with a handsome button of actual bullion worth several thousand dollars, that the ore of this mine can be very successfully treated and a very high percentage of extraction made by this method, which is a revelation to a good many because the ore of the Franklin contains a sprinkling of refractory sulphides, including iron, zinc, lead and antimony.

This additional equipment will form a very valuable and important adjunct to the simple plate amalgamation heretofore employed and work up total values in the ore to a very close margin. Mr. Chatten, the owner, is to be congratulated on the success of this important metallurgical demonstration. The plant represents quite an outlay of money, but it will rapidly pay for itself and recover values that were not available by any other method at a profit.

In the vicinity of the Franklin there is a large area of very promising territory and a good many claims have recently been acquired there by Mr. S. C. Robinson of Arkansas, who is having considerable prospecting development work done on several very promising showings of gold-bearing quartz.

*Mountainview Mines.*—Across the river from the Franklin Mine the Mountainview Mine was equipped during the past year with a heavy, up-to-date, 10-stamp mill of 50 tons daily capacity, run by electric power furnished by a plant installed at the mouth of Lime Creek, near by. This mill was started up for a trial run but shortly afterwards shut down again as conditions proved that the development of the mine was not sufficiently advanced to supply the necessary tonnage of ore economically.

A new adit tunnel has been started just above the mill level to tap ore bodies of this property, which is now well under way and will have a total length of 1,500 feet when completed to the anticipated point under the old works.

The Mountainview produced some very rich ore carrying average values of \$60.00 per ton from its upper levels and is favorably considered by some well posted local talent.

*Hawthorne Mine.*—At the Hawthorne Group on upper Lime Creek a small force is being steadily employed in the cross-cut tunnel development work for the purpose of tapping the series of fissures that traverse the group.

This tunnel is now in 350 feet and it is expected will cut the first vein within another 100 feet. A second vein will be encountered at a point 600 feet in. Both of these veins are of good size and contain good milling values at the surface.

*Moore Flat.*—At Moore Flat the Highland Mary claim has been developed during the year and is employing a force of seven men during the winter. This property has a strong vein with an ore shoot 125 feet long and 4 feet wide that is said to carry an average value of \$7.00 per ton in gold.

*Copper King Group.*—This property is situated on Wood Creek, a mile and a half southwest of the Highland Mary. It is a recent discovery of excellent promise and carries a vein several feet wide that can be traced at the surface for a distance of 1,800 feet along its strike.

It is in a granite formation, associated with porphyry dikes. One of its ore shoots has been pretty well prospected at the surface and found to be 100 feet in length by about 4 feet in width, carrying average values near the surface of 4 per cent copper and \$12.00 gold per ton.

*Crown Point Mine.*—One of the most extensive mining ventures in Elmore County has been undertaken for the development of the Crown Point Group of claims near Dixie. This consists of a deep cross-cut tunnel started from a point near the level of the South Fork of the Boise River.

It is equipped with machine drills and has already been extended in 1,300 feet and is being very rapidly pushed at the present time.

This tunnel will be 3,800 feet long when completed to Crown Point vein. It has already passed through several well mineralized fissures but is being pushed ahead to the principal objective point before extensive drifting will be undertaken.

The Crown Point vein from some shallow surface developments, produced some handsome shipments of gold ore that ran from three to four ounces gold per ton in car-load lots.

It will be tapped at a vertical depth of 1,100 feet, and several of the other fissures of this group which have also shown rich values at the surface will be penetrated by this long tunnel and the venture seems to promise some very profitable results, including deep drainage and a convenient avenue for the extensive development and extraction of ore bodies known to exist on the property.

*Gold Pan Mine.*—The Gold Pan group of claims, owned by the North American Exploration Company, and situated on Big Water Creek above Baskam's ranch on the South Boise River, is being developed by a small force of men under contract.

This group carries a well-defined vein about two feet wide that is traceable for a long distance at the surface and contains average values of \$20.00 per ton in gold. The tunnel has already been driven on this vein 110 feet and it is expected to continue it to a length of 800 feet, which, from the position of the vein, will gain a face depth at that length of about 500 feet.

The vein is very favorably situated for economical operation in the way of chance for adit tunnel development, water power and timber supplies and promises to warrant the erection of a small mill when further developed.

#### ATLANTA DISTRICT.

*Monarch Mine.*—The famous old Atlanta District, situated on the Middle Fork of the Boise River, enjoyed a season of more than usual activity in mining development during 1905.

The Monarch Mine continued blocking out ore with its usual force of about twenty men and at the same time the prosecution of preliminary working tests with a view of finding the most economical processes for treating its ores were continued, and some important results in this line are reported, which may justify the erection of a large plant for the reduction of the ore of this property next season.

The Monarch is the central feature of the great Atlanta Mother Lode, whose total production is conservatively estimated at \$5,000,000.

The Monarch Mine has an immense tonnage of ore blocked out and a good deal of it is high grade. This powerful lode is contained in a formation of porphyritic gran-

ite. It has been more or less developed continuously for a distance of over two and one-half miles.

*Minerva Mine.*—Just over the summit from the Monarch, in the same formation, is situated the Minerva Mine. This property was quite extensively developed during the past year and is carrying a good force of men at the present time.

It is equipped with a fine 10-stamp mill and a substantial tramway 2,100 feet in length. It carries two distinct ore courses that contain big milling values. These ore bodies were rather shattered and disturbed at the surface, but in a new tunnel recently completed both of the veins have been cross-cut at a depth of about 300 feet vertically below the outcrop.

The main vein is twenty-eight feet wide and shows a wide pay streak of the characteristic blue-gray quartz of this district mixed with some brown oxide quartz that carries high values in gold, some average samples several feet in width showing as much as \$38.00 to \$40.00 per ton.

The mill was operated on some test runs from this new development for a short time during the fall and demonstrated that the tailings would need additional treatment by cyanide or some other method for the high recovery of the total values.

This mine is well equipped and the development now in progress promises a very extensive reserve of profitable ore. It is being handled in an intelligent, practical manner and seems destined to become an important dividend payer.

*Atlanta Eagle.*—Below the Monarch Mine, to the north, the Atlanta Eagle Mining & Milling Company own a group of eight claims and developed considerable good ore during the past year and now have a shoot exposed that is nearly 200 feet long with an evidence of extending an additional 100 feet further on the strike of the vein.

This ore shoot will average about 3 1-2 feet wide and \$18.00 per ton in gold and silver, of which fully four-fifths are gold. This company also have a new mill of fifteen tons daily capacity, and several test runs of the ore were made showing an extraction of 55 per cent of the values by amalgamation, 22 per cent of the remaining values by

concentration and 80 per cent of the balance by cyanide treatment.

*The Tahoma Mine.*—This mine is still another adjoining property to the north and was also quite extensively developed during the past season and its minerals subjected to extensive practical laboratory tests for cyanide treatment. A mill run was also made on the ores of this property which is said to have produced very satisfactory results. The Tahoma has very large reserves of good ore, and if the negotiations now in progress for its purchase are completed it will doubtless afford employment for a good force of men.

*Petit Mine.*—At the Petit Mine, adjoining the Monarch to the east, on the same ore body, a small force has been kept steadily employed during the past year in blocking out ore. This mine is developed by adit tunnels and underground connections and has ore to the gross value of something like a million dollars exposed.

It has an ore shoot 600 feet long, that is 12 to 15 feet wide and carries a pay streak between 3 and 4 feet wide that will average \$14.00 to \$16.00 per ton in gold. A number of laboratory tests were made for the treatment of this ore by the cyanide method and some very satisfactory results obtained. It is under option at the present time to some wealthy mining investors and is likely to be equipped with a large mill next season.

#### BLACK WARRIOR DISTRICT.

For various reasons the glowing promise of the Black Warrior District, twelve miles northwest of Atlanta, didn't materialize as fully as was anticipated. However, nearly all the work that was done on the different properties in this district during the past year was paid for by actual gold bullion results obtained from its ores, which were treated from a number of the different prospects in small lots at a custom mill established in the center of the district and several thousand dollars in bullion produced.

This district has some of the largest and strongest and most continuous fissure veins and mineral zones to be found anywhere in the State, and it is likely with extensive development at depth to become an important producer of precious bullion.

*Rico-Mammoth Mine.*—The New Century Company did

considerable work on their Rico-Mammoth Group in this district and a good deal of pay ore was exposed. They also built a saw mill on the West Fork of Black Warrior Creek and another one on Queen's River and cut 130,000 feet of lumber for building purposes.

*Little Queen's River Property.*—On their Little Queen's River property, a vein 20 feet wide was developed showing several pay streaks that average as much as four feet in width in places and contained values of about \$10.00 per ton in gold, with occasional patches of very high-grade ore, including some handsome coarse gold specimen stuff.

Two Kincaid mills of fifteen tons capacity each were hauled in. These are supplied with two concentrating tables and it is expected that this equipment will be gotten in operation early the coming season. The property was also connected with Atlanta by telephone. There were twenty-five men employed by this company during the fall and their crew will average about twelve men during the winter. This revival of interest in the Atlanta section was largely due to the commencement of the State Wagon Road to connect Atlanta with Boise City by way of the Boise River. This road has been more than half completed and will, it is expected, be finished next summer. It will afford a much easier and cheaper means of access for wagon transportation, as the route is at a low elevation, all the way near the river level and well below the deep snow line. This should greatly cheapen transportation costs and afford a means of access to the district all the year around. Its present route by way of the very high summit over the old road from Mountainhome, which was closed with snow for fully six months each year, has been the cause of the backwardness of this important district, which probably contains a larger tonnage of developed gold and silver milling ore than any other district in the State.

The ores of this district are of the same class as those of Custer, Silver City and DeLamar, where the working costs vary from \$2.00 to \$3.00, and there is no reason why similar and even better results might not be obtained with proper equipment in the treatment of the ores of the Atlanta District.

#### NEAL DISTRICT.

*Golden Eagle Mine.*—The most important development

of the past year in the Neal District has been at the Golden Eagle Mine. This property was prematurely equipped with a fifty-ton mill last winter. It had previously been developed with an incline shaft 300 feet deep, but when the water was taken out and an attempt made to stope ore for this mill it was found that the development was inadequate to supply the demand and the operation of the mill was suspended after a short run.

The property was taken hold of at this stage by some Boise capitalists and put into the hands of a competent superintendent who has since carried out the development on the 200 and 300-foot levels, both east and west, with remarkably satisfactory results, exposing three distinct ore shoots varying in length from 45 feet to 105 feet and in width from 4 to 8 feet that carry average values of \$10.00 to \$15.00 per ton in gold, of which, contrary to anticipation, a high percentage is recoverable by free plate amalgamation methods, a number of sample tests having been made showing a free gold recovery of 40 to 60 per cent of the total values, and cyanide tests yielding 90 per cent, saving the balance of the values contained in the iron concentrates.

This development is being pushed by a good force of men at the present time and its ore reserves continue to expand in a very rapid manner. It is likely that the mill will be put in commission on this property early next spring and an important yield of bullion be added to the county's total output from this source this year.

The Golden Eagle has very strong ear marks of permanency at the surface that have been very amply substantiated to depth of 300 feet and there is no reason why its values should not continue down indefinitely.

**FREMONT COUNTY.**

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**COAL.**

The area of an important bituminous coal basin, for which this county is noted, has been greatly extended during the past year and several new discoveries have been made.

This coal field is situated on the east slope of the Big Hole Mountains, a low range of unaltered sedimentary formations flanked with rhyolite, consisting of Laramie cretaceous sandstones, shales and limestones that separate the Snake River plains from the Teton Valley.

The most important discoveries are the Horseshoe Claim and the Brown Bear and Boise Claim, situated twenty-six miles east of St. Anthony and the same distance east of Rexburg, in an air-line, and thirty-five miles from these railway towns by way of wagon road, via Canyon Creek Station and Oasis postoffice.

The new discoveries of the past year have added two additional veins to the series already known. One of these carries a clean coal blossom 20 feet wide; another seam, parallel to it, is 5 1-2 feet wide, and has a hard sandstone roof and floor. The latter has been opened by a cross-cut tunnel at a depth of 75 feet and was producing during November and December ten tons of coal a day which found a ready market on the dump at \$2.50 per ton, where it is purchased by the farmers from the thickly settled agricultural country that surrounds the district.

This coal is found to be of unusually high quality and makes very desirable fuel for steam and domestic purposes. It also shows a very strong coking test, and as the work is extended on the vein this tendency is increasing and some very fine samples of coke have been obtained from laboratory tests. The following analyses will give an idea of the superior quality of fuel contained in different veins, so far discovered in this basin:



*Analyses.*

| No. | Width  | Moisture | Vol. Carbon | F. Carbon | Ash |
|-----|--------|----------|-------------|-----------|-----|
| 1   | 10 ft. | 1.8      | 39.6        | 55.7      | 2.9 |
| 2   | 5½ ft. | 1.8      | 40.1        | 55.8      | 2.3 |
| 3   | 3 ft.  | 1.9      | 41.5        | 53.1      | 3.5 |
| 4   | 4 ft.  | 2.5      | 38.8        | 54.4      | 4.3 |
| *5  | .....  | 0.8      | 0.6         | 90.1      | 8.5 |

\*Laboratory Coke.

These samples were all taken from shallow development, less than 40 feet under the croppings of the different seams, and with the exception of a 6-inch clay band in the 10-foot seam and a 4-inch clay band in the 5 1-2-foot seam, they represent an average of the full width of each seam. The sulphur contents of the analyses so far obtained on these seams have never exceeded 0.7 per cent.

These discoveries are likely to result in one of the most important mineral resources of the State.

The series is now known to contain seven closely parallel veins varying from 2 to 20 feet in thickness and conformable in strike for a distance of three miles with an uniform dip that averages between 45 degrees and 50 degrees to the southwest, and should the uniformity in size usually experienced in the development of coal deposits continue a resource of ten million tons of available fuel may be anticipated within 500 feet of these outcrops on their dip and within a length along their strike of three miles.

The coal-bearing series to the north of the claims that have been located are covered with a heavy flow of rhyolite lava, while to the south the mountains become more abrupt and appear to be badly broken and disturbed. However, the area mentioned should alone provide a source of coal traffic that will have an important bearing on the industrial development of the Snake River Valley, as the field can be very readily approached on easy grades for railway construction and the development now in progress at the mines is likely to soon warrant the same.

## IDAHO COUNTY.

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The mining progress of the past year in Idaho County has been pronounced and important in spots with a few reverses.

### THUNDER MOUNTAIN.

*Sunny Side Mine.*—The big mill at the Sunny Side Mine, which was gotten in at such an enormous cost and was expected to make such a great record in bullion production, demonstrated, after a brief run, that the ore values disclosed in the extensive development of the mine had been shockingly overestimated and the results produced are reported not to have been sufficient to pay operating costs.

The mill was shut down early in the season and a new manager installed at the mine who carried a small force of men on development, which was greatly increased until a crew of about forty men is said to be employed on the property at the present writing doing development work and exploring its resources with a view of discovering and blocking out pay ore. This work is in the hands of Captain Treweek, a thorough-paced and practical mining man from Utah, under whose direction the real merits of the property will doubtless soon be disclosed. Recent reports from the camp say that ore has been found in quantity that ran from \$3.00 to \$50.00 per ton. It is sincerely to be hoped that this report is true and that the values may average between these extremes and an extensive body of that class of ore may be developed, as the Sunny Side Company have invested a vast amount of capital in the development and equipment of their property, in addition to paying a large part of the cost of constructing a wagon road into the district.

*Dewey Mine.*—The property of the Thunder Mountain Gold and Silver Mining Company, better known as the Dewey Mine, continues to be the only gold producer in the district after four years' of steady development. This property made a remarkably fine production, considering the fact that its mill was closed down for several months of the year undergoing repairs and the installation of new mortars. The production for the past year from this mine of precious bullion aggregated in the neighborhood

of \$67,000, and the mine and mill continue in successful operation at this date.

Part of the year's run was made from a surface quarry which yielded ore of about \$7 gold value per ton that was very profitably mined and milled at a total cost of something like \$2.20 per ton, which, considering the remoteness of the district, reflects great credit on the superintendent in charge.

The failure of the Sunnyside Mine in the early part of the summer seemed to flatten out interest in the district and several companies suspended operation. The resumption of development at this mine, however, during the fall, with a large force of men, has revived the faith of other operators and considerable development work is in progress in the district this winter.

*Werdenhoff Mine.*—In the Big Creek District, thirty miles north of Thunder Mountain, the largest crew of men employed during the past year was at the Werdenhoff Mine. Interest was kept alive, however, and assessment work done on most of the other holdings of this great mineral belt, although no large forces of men were employed. The temporary suspension of interest in this district was accounted for by the fact that the near future presented the prospects of its being made accessible to wagon transportation by the construction of a wagon road via Council, Meadows and Warren. This work was undertaken by the State and a large proportion of it completed, which included some construction on a bridge across the South Fork of the Salmon River east of Warren and the contractors promised to have this road completed in the Big Creek country early next summer, which will greatly facilitate the transportation of supplies and machinery and should result in a big influx of mining men and capitalists, for the district contains many extensive deposits of gold and silver-bearing ore on which sufficient work has been done to indicate a source of enormous tonnage of pay mineral, if sufficiently economical methods of treatment can be found to handle it.

The ores of Big Creek and its tributaries occur in bodies varying from a few feet to as much as two hundred feet in width. Many of them show sulphides at a comparatively shallow depth under the surface, and some antimony min-

eral and associated silver values. At some points beautiful specimens of fluorite-stained quartz are encountered. At Ramey Ridge some handsome coarse gold specimen ore has been discovered in small pay streaks contained in a larger mineral zone. The ore bodies of this belt are traceable for long distances. The inclosing formation is favorable for permanency and consists of a variety of porphyry dikes and altered granite and some belts of schisty, metamorphic sediments, the latter containing copper-iron-sulphide ores, associated with nickel and cobalt, and the lower end of the district has some handsome deposits of high-grade copper oxide ores.

The new wagon road will, it is believed, prove a great incentive to development to the district in general and a probable precursor of railway construction, for well posted local mining men who have become thoroughly acquainted with its resources believe it presents one of the biggest mineral tonnage possibilities in the State.

#### WARM LAKE DISTRICT.

At the property of the Trappers' Flat Mining Company, near Warm Lake, a large force of men was employed during the entire year of 1905 in mining development and mill construction, and a large reserve of good milling ore has been blocked out with the quiet, extensive underground development accomplished.

A saw mill was installed and extensive camp equipment in the way of buildings put up, together with a modern, up-to-date 10-stamp mill and aerial tramway. This new plant was expected to be put in commission on January 1, 1906, and the mine with which it is connected is said to afford a resource of \$10.00 gold ore that can not be exhausted in several years' steady operation.

#### BUFFALO HUMP.

This well-known gold quartz district experienced one of the duller years of its history, although important development was made on several of its properties.

*Jumbo Mine.*—The Jumbo Mine continued in operation most of the time during the year and made quite a large yield of free gold, but, so far, the management seems to have been unable to successfully treat the concentrates obtained from the ore, which means the difference between a dividend paying proposition and one that probably only

carries operating costs in this instance. These concentrates do not appear so seriously base but that they ought to be treated successfully by cyanide, if the application of the method were properly applied, as they closely resemble similar sulphides that have been successfully treated in other parts of the State by this method.

*Mother Lode No. 2.*—The development of the Mother Lode No. 2 vein at Concord was greatly extended during the past year and a large amount of good ore exposed. The veins of the Hump District are large quartz fissures in eruptive granite, traceable for miles. They contain some very good ore shoots carrying average values of \$5.00, \$10.00, to \$15.00 per ton, of which about 50 per cent can be recovered by plate amalgamation, the balance of the values being contained in concentrates. These concentrates consist of sulphides of iron, associated with a thin sprinkling of lead, zinc and copper sulphides.

*A Disastrous Fire.*—A disastrous fire visited the district during the past season and destroyed the larger portion of the Hump settlement.

#### ELK CITY BASIN.

This old mining section has enjoyed one of the most active seasons of its history during the past year, and a great deal of interest has been taken in its resources by outside capitalists.

*Hogan Mine.*—The great Hogan Mine, at Orogrande, owned by the Crooked River Mining & Milling Company, has been the center of attraction during the year.

Its 300-ton cyanide mill was completed and put in operation early in 1905 and its equipment subsequently considerably extended and added to, and late reports say that it is in successful operation at the present time, showing good results.

This property has a great zone of crushed, shattered and sheeted granitic rock that is said to average by careful sampling between \$3.00 and \$4.00 per ton in gold. It is over 500 feet wide in places and ideally situated for economical operation.

It is worked by the open quarry or "Glory Hole" method and has made the best record in the State for cheap operating costs, which are said to have been brought down

as low as 60 cents per ton for mining and milling on extensive test runs.

The success of this plant in profitably handling the low-grade ores of this great zone will doubtless result in its being largely increased in capacity, and the proposition presents a probability of developing into a mine of the "Treadwell" class, for the zone is of sufficient size to furnish a tonnage supply of almost any desired milling capacity.

I am informed that the quarry work on this property has recently revealed some smaller channels of high-grade ore that can be mined separately and are said to carry average values ranging up as much as \$100.00 per ton. There are a number of deposits of this class in the Elk City Basin and adjacent country extending to the east and on several of these considerable active development is now in progress.

Another class of deposits for which the Elk City Basin is noted is a system of pronounced gold-bearing quartz fissure veins, often accompanied with small intrusive dikes of aplite or granite porphyry.

Among the conspicuous examples of this class are the American Eagle, the Blue Ribbon, the Buster and others.

*Buster Mine.*—The second level of the Buster Mine, half a mile north of Elk City, was extended during the past year into its principal ore shoot, where a body of exceptionally high-grade ore was disclosed over 10 feet wide. A good deal of this ore would run over \$100.00 a ton in gold, and this strike justified the faith of its nervy owner, who has stayed with the property 20 years and accomplished, single handed, a good many hundred feet of development work.

He entered into a deal with San Francisco capitalists for the sale of the group last fall, and it has been undergoing more energetic development, with quite a force of men since coming into their hands.

None of this class of fissures have been developed to any extent below the water level of the country. They have been found, in a number of instances, to contain high-grade tellurium minerals, associated with iron sulphides and gray copper whenever the sulphides make their appearance, and several small shipments of high-grade ore

of this baser class have been sent out of the district that paid rich returns over and above the excessive transportation costs. This class of deposits seems to contain elements of bonanza possibilities in the way of rich shipping ore, if their development is continued to the deep, and many of them carry fine reserves of high-grade, free milling ore near the surface horizon.

The formation of the Elk City Basin is archæan gneiss and its surface has been placered over and yielded good results in eroded gold over a large area, while almost every tributary stream contains good colors in placer gold and indicates a wide distribution and extent of the vein sources of the precious metal.

This district is of a comparatively low elevation. It is densely timbered and well watered, and while the snows fall deep in the winter time the springs come early and it is, on the whole, a desirable climate to live in. It is hampered by a bad mountain road, but its resources are assuming such proportions of importance that concerted action on the part of the local people and county officials should result in inducing important State aid in opening it up to easier and better wagon road transportation.

The South Fork of the Clearwater affords it an easy route and a water grade for either wagon road or railway construction that would greatly improve its accessibility.

This district still contains some important placer resources, which is also true of the neighboring Newsome district, where some extensive hydraulic plants are operated each year that make an important annual yield of gold. This latter district also contains some of the low-grade gold-bearing granite zone deposits similar to the Hogan property at Orogrande that pan a little free gold for hundreds of feet in width, and also some fissure veins of much richer ore.

*Dewey and Evergreen Mines.*—Some important new development has taken place during the past year at the Dewey and Evergreen Mines on the South Fork of the Clearwater six miles from Grangeville, and their ore resources have been greatly improved and extended. This camp contains some large deposits of gold-bearing rock associated with a little copper and is locally well thought of.

## SALMON RIVER SECTION.

The Salmon River section of Idaho County, in the vicinity of Whitebird and Lucille, has afforded employment to quite a number of miners during the past year. This section contains numerous coarse gold placer bars along the Salmon River that yield good returns to individual operators. It also has some good copper ore showings.

*Blue Jacket Copper Mine.*—The Blue Jacket Copper Mine, in the Cooks' Corral District, a few miles south of Lucille, is being developed by the Northwestern Mining Company of Baltimore and is showing up some handsome bodies of copper sulphide mineral carrying good values in gold.

This property has an incline shaft 300 feet deep, with three levels. It is opened on a schisted zone 50 feet wide in a formation of diabase rock. A tunnel is now being driven that will tap the vein 500 feet below the collar of the shaft. This tunnel is now in 550 feet and is expected to strike the ore channel in another 100 feet, when extensive drifting will be undertaken.

*McKinley Mine.*—On the north side of the river, near Lucille, the McKinley Mine is a gold property that carries some fine values in free gold. It has been equipped with a small mill, and some test runs have been made showing good results.

Further up the Salmon River, the Bear Creek or Marshall Lake District continues to attract considerable attention. It has a number of very pronounced fissure veins carrying some exceptionally high values in gold, including some very beautiful specimen ore, and the development of the past year on several of these fissures indicates very strongly that it is going to make a camp of considerable importance.

In the vicinity of Resort a number of placer properties were operated during the past season, and while the water supply proved unusually light a considerable output of gold was made.

There are a number of important improvements being made in the development and equipment of the properties of this section that should result in a largely increased yield of gold in the future.

*Silver King Mine.*—In the Warren District the princi-



pal mining operation of the year was at the Silver King property.

*Little Giant.*—The Idaho Consolidated Little Giant property also received considerable attention, and they made plans for the installation of an electric power plant. It is reported that a contract was let for considerable tunnel work on the Czezik properties in this district.

*Railway Construction.*—Idaho County seems to be the most likely portion of the State to first receive the advantages of new railway construction. The consummation of the proposed plan to connect north and south Idaho with a railway would bisect this great county and prove a stimulus to the development of its extensive and varied mineral resources and bring them more prominently before the investing public.

Like several of the other intermountain counties in the State, it is badly hampered from lack of railway transportation at present.

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## KOOTENAI COUNTY.

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The geological conditions of Kootenai County are especially adapted to the occurrence of metalliferous veins. As a matter of fact, this is one of the best mineralized counties in the State, showing a wide distribution of the evidence of valuable base and precious metal ore deposits over almost its entire area.

One of the chief sources of its metal output during the past year, which was principally in silver, was from the formations and districts bordering the shores of Lake Pend d'Oreille. The formations bordering this picturesque body of water lying south of Sand Point and Hope on the Northern Pacific Railway are well mineralized around its entire shore line, which exceeds 150 miles in length.

These ore resources consist chiefly of copper-silver ores, lead-zinc-silver ores, and gold and silver-bearing copper-

iron-sulphide ores. These districts are served by small steamers that make regular daily trips from Sand Point and Hope and afford cheap transportation between the districts bordering the lake and the railway.

BLACKTAIL DISTRICT.

*B. F. & H. Mine.*—The Blacktail District contains a number of pronounced fissure veins that carry characteristic ribbon quartz associated with spatic iron, together with spots and streaks of very rich silver-bearing gray copper ore in altered sedimentary formations, and numerous shipments of high-grade mineral have been made. Two carloads sent out during the past year from the B. F. & H. Mine, owned by Mr. J. A. Evans, netted the fortunate owners very close to \$9,000. The ore of which they were composed contained values ranging from 300 to 700 ounces of silver per ton, together with about 10 per cent copper. The rich pay streaks of this district, as far as they have been developed, are usually small, ranging from a few inches to as much as 2 feet. An inch pay streak of this mineral, however, pays well for stopping. Large specimen pieces are frequently found that are sheeted with native silver and run to very high values. A specimen of this class of ore is exposed at Mr. Evans' mine that samples 3,000 ounces in silver and is nearly a foot square.

*B. H. & B. Mine.*—There are several other properties being actively developed in this district, including the B. H. & B. Mine, which has quite an extensive mining plant, including electric power drills.

*Bluebird.*—The Bluebird is another very promising property undergoing development with quite a force of men and showing up some rich ore. Both of these mines are likely to enter the shipping list next season. The same is true of the Wisconsin Mining & Development Company's property, consisting of a large group of claims extending down to the lake shore and are being developed with a long cross-cut tunnel very near the lake level, which has already attained a length of 1,000 feet.

LAKE VIEW DISTRICT.

On the opposite side of the lake, at the Lakeview District, the Hidden Treasure Mine made a shipment of a carload of rich ore during the past year and is under-

going development this winter. This mine produced a dry silver ore from a well defined quartz fissure in blue limestone near a contact with metamorphic sediments.

Lakeview is one of the prettiest mining camps in the State, situated on a flat beach or bar, right down near the lake shore at the mouth of Gold Creek.

The principal mines of this district are five or six miles up Gold Creek towards the divide that separates the waters of the North Fork of the Coeur d'Alene River and Lake Pend d'Oreille, and embraces some extensive deposits of good ore.

*Weber Mine.*—Among these is the Weber Mine, with a vein of gold and silver-bearing quartz 40 feet wide that has been developed extensively with adit tunnels and is said to carry average values of \$10.00 per ton in gold and silver, and a brecciated white quartz of this vein contains some beautiful native silver specimen ore that occurs in scales and flecks in the joints of the rock.

*Keep Cool Mine.*—The Keep Cool Mine, on the same vein as the Weber to the south, has also been developed by a succession of short adit tunnels which disclose a large and continued ore shoot of silver-bearing lead-zinc ore, that with the proper kind of treatment should be made to yield valuable shipping products.

*Conjecture.*—The Conjecture Mine is another quite extensively developed fissure parallel to the Keep Cool Mine and Weber, a little further to the north. It has produced a number of shipments of high-grade silver ore and had a carload of rich mineral sacked up ready for shipment at the time of the writer's visit last fall, that was said to average 250 ounces silver per ton.

This is an oxidized, dry silver ore, carrying a good deal of iron and manganese oxide, and is shipped to the Tacoma smelter, where it is handled at a treatment charge of \$5.00 per ton.

*Venezuela.*—The Venezuela is another big mineral vein, 45 feet wide on still another parallel vein to the south and carries some streaks of good silver ore. It is being developed by a long cross-cut tunnel which will tap the ore body at several hundred feet in depth where, it is anticipated, important lead values will be encountered.

The formations of the larger portions of the Lakeview

District are identical with and a part of the Coeur d'Alene series. They consist of thin, bedded quartzites and slaty graywacks that are folded at various angles from the horizontal to the vertical. They carry some pronounced fissures, whose extensive exploration seem justified with the anticipation of revealing large bodies of concentrating lead-silver ore and shipping ore.

On the opposite side of the lake from Lakeview a bold mountain uplift, shown in accompanying plate, seems to be composed entirely of blue and gray heavy bedded limestone, which is also true of the shore line of the lake for a distance of three or four miles, terminating at Bay View, where an extensive lime plant of the Washington Brick & Lime Company is located. This plant includes four large draw kilns, and its large output of lime is transported across the lake to the railroad, at Hope, at a cost of about 50 cents per ton, by the company's own steamer. This great lime body should prove a valuable source of flux for smelting operations and is an important unit in the geology of the region.

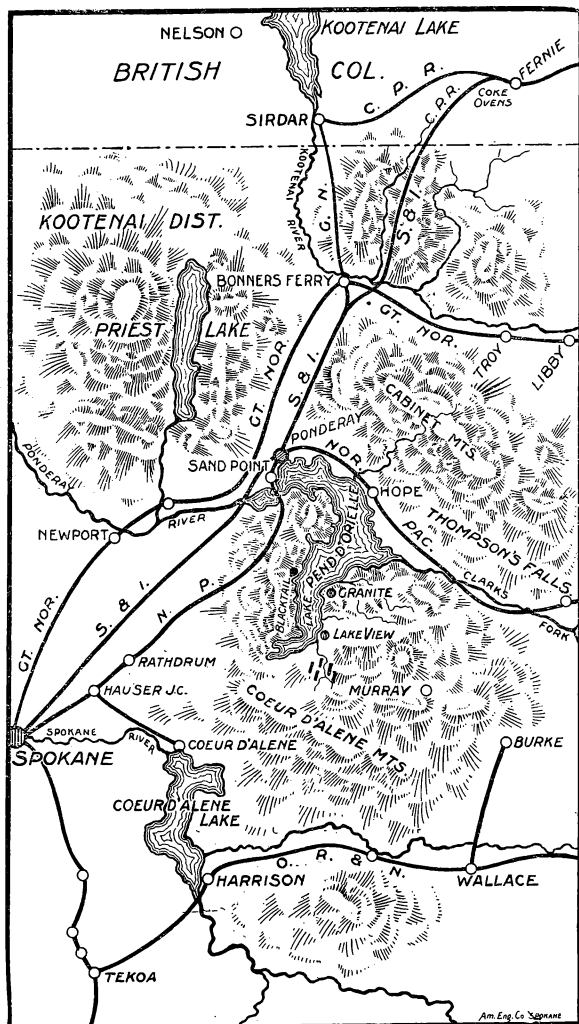
*Brown Mine.*—In the vicinity of Bay View the Brown Mine contains a large deposit of iron oxide ore associated with high-grade silver mineral from which profitable shipments have been made.

*Minerva Mine.*—On the east shore of the lake another promising camp is receiving considerable attention and development at Granite Creek, where the Minerva Mine, operated by the Minerva Mining & Milling Company, is located. The Minerva has a true fissure vein varying up to six feet in thickness, with well defined walls and contains some high-grade ore. It is developed by two cross-cut tunnels; the lower one, now in process of construction, will tap the inner ore shoots at an extreme depth of 400 feet.

This property has made small shipments of gold and silver-bearing lead-zinc ore that have netted \$40.00 per ton. There are several other very promising properties in this district, and when properly developed it is likely to prove a good source of shipping mineral.

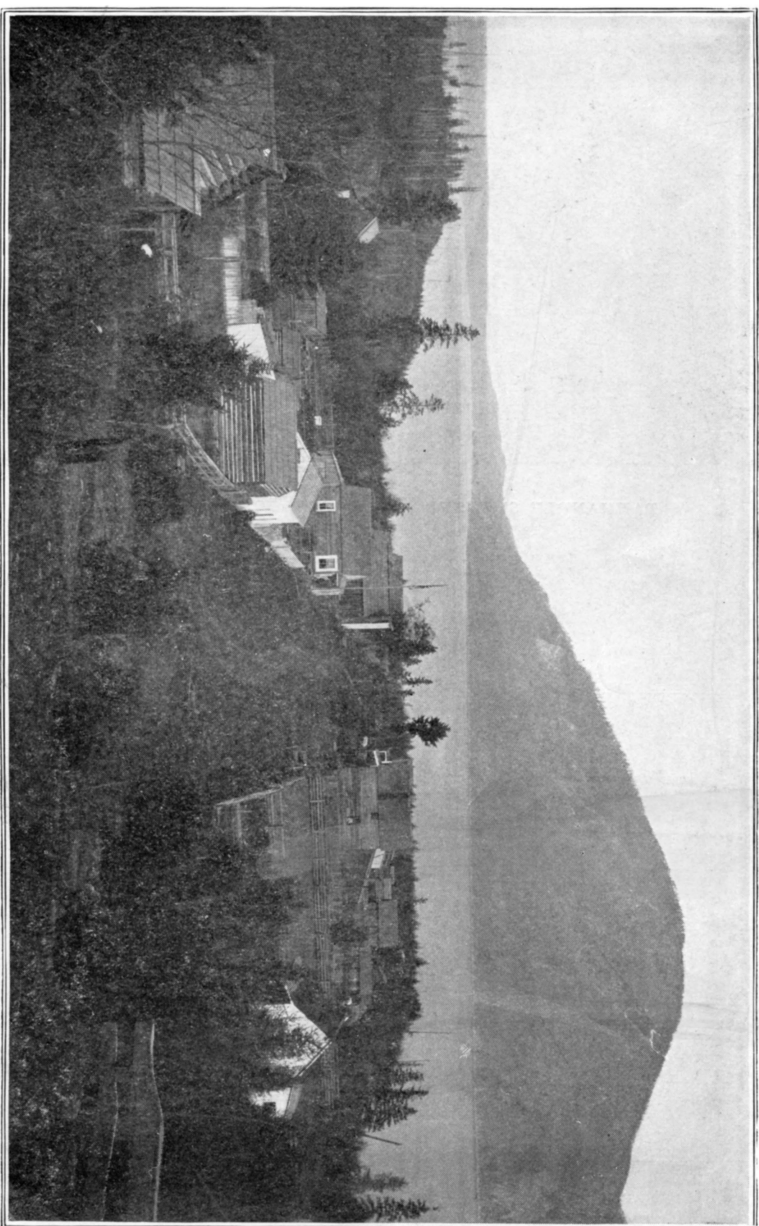
In traveling around the lake on the swift little steamers that serve its different camps, prospect holes may be observed at short intervals along its shores the entire distance around, and it is remarkable how completely mineralized its formations are.

Near Clark's Fork a fine deposit of copper sulphide ore is being developed, and northwest of Hope, a few miles out in the granite formations, there are some extensive

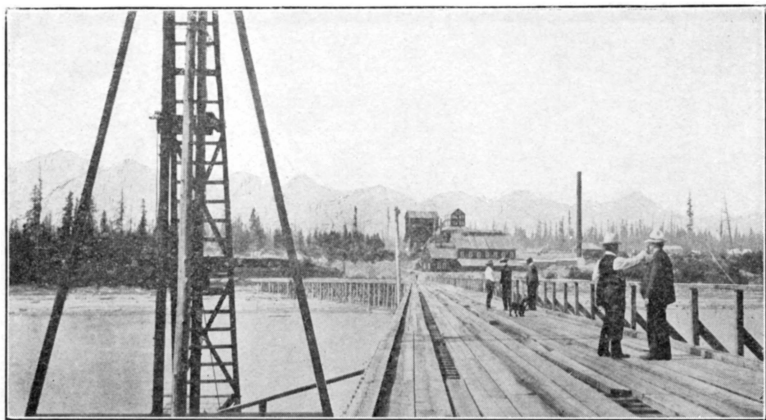


MAP SHOWING COUNTRY TRIBUTARY TO PANHANDLE SMELTER.

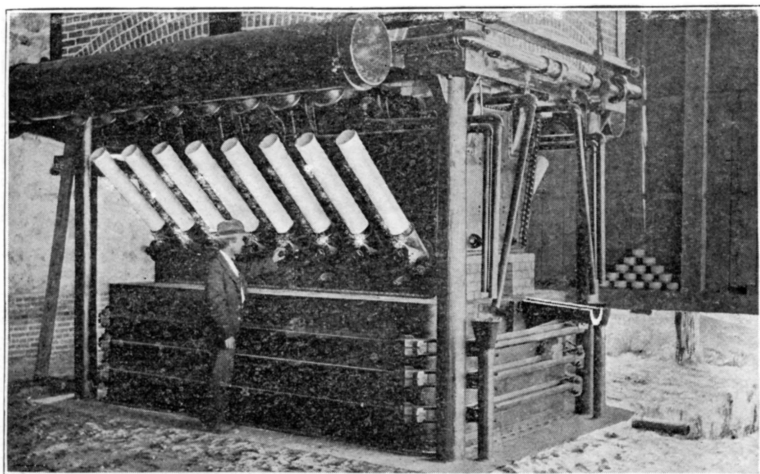
veins of gold-bearing iron-sulphide ore that seem to warrant extensive development, and the total production of the different districts surrounding the lake, but principally from the Blacktail and Lakeview District, is placed



A GLIMPSE OF LAKE PEND D'OREILLE, FROM LAKEVIEW, LIMESTONE MOUNTAIN IN THE DISTANCE.



PANHANDLE SMELTER AND DOCKS, PONDERAY, IDAHO.



LEAD SILVER FURNACE, PANHANDLE SMELTER.

at approximately half a million dollars to date, while, as a matter of fact, its resources have barely been scratched and are likely to justify an important yield of desirable smelting mineral in the near future.

*Panhandle Smelter.*—The mineral resources of the lake districts, and, in fact, of a wide adjacent territory, will soon be afforded a convenient market for their ores at Ponderay, near Sand Point, where a 200-ton lead smelting plant is now in process of completion, with all the machinery on the ground, and will soon be ready to blow in.

The geographical advantage of this smelting point is aptly illustrated by the accompanying map. This enterprise ought to be afforded the support of local capitalists, especially of the 150,000 club of Spokane, as its successful operation means everything for the development of the mineral resources of that region and the addition of a refinery, located in connection with this plant, or even near Spokane, could be made the basis of a very important industry for the manufacture of lead products that would keep a good deal of money in local circulation in that thriving business center that now goes East to pay for the labor and transportation costs two ways of large quantities of sheet lead and lead pipe and the various lead paint pigments, etc., that the country uses.

#### PRIEST LAKE COUNTRY.

*Idaho Continental Mine.*—Near the north end of Kootenai County, in the Priest Lake District, the Idaho Continental Mine contains a very large deposit of concentrating lead-silver ore, together with a pay streak of six inches to two feet of clean galena shipping mineral that carries good silver values. This property has considerable development, which justifies further extension. Its rather remote situation from railway transportation has been a drawback to its profitable operation; but the high prices at the present ruling for lead and the prospect of their continued strength will very likely result in this mine's further extensive operation.

*Priest Lake Mining Company.*—Near this property the Priest Lake Mining Company have several hundred feet of tunnel development on a well-defined quartz fissure containing some very high-grade galena-lead ore, with silver values, and in the same locality, on the east shore of



Priest Lake, some large deposits of gold and silver-bearing copper ore have recently been discovered and their development commenced.

*Panhandle Copper M. & S. Co.*—The Panhandle Copper Mining & Smelting Company have acquired and commenced the development of some large deposits of copper-iron sulphide ore. One of these deposits is of very large size and carries, associated with rich yellow copper pyrites, some heavy pyrrhotite mineral that may contain a little nickel and cobalt. These deposits also carry good gold and silver value, associated with the copper-iron mineral and present strong indications of developing into a profitable mining enterprise.

*Farmer Jones Gold Mining Company.*—At Pine Creek, seven miles north of Priest River Station, on the Great Northern Railway, a very promising gold-bearing district has been discovered. At this point the Farmer Jones Gold Mining Company are opening a fissure vein that is traceable for a long distance in a contact of basic granite and quartzite. This vein contains a 600-foot ore shoot that is 3 1-2 feet wide and carries some fine average values ranging from \$10.00 to \$100.00 per ton.

The main feature of its development, which is being rapidly pushed, is a cross-cut tunnel that has already been extended in 250 feet, and it is anticipated will shortly encounter the vein at a depth of over 200 feet.

Some remarkable specimen values have been found at the croppings of this vein that have run up into the thousands of dollars per ton, and the proposition seems to have a very promising future. Its development is in good, practical hands and is being pushed in a conservative manner, and they aim to fully demonstrate the merits of the deposit before going into mill construction.

There are a number of other promising properties in this district, including some large bodies of brown iron oxide that are being operated by some British Columbia people and may prove the blossom of large bodies of more valuable mineral.

The Priest Lake Country embraces both granite and metamorphic sedimentary formations, including some wide belts of pure limestone up near the northeast corner of the county that contains similar high-grade silver-bearing

gray copper ores to those found in the Lake Pend d'Oreille region. The country is densely timbered and exceptionally well watered. Its contours are steep and afford fine facilities for the economical development and operation of mines. The resources of the country have not been very well prospected and it affords one of the best fields in the State for pioneer investigation.

#### ST. MARIES COUNTRY.

South of Lake Coeur d'Alene, in the St. Marie's country, the Tyson Consolidated Mining & Milling Company have some valuable quartz and placer properties at Tyson and are putting in an extensive hydraulic plant to provide power and water for their operation.

This district contains some rich gold placer deposits and already has made a production of over half a million dollars in precious bullion. It is also prospected sufficiently to demonstrate that it contains numerous gold-bearing quartz veins that carry some very fine average values and promise big results for milling operations when properly developed.

This, and the adjacent St. Joe country, present one of the best prospecting fields in the State, and while their present prominence is due to their famous timber resources they are likely to develop some notable mineral districts in the future.

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### ***LATAH COUNTY.***

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The most important part played by Latah County in the mining industry of Idaho so far is the education and development of mining engineers at the Idaho State School of Mines and University located at Moscow.

The last session of the Idaho Legislature appropriated \$40,000.00 for the establishment of a metallurgical laboratory, by which practical lessons could be given in the treatment and handling of ores and minerals by the various up-to-date methods.

This additional equipment will give the Mining School of the State University a very complete plant and will greatly aid in the study of this branch of science of mining engineering. It is expected to be in full working order for the next school year. The Department of Mining is well attended and very popular. Some bright young men have been graduated already from this institution and several of them are making a marked success in life in our northern mining districts.

Latah County contains a variety of mineral, including gold, silver, copper, mica and opals, and a small amount of gold bullion is annually produced from the northern end of the county. Its mineral deposits, however, have not been very extensively developed, but considerable interest is being manifested in them at several points at the present time and it is likely that a valuable production will be made at no distant date. This is especially true of the county's mica deposits, which include some very promising claims, including large crystals of fairly clear mica.

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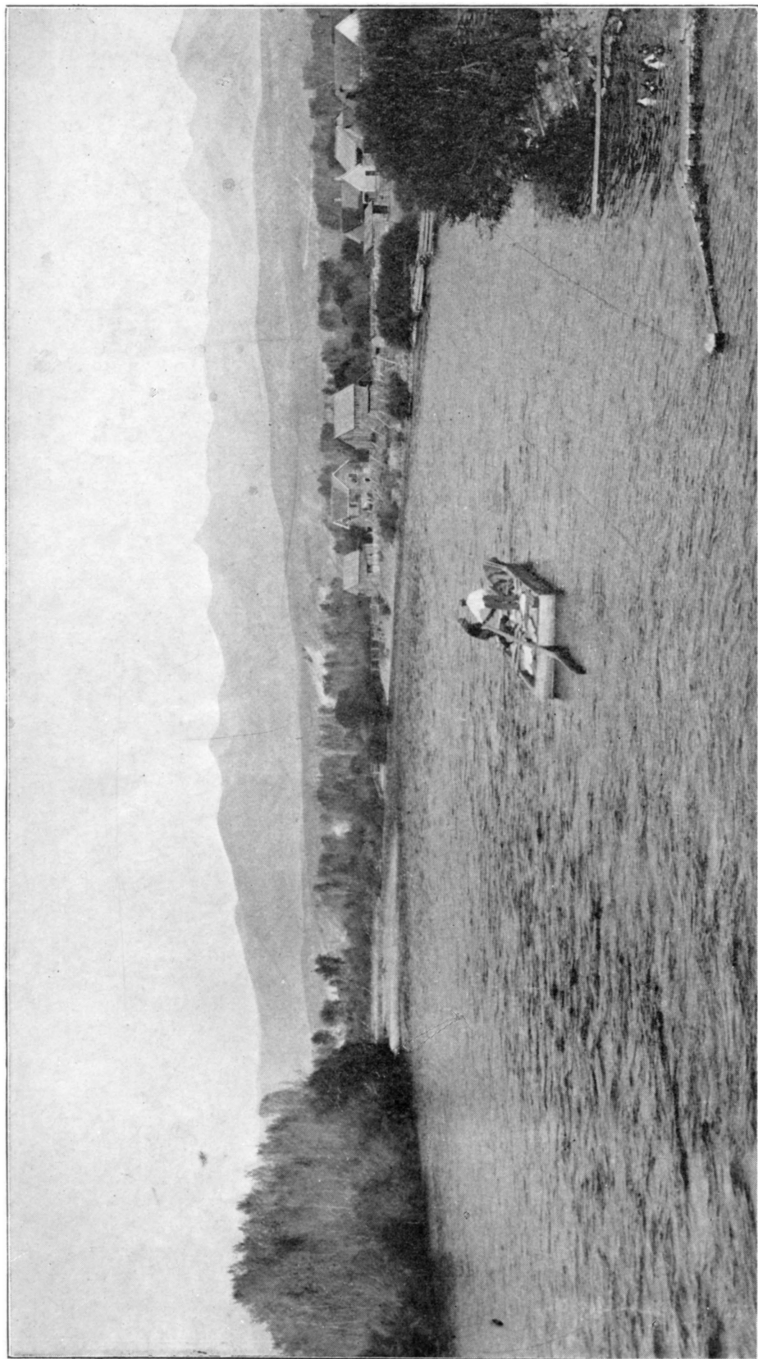
### **LEMHI COUNTY.**

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The past year has seen quite a revival of interest among the mining resources of this county and several important new ventures have been inaugurated and are now being quite vigorously pushed that promise profitable results before the close of another year.

Lemhi is one of the best mineralized counties in the State and its backward condition of development is accounted for principally by its lack of railway transportation facilities, a feature likely soon to be overcome according to the apparently authentic reports of early railway construction in this field.

*Topography.*—The topographic features of this county are a replica of the whole State on a smaller scale, and consist, over a large portion of its area, of nearly 4,000 square miles of an irregular grouping of high mountain



SALMON RIVER, NEAR SALMON CITY, SHOWING FLATBOAT LOADED WITH 10,000 POUNDS FREIGHT.



BOHANNAN BAR, HYDRAULIC PLACER MINE NEAR SALMON CITY.

ridges and spurs with intervening canyons and gulches, the slopes of which are generally well timbered, and in many instances important water courses that afford many fine water power privileges occur.

The eastern border of this county, which also represents the State line, is marked by a section of the main continental divide that at this point forms one of the most ideal examples of a clean-cut mountain range that is afforded anywhere in the great west.

The main Salmon River at this part of its course has assumed the proportions of a large stream, navigable for good-sized flat-boats. It traverses this county in a northerly and westerly course for over 100 miles, the greater portion of which, however, is through narrow canyons with bluff slopes. For a distance of ten miles north and south of Salmon City it opens up into quite a broad valley that is covered with well cultivated farms.

Starting near its southeast corner, the Lemhi River flows through this county in a northwesterly direction for seventy-five miles to its confluence with the Salmon River at Salmon City.

The Lemhi is a large mountain stream flowing several thousand inches of water at low stage. It has an average grade of 50 feet to the mile and affords a convenient source of irrigation water for the well cultivated bottoms through which it meanders.

With its included low foot-hill belt, the valley of this stream will average about six miles wide, and its broad, adjacent slopes afford rich pasturage for large herds of cattle, which, together with the meadow lands along the bottoms, form the basis of a very prosperous live stock industry.

At the lower elevations in the vicinity of Salmon City a great variety of grains, fruits, and vegetables are successfully raised, and the climate will average up with some of the best areas of the State.

*Geology.*—In its geological features Lemhi County is also a duplication on a smaller scale of the general geology of the State at large. While it has less of the undesirable recent basaltic lava flows than any other county in the State, it has a larger proportion of the more desirable metal-bearing formations.

Divided into three sections, with north and south lines, its western third is largely made up of granitic formations with intrusive dikes. These granites include, as well as the usual eruptive granite, some large areas of archæan gneiss and schist. Its middle section is largely occupied with metamorphic sediments and eruptive, intrusive rocks.

This section has an immense area covering the western slope of the main range of the Rocky Mountains of the typical Coeur d'Alene series of quartzite slates and graywacks, with numerous narrow dikes of basic igneous intrusives and some wide belts of light colored porphyries.

Its eastern third is occupied largely by a massive development of limestones, dolomites, quartzites and eruptives in bold, rugged ranges. This series of formations belongs to the carboniferous period and are correlated to the rich metal-bearing series of the same age at Tintic, Park City and Bingham, Utah.

The writer lived in this county for fifteen years and is familiar with almost every square mile of its area and believes that there is not a single square mile of the rugged surface of the county, outside of the valley bottoms, that does not contain numerous manifestations of deposits of valuable minerals.

The western two-thirds of the county have furnished an important and constant output of good bullion for fully forty years, and the limestone districts of its eastern section were noted for lead-silver production before the lead mines of the Coeur d'Alenes were discovered, and contained one mine that shipped 60,000 tons of crude ore that averaged 60 per cent lead.

The mining development of this particular part of the county has recently experienced a very important revival and is likely to again become a very notable producer of lead-silver mineral, if any of the numerous railway schemes that are occupying public attention so insistently are consummated.

*Salmon City.*—Salmon City, the county seat of Lemhi County, is one of the most up-to-date and picturesquely situated inland towns in the State. It has a number of fine brick business houses and dwellings, gravity water works, electric light, telephone connections with the rail-

road and a daily stage service from Red Rock that is unexcelled in efficiency.

Its charming surroundings of mountain, valley and stream grow on a person in such a way that if one has ever lived there one always feels an inclination to return. It forms the natural gateway to one of the most strategic routes for transcontinental railway construction, and should one of the big lines avail itself of this avenue across the State it will become famous for its scenic grandeur and a place where artists may catch glimpses of some of Nature's masterpieces.

At an early stage of the summer season, from a certain vantage point on the western range a short distance north of Salmon City, the writer has watched the rising sun gild a close-set group of rugged pinnacles on the continental divide to the east with brilliant, incandescent light, then slowly glide in between them, appearing for an instant a magnificent, scintillating gem in its rough setting of rocky peaks, a picture beyond the power of words to describe.

In the evening, when the sun sinks to the level of the bold western range of mountains, their shadowed outlines creep across the intervening valley and slowly climb the steep slopes of the continental divide to the eastward, chasing the glorious light to the loftiest summits of bare rock, that, for a lingering period, are transformed into colors of freshly melted gold.

Succeeding this sharp contrast of light and shade, the same irregular outlines are duplicated by a remarkable after-glow effect that for a lingering period again floods the summits with soft saffron-yellow light, then gently fades into the subdued gray of "a sleepy day." The sunrise and sunset effects in this valley are unsurpassed anywhere in the West and form one of the peculiar charms of its situation.

While high mountain summits seem to enclose the Lemhi Valley on every hand there are several very feasible passes for railway construction. The entrance to the Lemhi Valley from the Snake River plains, by way of Birch Creek, is one of the most easily approached mountain passes in the West. In fact, it consists of a broad estuary-like valley that is a mile wide, and so level in the vicinity of its highest elevation that it is impossible to tell which way the drainage runs for quite a distance.



From a point about twelve miles north of Salmon City the Salmon River flows through a canyon that contains no insurmountable obstacles for railway construction and strikes in a general course that departs less than ten miles from an east and west line to its confluence with the Snake River, 180 miles further west, and should this natural avenue across the rough mountain country be occupied by a transcontinental line it will open to development an immense area of tributary mineral resources and traffic.

Lemhi County continues to produce considerable placer gold, but the light water season of the past year greatly retarded its output in this line. Another serious setback to its gold output was the destruction of a fine 30-stamp mill owned by the Kitty Burton Gold Mine Company at Indian Creek, in September, by fire.

This property had been in successful operation for several years, and the loss of gold from this source also accounted for a marked falling off in the precious bullion output of the county during 1905. I am informed, however, that this plant will be rebuilt in the near future, as the company's developed ore resources are extensive and of good grade.

*Placers.*—At Big Creek, fifteen miles northwest of Leesburg, some rich, high bar gravel deposits were worked in early days, and a large amount of capital was expended a number of years ago in an attempt to open the main stream with a bedrock flume. This venture was poorly directed and managed, however, and failed to accomplish its object.

Big Creek, and one of its tributaries called Beaver Creek, are believed by some conscientious old placer miners of this locality to contain high values and to present an extensive placer proposition that will warrant a big investment.

This property has recently been acquired by the Big Creek Gold Mining Company, Limited, a Chicago corporation, who are planning its extensive development.

The placer resources of Lemhi have been extensively operated in past years and have produced many millions of dollars in gold. They embrace some extensive hydraulic plants, one of which is partly illustrated in the accompanying cut of the Bohannon Bar Diggings, situated seven

miles east of Salmon City. The most famous placer district of the county was the Leesburg Basin, fifteen miles west of Salmon City, on the opposite side of the Leesburg Range.

The richest resources of this famous basin have long since been exhausted, but some important areas of flat gravel beds still remain that should pay well for dredging operations.

*Gold Flint Mine.*—This basin also contains some important gold quartz deposits, and has produced some rich ore. One of its best developed quartz properties is the Gold Flint Mine, which has 2,000 feet of adit tunnel work, blocking out a large reserve of ore, and I understand it is to be equipped with a good-sized mill in the near future.

*Gold Ridge.*—The Gold Ridge Mine, in the same vicinity, is being quite actively developed at the present time, and has a very promising future. The situation of this vein is such as to indicate that its erosion was one of the sources of the rich placer ground that has been worked below it. This vein is a very strong one, and between the Gold Ridge and the Gold Flint Mine is another property that has been considerably developed, called the Gold Dust Mine.

*Gold Dust Mine.*—This property is equipped with a modern 10-stamp mill that has made several test runs and demonstrated the fact that additional machinery will be required for the successful treatment of its ores, and the company have recently added 3,000 pounds of machinery and material for a cyanide annex, to which method of treatment the ore is said to show good results.

There are a number of other excellent gold ore bodies developed among the old placer districts of the Leesburg Basin, and some fine opportunities presented for an investment of capital.

*Copper King.*—On the steep slopes of Beaver Creek a large deposit of rich copper ore has been undergoing development by its original discoverers for several years and has recently been patented.

This property is known as the Copper King and carries a big vein of schisty, silicious gangue and breccia that is richly veined and impregnated with very high-grade red oxide of copper and other high-grade copper minerals and

also carries important precious values. This forms one of the most presentable copper ore showings in the county and would prove an important source of shipping ore if railway transportation facilities should be afforded to that section of the State.

*Blackbird Copper District.*—At the Blackbird Copper District, on the opposite side of the valley of Big Creek, a few miles further south, there exist some very extensive disseminated copper sulphide deposits that carry high proportionate values in gold and only need transportation facilities to afford the basis of a populous and productive camp.

Quite a number of the claims in this district have been patented, but a good many of them are held by location and consistently represented annually and developed to the extent of their owners' means. These annual installations of work invariably show up additional tonnage and increases the extent of their ore resources.

In the Deer Creek section of this district recent development has disclosed some remarkably rich gold values that promise big profits for a simple milling operation.

#### YELLOW JACKET DISTRICT.

An important revival of mining interest has been manifested in this old district during the past year, and the transfer of the Black Eagle group of mines is recently reported at a price of \$35,000.00. This property contains some very rich ore which has been successfully treated in an arrastra.

It is also reported that a deal is now pending for the old Yellow Jacket Mine. This property is equipped with a 60-stamp mill and represents a monument of mining mismanagement. It has an immense surface showing of pay ore, and its importance has never been fully demonstrated.

Below this big mill there is a large pile of tailings accumulated from its former operation that is said to average \$8 per ton in gold, and to yield admirably to cyanide treatment.

Negotiations are also in progress for the purchase of the Yellow Jacket placers in this district, comprising an extensive tract of gravel that has been partially developed and proven to contain rich values in coarse, high-grade gold.

*Singiser Mine.*—Among the most important mining transactions of the past year was the acquisition and development of the old Singiser Mine by the Oregon-Idaho Mining Company, a corporation comprised of Pennsylvania capitalists. These people have instituted a vigorous campaign of development and were recently employing a force of 50 men. They have completed a thousand feet of underground development during the past year and disclose some large reserves of high-grade ore that carry average values up to \$20.00 per ton, and the ore body is said to be as much as 80 feet wide at one point.

This is an immense fissure vein in porphyry formations, filled with brecciated igneous rock cemented together with silicious sinter. The values run in both gold and silver, and the ore contains nothing, apparently, to prevent its successful treatment by some of the leaching methods.

*Ramey Group of Mines.*—In the same district the Rabbit's Foot Mining Company have acquired the Ramey group of mines and a number of other adjoining claims, giving them control of an extensive area of very promising mineral territory. This company are engaged in an aggressive campaign of development along practical lines and should secure ample reserves of ore to justify the installation of their new mill by spring.

All the machinery for this plant is said to be on the ground and embraces a complete equipment for a modern 10-stamp mill. The writer has not personally visited the Ramey Mine for two years, but formerly was very familiar with it.

This property embraces a very interesting mineral deposit of gold and silver-bearing igneous rock that is traversed by pronounced fissure courses containing some very high values in native gold, and also rich silver sulphide minerals, and I have often panned bonanza values in native gold from its select pay streaks.

The present enterprise is being backed mainly by eastern capital, and the proposition affords every promise of becoming an important and profitable source of precious bullion.

*Copper Queen.*—Along the main range east of Salmon City, a number of mining enterprises were under process of development during the year. Among these the Copper

Queen Mine, at Agency Creek, which is largely owned by Montana people, was equipped with a fine hoisting plant; a double compartment shaft has been started down on the vein which will be continued to a depth of 600 feet. It has exposed a remarkably rich shoot of bornite copper ore that carries rich values in gold and silver, especially gold, often showing specimens that are studded with very coarse pieces of native yellow metal, and considerable shipping ore is being accumulated at this property that will soon be sent out and is expected to average 30 to 40 per cent copper, in addition to associated gold and silver values.

This property is owned by a stock company which comprises some of the most prominent politicians in Montana. It is capitalized at several hundred thousand shares, and has developed in such a handsome manner lately that its securities have gone over \$4.00 per share, with the prospects of a still higher raise.

*Goldstone Mine.*—Following the range to the northwest the old Gold Stone Mine at the head of Pratt Creek is making preparations for a year of active operation. An air compressor of four drills' capacity has recently been installed at this mine and its 10-stamp mill is soon to be moved to a convenient place below the mouth of a deep working adit that has been run to the vein and is now being extended. This mine is opened on a well defined fissure in metamorphic sediments. It has a pay shoot two feet wide, of ore that shows average values of \$80.00 per ton in gold, and test runs indicate that about 90 per cent of its value can be saved by amalgamation and concentration.

*Dark Horse Mine.*—Situated near the head of Wimpie Creek, the Dark Horse Mine embraces a large group of claims overlapping the Idaho-Montana line and carries an important copper-gold ore deposit similar to the Copper Queen, producing the same class of high-grade bornite mineral.

This property turned out a carload of ore at the close of the year that is said to have averaged better than 30 per cent copper, together with important values in gold and silver. It has considerable development and is highly thought of locally.

*Confidence Group.*—Within the past year the White Horse and Confidence Mines have been bought by a company of Colorado investors who have built several miles of wagon road and erected a 5-stamp mill, which is reported to be in successful operation at the present time.

This property carries two well-defined fissure veins in the metamorphic sedimentary formations of this range that contain some high values. Milling tests of considerable quantity, showing results of \$25.00 per ton to plate amalgamation, and in addition a good percentage of rich concentrates. This property was originally equipped with an arrastra. It has been a poor man's proposition, having paid its original owners well from the beginning.

*Schumaker-Olson Mine.*—This property, owned by a company of Butte men, has been operating its veins at the head of a tributary of Carmen Creek with notable results. They have recently placed a 5-stamp mill on the ground and expect to have the machinery in operation in the early spring.

The ores encountered indicate very profitable milling results, and like most of the mines along the main range produce some very beautiful specimen gold quartz, often running up to several thousand dollars per ton in selected pieces.

*Gibbonsville.*—Further to the northwest, about twenty-five miles, the old quartz and placer camp of Gibbonsville, on the North Fork of the Salmon River, continues to be the center of some mining activity and has several properties that justify continued operation.

*Coal.*—Salmon City has a fine resource of lignite coal in the foothills only two miles west of town which have risen considerably in popular favor of late and have almost entirely suspended the use of wood as domestic fuel. This coal is sold on the local market at \$4.50 per ton.

The mines at present development are capable of producing fifty tons daily, and their veins are of such size that a yield of several hundred tons a day could be figured on for an indefinite period with further development.

*Queen & Crescent Mining Company.*—The Queen and Crescent Mining Company own a well equipped group of claims, seven miles north of Salmon City, in the Eureka Mining District. The equipment of this property con-

sists of a 10-stamp mill and hoisting plant, also an air compressor and machine drills with which a long cross-cut tunnel has been extended to undercut at considerable depth the former development of the property, which has been done through a vertical shaft. This new tunnel is already in 1,100 feet and is expected to strike the main Queen vein at 1,200 feet, after which a drift will be continued along the vein and a raise put up to connect with the shaft and levels above, affording a convenient avenue for the drainage of the mine and the economical extraction of its ore bodies. This new tunnel has already cut one strong mineralized fissure, but drifting along its course is being deferred until the Queen vein has been encountered. The latter is one of the largest and best defined gold-bearing fissures in the county. It is over 10 feet wide, in strong granite walls, and when the development now in progress is a little further extended it is expected to afford an extensive tonnage of profitable gold ore. It is intended to push this big tunnel on further into the mountain, beyond the Queen vein, for the purpose of developing other important ore courses that traverse the property.

*Clipper Bullion Mine.*—Successful milling operations were carried on at the Clipper Bullion Mine, at Shoup, and an important amount of precious bullion turned out by the 5-stamp mill on this property during 1905.

The other mines at Shoup experienced rather a dull year. On the opposite side of the river, at Pine Creek, several rich discoveries were made during the year, and some Colorado capitalists are now negotiating for properties in that section. The State wagon road projected from Indian Creek to Shoup, and which is likely to be completed during 1906, may mean a great deal for this part of Lemhi County, for Shoup and vicinity has some very handsome opportunities for the investment of capital, and has, among its offerings, some well developed ore bodies of good grade.

*Gilmore Mine.*—The largest single producer of mineral in Lemhi County during 1905 was the Gilmore Mine, situated in the Texas Mining District near the head of the Lemhi River. Its output for the year approximated 2,600 tons of lead-silver ore.

This property is developed with a cross-cut tunnel that

taps the vein about ninety feet deep, from which an extensive drift has been run and a fine ore body disclosed. This ore body has been developed from the tunnel level with a vertical shaft 200 feet deep. The ore deposit occurs in a nearly vertical fissure vein, in walls of pure blue limestone, and varies in width from 1 to 30 feet. The ore seems to be a replacement of the limestone wall rock and some lateral fractures and joint planes.

The property is equipped with a rather crude jigging plant that has a capacity of 300 to 400 tons of concentrates per month. This plant is likely to be improved with additional machinery in the near future, for finer crushing and closer concentration, as the expensive wagon haul doesn't warrant shipping too much waste.

The mine is being well handled and has a large reserve of ore in sight, said to approximate ten thousand tons, containing crude values of something like 30 per cent lead and 15 ounces silver, together with a little gold. Its ore shipments are temporarily suspended, owing to an unexpected freeze up in the water line that supplies the mill. Efforts are being made to remedy this defect at the present time, and the mill will probably be gotten in commission at an early date for a continuous run during the balance of the year, as the ore reserve and the physical condition of the mine warrant this anticipation.

The management are now dropping the shaft down an additional 200 feet, from which point another level will be run that should afford an additional extensive reserve of high-grade mineral.

The ores of this mine are largely lead-carbonates, associated with nubbins of galena and a good percentage of iron oxide, and they are eagerly sought after by the smelting companies for their fluxing qualities.

The situation of this mine is eighty miles from the nearest railway shipping point, at Dubois, on the Montana division of the Oregon Short Line Railway. This distance is covered with a wagon haul at a cost of \$10.00 per ton, over a smooth, hard desert road, with a very gradual fall all the way from the mine to the railway, and the ore teams readily average a ton to the animal.

The Texas Mining District, in which this property is situated, is quite an extensive one. Its formations con-



sist of heavy bedded limestones, dolomites and quartzites, together with intrusive dikes and masses of igneous rock that resembles diorite. It is very extensively fissured and mineralized. It is an old district and was first discovered and worked in the early '80s, but since that date, until the purchase of the Gilmore property about three years ago, most of its locations have been in a quiescent condition as regards development, excepting for annual assessment work by a few of its more tenacious supporters.

Since the discoveries of the rich and extensive ore bodies at the Gilmore Mine, which, prior to its acquisition by its present owners was not considered as favorably as some other claims in the district, quite a revival of interest has been manifested in this and adjacent districts, and several development companies have been formed to exploit their resources.

There are several other fine opportunities open that carry manifestations of ore bodies at the surface and in shallow development that are well worthy of extensive exploratory work and present eminent evidences of the existence of large and profitable ore bodies at depth.

#### SPRING MOUNTAIN DISTRICT.

This district and the same belt of ore-bearing formations is continued to the southeast for ten miles where it is known as the Spring Mountain District.

At this point, near the summit of the range, nearly 10,000 feet above the sea level, a large group of claims was acquired during the past summer by some successful Utah mining operators, one of whom is Mr. J. D. Wood, Vice President of the Daly-West Mine at Park City, and also extensively interested in a number of other Utah lead-silver producers.

These gentlemen have already invested \$50,000 in the acquisition and development of this property. They were attracted to it by its great number of manifestations of ore and a marked similarity of its inclosing formations to those of the Tintic District and Park City.

The property carries several rich croppings of lead-silver mineral, containing, in addition, important values in gold and copper. The ores are principally carbonates of lead and iron, with occasional nubbins of galena, and occur in great fissured zones in the limestone and near a contact

with the quartzite. The property covers a spur of the main mountain divide that falls off very abruptly and affords a tunnel site advantage that could hardly be excelled, as the mountain slope on which the claims lie has a pitch of nearly 40 degrees and a vertical height of something like 1,000 feet above the tunnel site. The extensive exploration of the numerous ore showings on this group will be pushed right along.

A large force of men is employed on this work at the present time, and it is to be hoped, and confidentially expected, that the property will become a shipper before the season of 1906 is very far advanced.

*The Climax Group.*—On the opposite side of the broad valley of Birch Creek from Spring Mountain, the Climax Group of claims, adjoining the famous old Viola, has been bonded and some work is in progress upon it at the present time.

This is one of the most flattering chances for the discovery of a big body of lead-silver ore that Lemhi County affords. The claims carry a body of soft iron oxide ore that has been proven by development to be at least 200 feet square, without any limits being found. It carries a light dissemination of lead carbonate all through its mass and is likely to be underlaid or succeeded on its dip by a body of lead ore similar to that already mined from the Viola claim immediately to the south of it, which was 1,200 feet long and as much as 70 feet thick of 60 per cent lead carbonate ore. This great mass of mineral went down about 200 feet at a flat dip of about 15 degrees in the blue limestone, within 20 feet of a massive quartzite contact and produced over \$5,000,000 in three or four years' operation at the shallow depth mentioned. It was cut off by a fault, and it is the impression that the Climax iron body is the continuation of it and the channel from which its great resource of lead mineral was derived.

#### JUNCTION DISTRICT.

Some high-grade ore shipments in lead and silver have occasionally been sent out from the Junction District on the same range as the Viola, twenty-five miles further to the northwest, and recent reports from there tell of rich discoveries having been made late last fall.

This whole western third of Lemhi County is fine pros-

pecting territory for lead-silver ores. They invariably also carry gold values and some copper and in every way resemble the ores of Park City and Tintic, Utah, as well as do their inclosing formations, and it is not unlikely that their extensive exploration will result in the discovery and development of similar bonanza bodies as have made our sister State famous.

There are many showings of mineral in the districts at this end of Lemhi County that are worthy of much more consideration than they have received and will justify investigations on the part of investors in this line of mining.

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### ***NEZ PERCE COUNTY.***

Nez Perce County's chief resources run to broad acres of beautiful agricultural land and forests of pine timber rather than to mineral, but the annexation of the south end of Shoshone County by act of the last Legislature, to Nez Perce County, which wasn't received with a good grace owing to the load of debt that was transmitted with it, adds to this county an important belt of mineral territory, including the famous old placer district of Pierce City, the scene of the original gold discoveries in Idaho.

This district contains some extensive tracts of flat gravel deposits that still remain unworked by reason of their condition involving expensive development and equipment. This is being taken up on several properties, including one dredging enterprise and several bedrock flume and hydraulic enterprises that are likely to give Nez Perce County a standing as a gold producer in the years to come.

*Gaffney Company Dredge.*—The Gaffney Company own a tract of fine dredge ground covering two miles of Orofino Creek that contains a bed of gravel 8 to 20 feet deep, which, according to conservative estimates, averages 20 to 30 cents per cubic yard all through and also has some pay streaks of much richer ground.

Plans are in progress to equip this property with a large dredge plant, for which process of operation the ground is ideally adapted, as the bedrock surface is soft, the gravel fine, and contains no cement or clay, and the dredge should work to its maximum capacity in this class of material.

Another extensive tract of Orofino Creek, covering six miles of its course, is owned by a Chicago company, who are developing it by a bedrock flume and will employ a large force of men the coming season. This ground is also known to contain good values and should prove an important producer. There are also several other placer properties in this district of considerable extent and value that will justify equipment with the necessary machinery to treat their contents economically.

The Pierce District, in addition to placer, contains a number of gold-bearing lode deposits. Its principal formations are granite and intrusive dikes of mineralized porphyry.

*Wild Rose Mine.*—One of the most promising of these lode deposits is the Wild Rose Mine, which has recently been taken over by a new company and is to be exploited extensively.

It carries a large vein or lode of low-grade ore 28 feet wide, accompanying which is a well-defined pay streak about a foot in width from which a number of mill runs have been made in the small plant on the mine that yielded \$100 per ton in free gold. The balance of the lode is said to average \$5.00 per ton and should afford an immense tonnage that, under careful handling, ought to pay a nice margin of profit.

*Columbia Crescent Mine.*—The Columbia Crescent Mine, three miles east of Pierce City, is locally considered one of the best propositions in the district. It has been idle, however, for some time. This property contains a pay streak 20 inches wide that carries average values of \$50.00 per ton.

*Ozark Lode.*—The Ozark Lode, 1 1-4 miles east of Pierce City, has recently changed hands and is being quite energetically developed. This property is being opened on a strong fissure 7 feet wide that is said to contain big milling values, estimated to average over \$15.00 per ton. The present company intend to build a mill on this property the coming season.

*Klondike Mining & Milling Co.*—The Klondike Mining & Milling Company is another property of the district that is being developed by a long adit tunnel that is expected to gain very considerable depth on the vein, which is 30 feet wide. A good portion of this width is said to average between \$8.00 and \$10.00 per ton in gold, and the amount of ore expected to be undercut by this deep adit should afford a resource of milling ore that will warrant a good sized plant.

The Nez Perce gold output for 1905 will exceed 1,600 ounces, an amount that is likely to be increased several hundred per cent in the next year or two, as the Pierce camp is more active than usual and there are several important mining deals pending.

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### ***ONEIDA COUNTY.***

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The only item of mining importance reported from Oneida County is the production of 200 ounces of gold, which are doubtless derived from the operation of placer mines along the Snake River border of that county.

Oneida contains some extensive areas of mountain territory that have been very little prospected. These mountains embrace a variety of formations, including both crystalline and sedimentary rocks. The latter are known to contain some promising prospects of coal, and it is not unlikely that other economic mineral deposits may be found in this county.

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### ***OWYHEE COUNTY.***

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Owyhee County, covering the southwest corner of the State, still continues the most prominent precious metal producer, and largest employer of mining labor in the

State, next to Shoshone County, the old bonanza mines of Silver City and DeLamar forming the principal source of bullion.

A good deal of development work was done and undertaken, however, on other properties in this famous old mining section, and the future looks bright, with the promise of continued and increasing production.

*Trade Dollar Consolidated Mine.*—The Trade Dollar Consolidated vein enjoyed one the banner years of its history in the matter of production, and it is probably in better physical condition today, with more ore blocked out ahead, than it ever has been since the consolidation or before.

The company continues to carry a force of 225 men in mine and mill. There was over 8,000 feet of straight development work accomplished during the year, in addition to the ore production, and a reserve of high grade mineral blocked out and undercut that guarantees the continued operation of the mill for two years ahead. In addition to this, an extensive area of probably very productive territory was proven.

*Dewey Tunnel.*—The great Dewey Tunnel of the Trade Dollar Consolidated property is now in 11,300 feet from the mill level with a maximum face depth of 1,700 feet, and the rich values of the mine have been developed down as low as this level. Electric power is employed in the operation of this mine and mill in almost every department, and its application is reduced to a fine system.

The milling costs have been reduced to \$2.99 per ton, with a saving of 93 4-10 per cent. The ore is a white quartz, containing copper-iron pyrites and silver-sulphide minerals. The proportion of values is about 3-4 silver to 1-4 gold. The plant is of 20-stamps, wet crushing and concentrating, which saves about 3-4 of the values, and the tailings are amalgamated in pans and settlers without further grinding and by the addition of a little blue stone, salt and mercury with steam heat. About 2-3 of the value are saved in the concentrates which are shipped to the smelters, and the average value of the ore treated during the year was something over \$30 per ton.

The great tunnel on this mine has proved a big success ✓

in facilitating its drainage and economical operation, together with demonstrating the continuity of the ore to great depth. It is true that as far as the vein has been explored at this deep level the ore shoots are not so continuous as in some of the levels above, but they nevertheless show a connection of rich mineral through to this level and afford a new drainage surface to sink from with the prospect of a remineralization and more extensive distribution of mineral at still greater depth, as was experienced in the great Bunker Hill drain tunnel in Shoshone County.

*DeLamar Mine.*—The old DeLamar Mine, five miles below the Trade Dollar, on Jordan Creek, continues in splendid physical condition. It discontinued the production of ore on the 15th of August for the purpose of installing a new milling plant. A considerable force of men were kept on development work in the mine, however, and its ore reserves of the quality handled during the past three or four years are reported to be extensive at this date, and the continued successful and profitable operation of this great mine is practically guaranteed for several years by the action of the management in rebuilding the mill, as the well-known conservatism of the company owning this property insures this supposition.

The new mill is expected to be in shape for operation at an early date. It includes several modern improvements that are expected to reduce the cost of handling the ore and increase the percentage of saving, especially of the silver values. The great mill tunnel is being prepared for reopening. This is one of the largest pieces of mining development in Southern Idaho and was extended over a mile in length into the mountain by a former management, where it encountered the vein, which, however, was only prospected to very limited extent.

• The DeLamar property is a very extensive one in area and carries many phases of mineralization that justify further extensive development and investigation. Several of these points have been taken up in the past two years by the present management with very encouraging, and in some instances important results. The stock of the company, which was down to \$1.00 a share, was recently selling at over \$4.00. This mine has been the largest sin-

gle gold producer in the State for several years, and there is a bright prospect that, with its new milling equipment and extensive ore reserves, it is likely to continue to be so for some time.

The capacity of the new mill on this property will be something over 100 tons of ore per day. The ore, like the ore of the Trade Dollar, is a gold and silver-bearing silicious milling ore. The proportions of value in the ore, however, are reversed, and in this instance run more than three-fourths gold and the balance in silver. The ore of this property, however, carries hardly any concentrates, and the values are extracted by cyanide treatment direct, at a cost of less than \$2.50 per ton.

The DeLamar and Trade Dollar Mines are closely comparable in ores and formations to the rich deposits in this class that are attracting so much attention in Nevada at the present time, and they have been cited as examples of productiveness and permanency by United States geologists in their recent reports of the new Nevada camps producing ores of this class.

#### WAR EAGLE MOUNTAIN.

*Golden Chariot Mine.*—A new era of activity was inaugurated among the old properties of the War Eagle Mountain portion of the Silver City District during the past year, and a good many men found profitable employment.

The Sinker Tunnel Company extended a raise several hundred feet in the direction of the old workings of the Golden Chariot Mine to the point where its further extension seemed too dangerous an undertaking without a more accurate knowledge and survey of the extensive openings filled with water that it was designed to tap, and it is understood that the company will undertake to unwater the old mine from the upper workings before making the connection that they have been driving for.

The Golden Chariot was one of the most famous producers of War Eagle Mountain and has many millions of dollars of gold and silver production to its credit. Its operations and important production ceased long before the present modern economical milling methods were inaugurated, and the mine is known to contain extensive reserves of ore of a sufficient grade to pay a handsome profit under modern treatment.



*Pioneer Mines Company.*—This property adjoins the Golden Chariot and is well equipped with an excellent mill and mining plant, which has recently been supplied with electric power from the Swan Falls plant of the Trade Dollar Company, and a good deal of development work has been done on the property during the past year, and the company are now employing twenty men who are developing and extracting ore of a very good quality.

*Stormy Hill Mine.*—In the near vicinity of the above property the War Eagle and Stormy Hill mines were purchased recently by some residents of Utica, N. Y. The War Eagle is one of the old mines of the district and has made a large product. It is on one of the strongest ore courses, lying between the Golden Chariot and the Poorman Mine, and the new owners are planning a large amount of development in the near future.

*Commonor Mine.*—Another important mining deal was consummated during the past month by the purchase of the Commonor Mine, adjoining the Golden Chariot to the southeast, by some Boise investors.

This property carries one of the characteristic fissure veins of War Eagle Mountain and contains some very rich gold-silver-bearing ore. It was worked by leasors for a short period last year and produced about 100 tons of ore that milled better than \$50.00 per ton in gold, and is noted for high-grade specimen mineral.

Large pieces of ore are frequently found in this vein that are simply plastered with native gold and make a very attractive showing. The new owners are already employing a small force of men, sinking a shaft and drifting on the vein, and expect to be able to extend their operation when spring approaches and probably install a milling plant during the coming season.

*Never Sweat Mine.*—A little further to the southeast the Never Sweat Mine has recently attracted the attention of eastern capitalists and a deal for its purchase is said to be pending at the present time.

This property carries a well-defined fissure in the granite formation of War Eagle Mountain and the characteristic rich gold and silver-bearing ore for which adjacent mines are noted. An adjoining property, still further to the southeast, known as the Burro, was operated by its

owners during the past year and a mill run made that is said to have yielded better than \$50.00 per ton in gold. This vein is well defined for a long distance. Its continuation, however, to the south from the Burro is capped over by a flow of rhyolite, and while no ore croppings can be found in consequence of this obliterating cap, that portion of the district is entirely virgin and presents some excellent opportunities for speculative development companies.

The fissures of the War Eagle Mountain are contained in a formation of eruptive granite, associated with granite porphyry dikes. They are usually of small size but very persistent in the direction of their strike and dip. They present a history of precious metal production amounting to fully \$20,000,000, and at no place have been followed down more than 1,400 feet. The Sinker Tunnel has already attained a length of a mile and a quarter. It is one of the best constructed and equipped mining tunnels in the State, and if continued another mile and a quarter under War Eagle Mountain, would cross-cut its numerous veins at a maximum depth of something over 2,500 feet.

*Banner Mine.*—The Banner Mine is another of Silver City's prominent prospects that was incorporated during the past season and now forms the basis of a mining development company who are pushing work on their property, which parallels the Trade Dollar Consolidated vein to the south.

This company own a large group of claims which embraces some very promising territory and a handsome fissure containing high values, and its continued development practically insures the bringing in of a new and important producer for Silver City.

Negotiations were recently in progress for the reopening of the Potosi Mine. The Addie property is another promising ore course of great strength that has been quite extensively developed during the year, and has shown up some high-grade ore. The Trade Dollar extension is still another promising piece of mining territory that has been operated during the year. In fact, the outlook for this old district is brighter than it has been for a decade. There are more men employed at present than for several years, and the numerous active enterprises, with increasing

equipment, indicates that the season of 1906 will be another record year of production.

The success of mining operations of this district is due in no small measure to the establishment of the Swan Falls power plant by the Trade Dollar Consolidated Company, which affords a reliable source of power for mining and milling operations at a reasonable cost. In fact, it would be practically impossible to operate the mines of this district at a profit and continue their development without this or similar source of power, as the cost of fuel has recently become prohibitive, owing to the long continued drain on the limited local source of supply.

#### CASTLE CREEK DISTRICT.

Southeast of Silver City a good deal of prospecting work was done during the year and several important discoveries are reported. This district contains some large veins that carry excellent values in gold, silver, lead and copper, and it is likely to be heard from with the development of important ore bodies in the future.

#### SOUTH MOUNTAIN DISTRICT.

The South Mountain District, southwest of Silver City, was also the scene of some mining activity during the past season. South Mountain contains some large and fairly well developed bodies of silver-lead and zinc ore, carrying good values in gold as well.

Another class of deposits in this district are large bodies of iron oxide ore, containing good associated values in copper and gold, and in some instances a rich development of zinc blend ore has been discovered.

This district is noted for its large ore bodies. Its backwardness is accounted for from lack of railway transportation facilities. It offers some splendid opportunities for investment and is likely to afford a large tonnage of rich smelting ore when its different deposits have been sufficiently opened.

***SHOSHONE COUNTY.***

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The mining industry of the Coeur d'Alene District in Shoshone County continues to expand at a very rapid pace and the production of its mines in 1905 exceeded the great record of 1904, with a handsome increase of fully \$3,500,000 in value, a remarkable showing in view of the fact that the operation of its mills were hampered by another excessively dry summer season, and one of its most important mines, The Morning, was run at less than one-half of its average capacity, and the present condition of the mines, together with a strong prospect that the metal values will be maintained during 1906 indicates that the current year's production will continue on the same magnificent scale and probably show a still larger proportionate increase than was made in 1905.

The remarkable performance of the principal mines of this famous district are proving a revelation to their old operators, who occasionally return to visit them.

The enormous production from such deep levels, especially in the Standard-Mammoth Mine of the Federal Company, and the property of Bunker Hill and Sullivan Company, induces comment and the supposition that they are being crowded to their utmost capacity for the purpose of taking advantage of the present high metal market.

The reverse of this supposition, however, is the actual condition, for these great mines never had at any period of their history such extensive ore showings and actual reserves of such high values in sight as they have at the present time, especially in their lowest levels. This condition is also true of the other large producers of the district and the maximum horizon of highest enrichment in this great mineral field yet remains to be discovered.

*U. S. Geological Survey Report.*—The United States Geological Survey is preparing a detailed technical report on the Coeur d'Alene District. A review of this work, entitled "The Ore Deposits of the Coeur d'Alene District of Idaho," by Frederick Leslie Ransom, published during the past year in "Contributions to Economic Geology for 1904," gives a splendid review of the situation and of the

present condition and importance of this famous mineral field, together with some excellent maps and statistics. This, it is expected, will be elaborated on and illustrated in detail when the completed report is out.

*Geography.*—The mines of this district are situated in Shoshone County on the upper tributaries of the Coeur d'Alene River, in the Coeur d'Alene Mountain, a complex group of high ridges, deep, narrow valleys and canyons that form a continuation to the northwest of the Bitter Root Mountains.

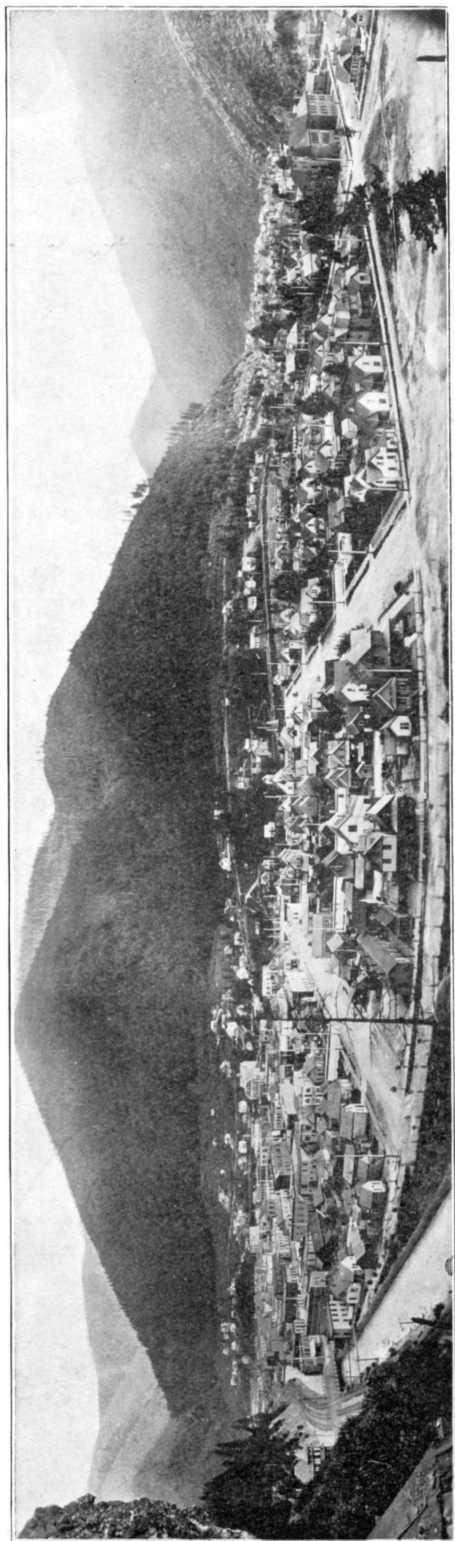
Wallace is the principal town and business center of the district, but the principal mines are located near the neighboring towns of Wardner, Mullan, Burke, Mace, Gem and Murray, all, however, embraced within an area of about fifteen by twenty miles.

There are two railroads into the district, one of which is a branch of the Northern Pacific, connecting at Missoula, Montana, and another one, a branch of the O. R. & N. Ry. Co., connecting with Spokane by way of Tekoa or by way of the Lake Coeur d'Alene steamers, from Harrison to Coeur d'Alene City, then by either electric or Northern Pacific steam line to Spokane. All of these lines give daily service and make all of the towns of the district readily accessible, excepting Murray, to which point a branch is likely soon to be extended.

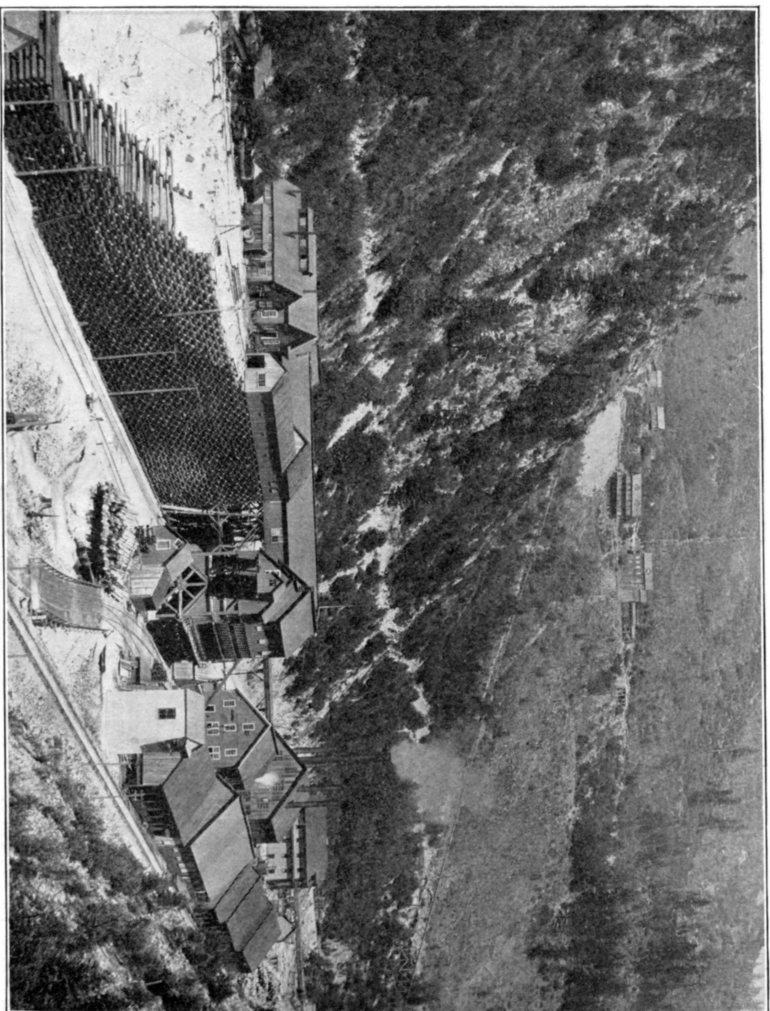
*Elevation.*—"The highest elevation in the Coeur d'Alene District is Mount Stevens, near the Idaho-Montana boundary, which reaches a height of 6,826 feet above sea level, and the lowest point a short distance west of Kellogg, on the South Fork of the Coeur d'Alene River, is 2,250 feet above sea level." The elevation of the different towns will average about 3,000 feet.

The high mountain ridges and deep canyon slopes of the district are attributed to erosion from an original plateau country. These steep slopes are seldom bluffly but usually weathered to a smooth surface. They are generally well timbered, a sharp contrast to the many western mining districts further south, and together with a moderate elevation of the principal towns present a healthy and desirable climate to live in.

*Geology.*—The following paragraph from the govern-



PANORAMIC VIEW OF WALLACE, 1906, THE BUSINESS CENTER OF THE CŒUR D'ALENES.



STANDARD MAMMOTH MINF. MACE. CAMPBELL TUNNEL ENTRANCE.

ment report gives a concise description of the principal formations of the Coeur d'Alenes:

"As a whole, the Algonquian sediments of the Coeur d'Alenes region exhibit little lithological contrast. They are chiefly shallow water deposits, as shown by the prevalence of ripple marks and sun cracks. They comprise dark argillites (mud-rocks), graywackes (mud-sand-rocks), quartzites of various degrees of coarseness, and usually sericitic quartzitic sandstones, and impure limestones or calcareous argillites. Secondary cleavage is frequently present in all but the coarser arenaceous beds, but this slaty structure varies greatly in development in different parts of the field."

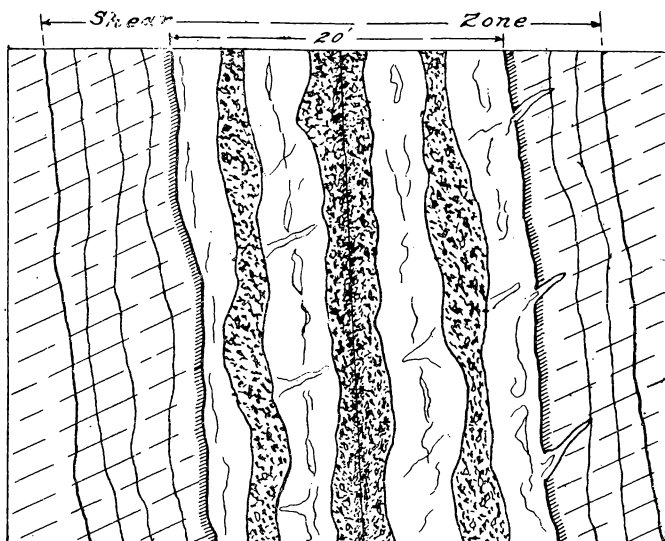
These ancient metamorphosed sedimentary formations have been intruded by a few small dikes of igneous rock that resemble diabase and diorite. There are also several masses of syenite or quartzless granite. The sedimentary formations have been divided by the government report into several different horizons, according to their color and texture, the principal lead-silver ore producing division of which has been classified as the Burke quartzite, which, together with the other sedimentaries, has been sharply folded; it presents a general appearance of flaggy, thin bedded quartzite that stands at angles from the horizontal to the vertical. This series is well illustrated by prominent exposures in the railroad cuttings along Canyon Creek, and at the surface presents the appearance of alternating bands of yellowish and grayish rock, in wavy lines, each a few inches thick.

Underground, this thin bedded formation has the appearance of a fine grained, semi-vitreous white quartzite, with a development of silky sericite in its imperfect cleavage structure.

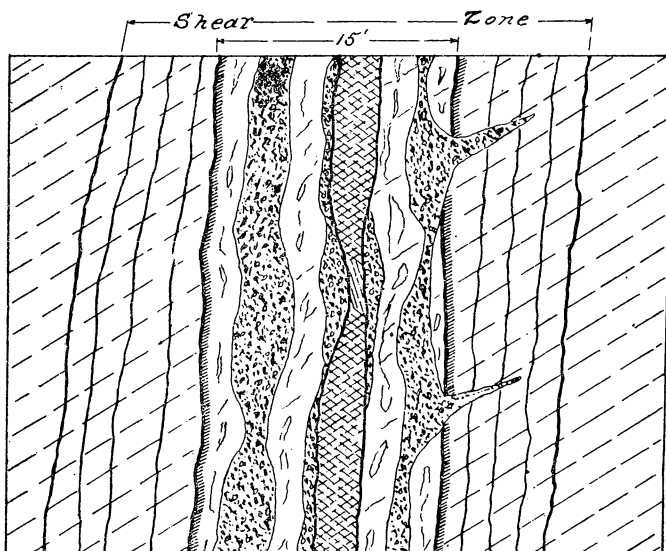
The slate formations associated with the quartzites of the Coeur d'Alenes are of extensive development but rarely approach the perfection of roofing slate and are most generally of lighter shade and highly silicious composition; occasional horizons of rather coarse-grained, heavy bedded quartzite are encountered throughout the district, but the general structure of the formations is thin bedded.

*History.*—The history of the Coeur d'Alene Mining Dis-



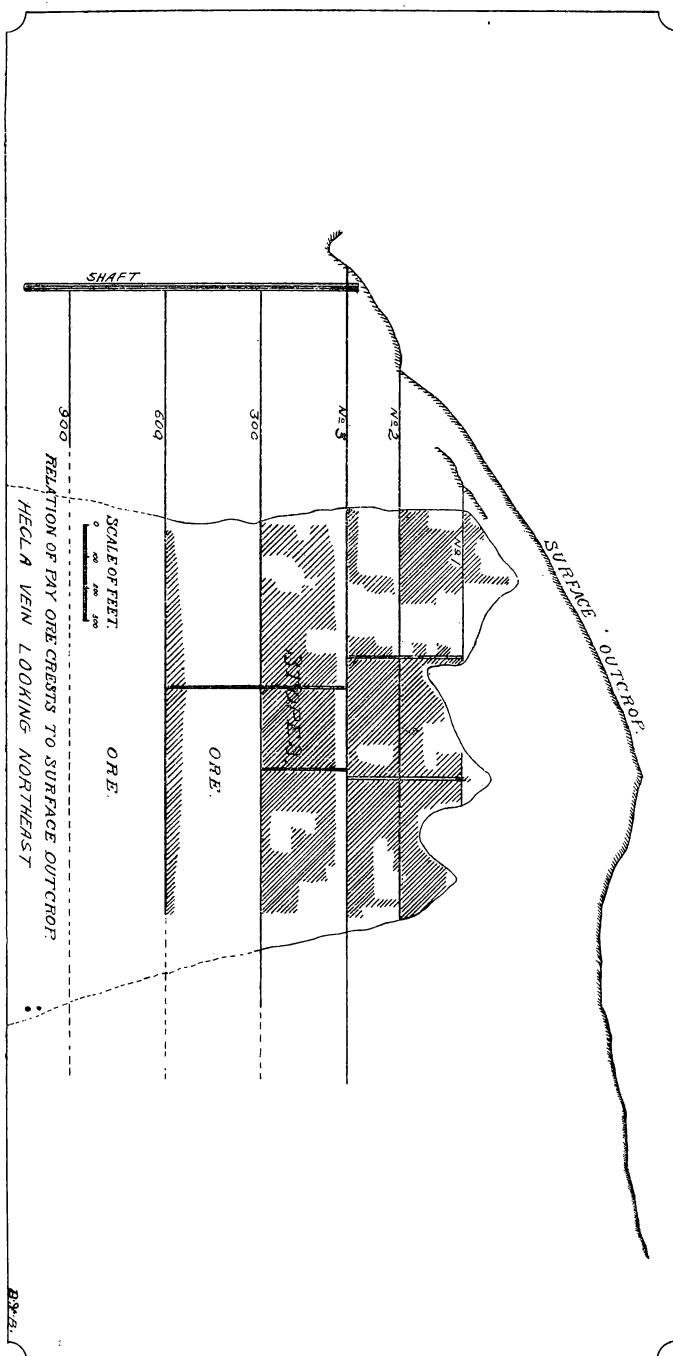


*Cross Section of  
STANDARD MOMMOTH VEIN*



Dike. Ore. Crushed Quartzite.

*Cross Section Showing  
Structure of Dike and Ore Bodies  
of the  
HECLA MINE*



trict commenced with the discovery of rich gold placer deposits near Murray in 1884. The lead-silver deposits were discovered shortly after that date and commenced to produce in 1886. The gross value of the output in metallic products from 1884 to the close of 1905 has amounted to a little over \$124,000,000, each succeeding year with few exceptions showing a steady increase in the volume and value of their yield, the output for 1905 exceeding a grand total of \$17,000,000, of which copper ore production from the Snowstorm Mine furnished an important item.

The following is a classification of the principal ore deposits of the district by Dr. Ransome:

"The ore deposits of the Coeur d'Alenes may be divided, with reference to metallic contents, into three classes:

Lead-silver deposits.

Gold deposits.

Copper deposits.

"The lead-silver deposits are, in general, metasomatic fissure veins, formed in greater part by replacement of silicious, sedimentary rocks along zones of fissuring. They consist essentially of galena and siderite. The gold deposits comprise bed veins, fissure veins and placers. The copper deposits include impregnations along certain quartzite beds and metasomatic fissure veins. The impregnated quartzite only has produced copper on a commercial scale."

*Principal Producers.*—In the present relative importance of the different individual lead-silver producers of the district the Bunker Hill & Sullivan takes the first rank; the Standard-Mammoth, second; Morning, third; Last Chance, fourth; Hecla, fifth; Hercules, sixth, and the Tiger-Poor-man, seventh, all of which are dividend-paying properties.

The ore bodies of the Hercules and Hecla are both manifesting remarkable strength in their lowest development, which is shallow compared to the other mines mentioned, and it seems very likely, from their present condition, that they will rapidly expand in magnitude and capabilities for production with the bonanza in the list preceding them.

In addition to these mines, the other shippers of the district that made important outputs of high-grade lead-silver mineral were the Stewart, Frisco, Hunter, Rex, California Consolidated, Monarch, Bear Top, Black

Horse, Success, Tamarack and Chesapeake and Blake Mines. This last mentioned string of properties are in the primary stages of their development and in several instances show the unquestionable ear marks of becoming important producers.

*Vein Structure.*—The structural features of the Coeur d'Alene veins and ore deposits are illustrated by the accompanying diagrams. The ores are found in pronounced fissured zones that have a general strike easterly and westerly and usually dip to the south at angles varying from 40 degrees from the horizontal to nearly vertical. A cross section of these great ore channels generally shows a crushed, sheeted and shattered condition of the normal country rock, which has been replaced with the ore minerals, consisting essentially of medium to very fine grained galena and iron carbonate, siderite.

The occurrence of true vein quartz is confined to very limited patches and wedges that usually strike out from the ore-bearing fracture into the bedding planes of the wall rocks. The walls of these fissures, especially in the Canyon Creek and Mullan Mines, are sheeted for considerable width on either side of the ore courses, and in the vertical veins produce heavy ground when the ore bodies are removed that exerts an excessive vertical and end pressure on the heavy timbers used to protect the openings, and often requires filling with waste to stay the ground.

In their surface aspect the Coeur d'Alene ore deposits, with two or three exceptions, are insignificant. The great tabular ore shoots of the Standard-Mammoth, Tiger-Poor-man, Hecla and Hercules gave very indefinite evidence at the surface outcrop of their wonderful ore resources, which were manifested generally by rusty zones of fissured country rock or brown, iron-stained gossen croppings and a few short pointed ore crests. The surface of the country, with its densely timbered slopes and canyons, must have shown very little evidence of its rich mineral-bearing character to the early pioneers. It is true that the Bunker Hill and Sullivan made a large surface manifestation of mineral, which, however, was mostly very low grade, and the same is true of the Morning at the surface.

The district now contains dozens of development propositions, which, while showing little evidence of ore at the

surface, are in many instances being opened on fissures just as pronounced and with just as good surface indications of ore as several of those that have been developed into dividend-paying propositions, and the extensive amount of new work in progress in the district is almost sure to result in the discovery of other new and important ore bodies as the work progresses. Many of these new development enterprises are strongly supported by local investors. The business men, the mine operators and resident miners working in the producing properties of the district take a great interest in this line of development, and I know of no district in the State where better results are accomplished in the shape of actual work for the development money spent than in the Coeur d'Alenes, and there is none that offers a better opportunity for speculative investment in this line.

The buried ore-crest condition is well illustrated in the accompanying longitudinal plan of the Hecla Mine.

*Wardner Mines.*—The great ore bodies in the Wardner Mines of the Bunker Hill & Sullivan and Federal Companies at Wardner are bounded on one side by a defined foot wall that dips at an angle of about 40 degrees, cutting the formation in both strike and dip, and invariably carries a strong gouge or selvage of clay or crushed movement breccia, varying from a few inches to several feet in thickness.

Above this there is no defined hanging wall, but the sheeted and shattered quartzite of the country rock has proven more or less mineralized for a width of over two hundred feet. In this wide zone great masses of concentrating ore occur in a very irregular manner resembling in a measure the great chamber deposits of limestone districts, excepting that their longest axis is pronouncedly in the direction of the dip of the vein. These ore shoots make on the main foot wall of the lode, or in troughs formed by spur slips or false walls that strike out into the lode at quite a sharp angle from the main foot wall. These ore bodies in several instances have been repeated one above the other, the upper body occurring as much as 100 feet above the main foot wall and separated from the underlying one by a practically barren width of country rock.

This condition involves an unusual amount of cross-cutting and development work, as it is an easy matter to miss important bodies of mineral in such a wide zone, and several of these great ore bodies have been traced out and discovered from very slim symptoms by the underground staff of these mines, who, through years of experience, have developed an instinctive nose for ore that has resulted very profitably for their employers.

The recent development of new ore bodies in the Federal Company's portion of this great lode in territory that was supposed to be exhausted has added ore reserves that will take years to exhaust, while the ore developments and values found near the Kellogg level of the Bunker Hill & Sullivan Mine are truly phenomenal.

The surface levels of these mines produced some rich ore and limited amounts of crude shipping mineral have been found on almost every level, but they have been noted principally for their large bodies of low-grade concentrating mineral, and it is doubtful if the average lead contents of the ores produced by these properties prior to a year ago has amounted to 8 per cent, and their mills have been operated for months from their middle horizons on 5 per cent feed, and less.

The ore production of the Federal Mines at this camp during the past year has greatly exceeded an 8 per cent lead average and has included an important output of crude shipping mineral, while the Bunker Hill & Sullivan, from its Kellogg level nearly 3,000 feet below its higher ore crests on the dip of the vein, shows a breast of ore over 50 feet wide at right angles to the dip that averages 25 per cent lead and for the past year about a third of its daily product of a thousand tons has been clean shipping mineral that was trammed direct from the mine to the railroad cars.

*Standard-Mammoth Mine.*—The ore in this vein usually occurs in three bands or lines of fissuring, each varying from a foot to three or four feet wide, with an intervening space of practically barren quartzite in between the whole forming a zone 10 to 20 feet wide that stands nearly vertical, and has to be mined that width to get out the ore, the whole mass being broken down together with machine drills and sorted on the stope floors, the ore being readily

separated and the waste wheeled back and dumped into the space below for filling to hold the heavy walls apart.

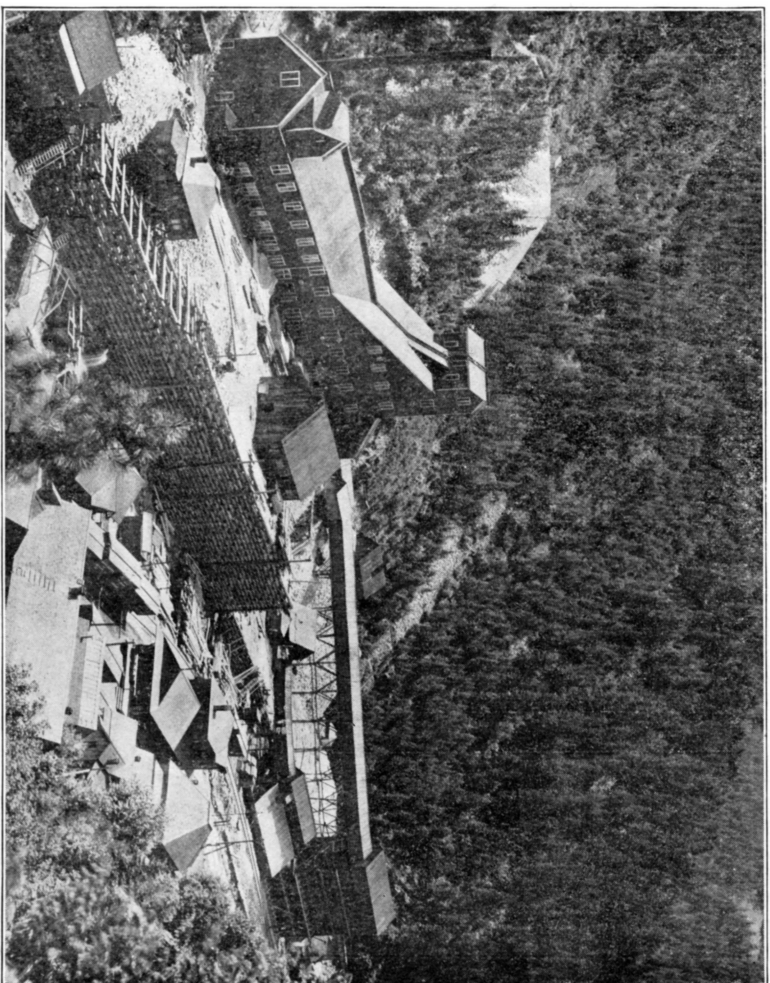
The ore of this mine is medium coarse to fine steel galena, the latter occurring along the line of the central fissure plane. It carries much higher values in silver than the average of the district, producing about three-fourths of an ounce of silver to each unit of lead.

This mine produces one thousand tons of concentrating ore a day that averages 10 per cent lead, together with considerable clean shipping mineral. The recent expansion of its great ore shoots in the lower levels to a length of 1,800 feet has fortunately been in the direction of the Mammoth ground, which has always been the richest silver end of this great ore body. Its present lowest level is nearly 2,500 feet below the highest vein croppings and shows greater ore strength in both quantity and value than any of the levels above, while each of the three main levels above it and below the Campbell tunnel still hold immense reserves of mineral that will take years to exhaust.

The Hecla vein, on the opposite side of Canyon Creek, is a vertical contact fissure built on a narrow dike of fine-grained, igneous rock, related to diabase, that is from a few inches to 2 or 3 feet thick. It is blue to drab brown in color and often reduced to a clay gouge. It is accompanied with one or more bands of high-grade concentrating ore on either side, as shown in the accompanying sketch.

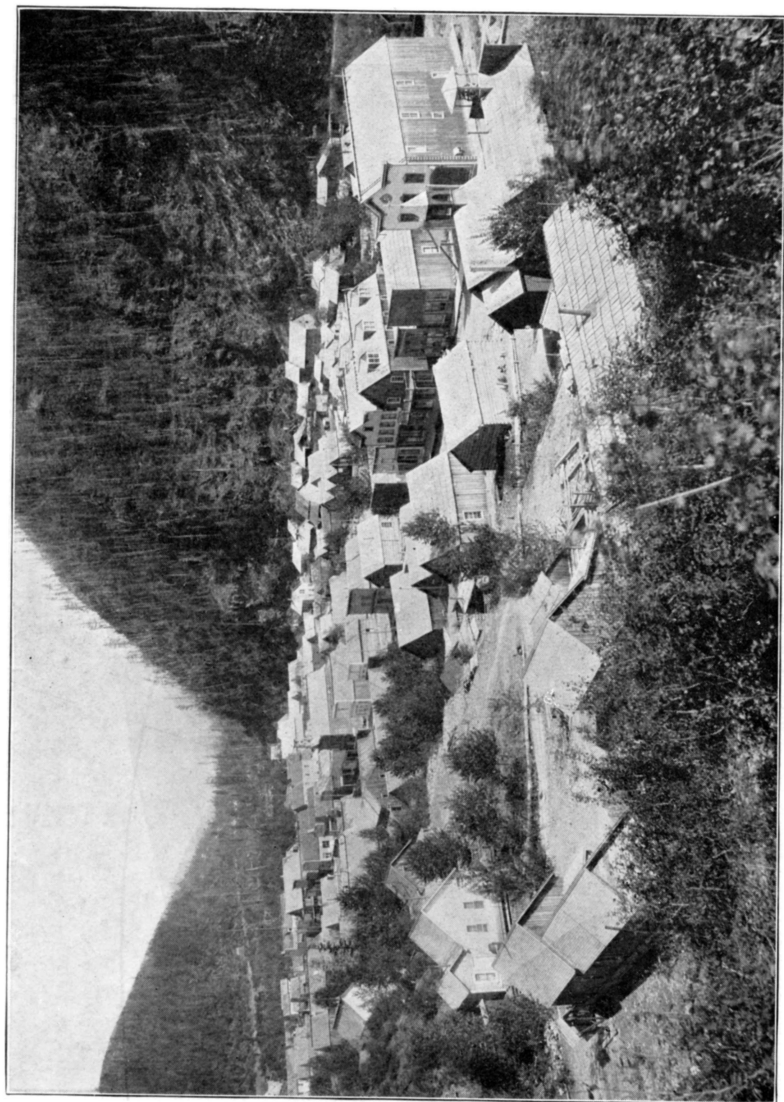
The dike ore and intervening waste bands are broken down together and the waste kept in the mine for filling as the wall rocks are sheared and sheeted for some distance back from the ores and as in the Standard-Mammoth Mine are hard to hold with timbers alone. This is the only contact fissure ore body so far developed in the district. Its width and length have expanded in a most remarkable manner in the lower levels, which is also true of the dividends from its operation during the past year, while the dike association of this ore body is one of the strongest indications of deep seated permanency.

At the 600-foot level of the Hecla Mine, below Canyon Creek, the ore body shows frequent short wedge-shaped spurs of true quartz, sometimes barren, but usually associated with massive galena and an occasional pebble or bunch of pure chalcopryite ore. This occurrence may or



HECLA MINE HOIST, BURKE, IDAHO.





MURRAY, IDAHO. SCENE OF THE ORIGINAL DISCOVERIES IN THE CŒUR D'ALENES.

may not indicate that the ore will change to copper at great depth. The marked transition from lead to copper at depth in many of the Utah lead camps, and the fact that the Hecla is almost directly on the strike of the great copper-bearing fissure of the Snow Storm and other copper mines on the opposite side of the mountain, lends color to this supposition.

The accompanying longitudinal plan of this ore body illustrates the depth of its pay ore crests below the outcrop of the vein which was simply a rusty stained and more or less crushed and brecciated quartzite country rock at the surface, and also illustrates the important outcome of a very indefinite surface indication of a rich ore body, together with the necessity of the extensive prospecting development work often required to reach pay ore in this district. There are a number of equally promising surface evidences of fissuring now being opened by new development companies that will doubtless result in the discovery of similar great ore bodies in some instances.

*The Hercules Mine.*—The Hercules Mine, two miles north of Burke, contains a slightly different type of deposit from the other Canyon Creek ore bodies. It occurs in a very powerful fissure that, like the others, strikes nearly east and west but has a much flatter dip to the south, standing at an angle of about 55 degrees from the horizontal.

It presents a very insignificant streak of quartz at the outcrop six inches wide with a few specks of lead and iron oxide in a formation of graywackes of slightly more argillaceous texture than the country a little further to the south.

At 200 feet below its highest crest in the No. 1 tunnel a big vein is exhibited ten feet wide, filled with crushed country rock on a defined footwall and carrying very low values in lead and silver. The No. 2 tunnel was run 1,500 feet and tapped the vein at a point nearly 400 feet vertically under the No. 1 tunnel, where a body of ore was discovered 320 feet long and 25 feet wide that has proven phenomenally rich between this level and the level above and has yielded ores of secondary enrichment, including some beautiful specimens of crystallized lead and native silver.

The yield of the mine from this horizon during the past three years has amounted to something like \$3,000,000 and was derived entirely from crude shipping ore, in addition to which an immense tonnage of high-grade concentrating ore was produced.

At the third level in this mine, over 1,200 feet below the highest croppings of the vein, the ore is completely changed to galena. The shoot remains the same length and width and carries great masses of solid steel galena and a wide body of rich concentrating ore in addition. The apparent crest of another ore shoot has been discovered in drifting along the vein west of the main body at this level which may indicate its wide extension in that direction.

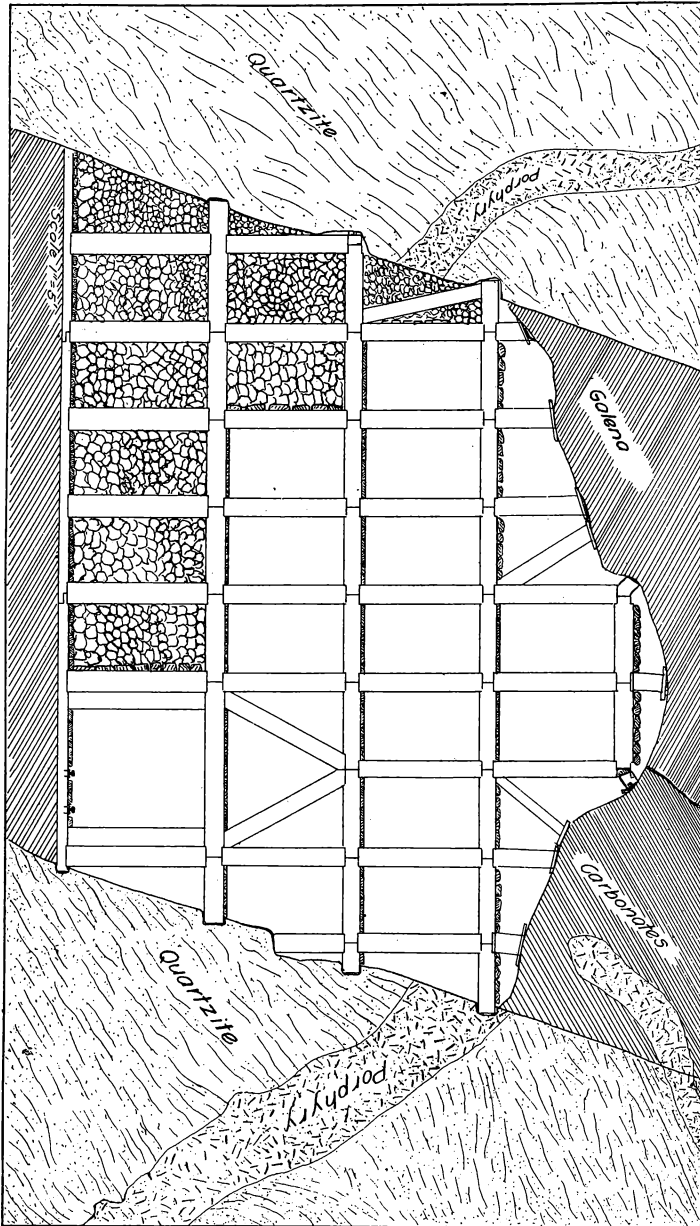
The accompanying cross-section of the Hercules shows the position of the secondary ore and galena where the change is taking place in the ore body, just below the No. 2 tunnel. This plan also shows the position of a dike, which resembles altered diorite. This dike rock has been closely associated with the ore body all through the mine and may have borne some relation to the deposition of its ore. It will be seen from the plate that it illustrates and proves the vein to be a fault fissure of moderate displacement, as the porphyry rock does not match on the two sides of the ore body.

The hanging wall in the Hercules, as in the Wardner Mines, is not well defined, for, while the foot wall is very pronounced, stringers of mineral have been found in the hanging wall country for a width of 100 feet above it.

The Morning Mine, at Mullan, more closely resembles the Standard-Mammoth Mine. It exhibits a most remarkable ore shoot that stands nearly vertical, has been successfully mined for fully 2,000 feet in length. For 900 feet of its course this ore body, above the No. 5 level, is split and forms two ore channels with an intervening pillar of quartzite 30 to 60 feet thick. These ore courses vary from 5 to 15 feet wide and often fill half the space with high-grade concentrating mineral.

From the No. 5 level a shaft is being sunk to meet the new No. 6 cross-cut from the mill level, which is now in nearly two miles and will take the vein at a depth of about 2,000 feet below its apex.

CROSS SECTION OF VEIN  
HERCULES MINE  
IDAHO  
BURKE



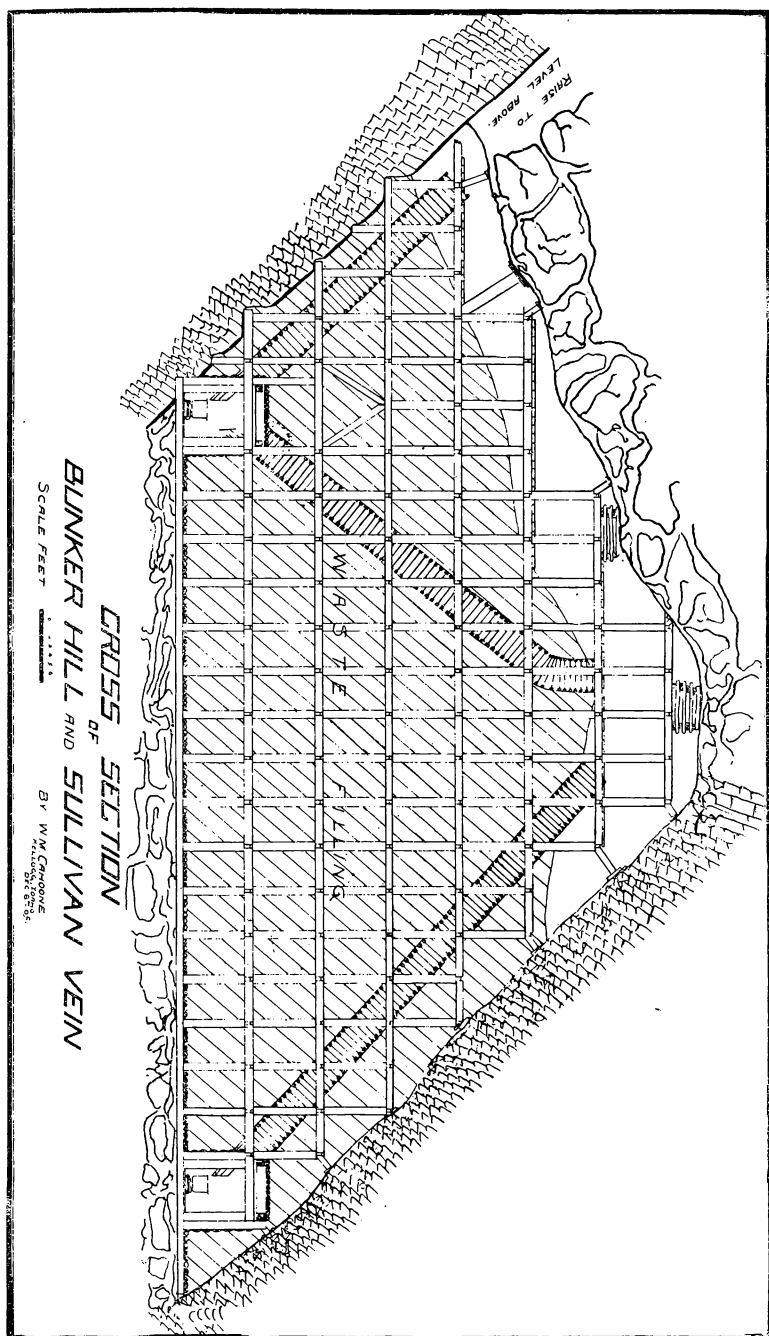
Three levels are being run from this new shaft below the No. 5 and the ore bodies they are revealing and the values they contain are showing a most remarkable increase over the horizons above No. 5, and the property is manifesting definite evidences of becoming one of the biggest tonnage propositions of high-grade mineral in the whole district. Its recent purchase for \$3,000,000.00 cash by the Federal Company is locally considered a great bargain.

The ores of this mine are of about the same tenor in silver as those of the Wardner Mines. They consist of medium-grained galena, in crushed quartzite gangue, and are quite free from objectionable sulphides.

*Snowstorm Copper Mine.*—The Snowstorm Copper Mine has been developed to a depth of over 1,200 feet by cross-cut tunnel and in cross-section presents but one defined wall. It strikes easterly and westerly and dips to the south at about 60 degrees. The footwall carries a well-marked gouge or selvedge and has proven a remarkable water-course at the third level. The main ore shoot developed is over 500 feet long. The thin bedded conformable quartzite above the footwall is impregnated with copper carbonate ore to an extreme width of 60 feet at one point above the second level, where it averages about 5 per cent copper and 8 ounces silver per ton. These values gradually fade out into the thin bedded quartzite or quartzose sandstone of the hanging wall country.

*Mining Methods.*—Up to the present time a very large proportion of the ore extracted from the Coeur d'Alene mines has been through tunnels without the necessity of hoisting or pumping. There are, however, four large and well equipped shafts in the district in operation. Those of the Tiger-Poorman and the Hecla at Burke are sunk from the surface. The former is 2,000 feet deep, and the latter is 900 feet deep.

*Frisco Consolidated Mine.*—The Frisco Consolidated Mine at Gem also has a large, well equipped shaft 1,400 feet deep in a tunnel 1,200 feet from the surface that has been idle for several years but is being unwatered at the present time with a view of the deeper development of an extensive ore body it penetrates, a justifiable move in view



of the marked success of deep development at other points in the district.

The present great tonnage output of the Standard-Mammoth Mine, amounting to 1,000 tons a day, is hoisted through a vertical three-compartment shaft, the collar of which is in a big underground station at the face of the Campbell tunnel, 3,000 feet in from its portal, at Mace.

There are a number of fine tunnels in the district. The Kellogg tunnel of the Bunker Hill & Sullivan Company is two miles long with an additional mile of drifting at that level on the vein.

The Reed tunnel, on the same property at higher level, is 5,500 feet long, and the Sweeney tunnel of the Federal Company, in the same vicinity, is 5,000 feet long. There are also a number of other long tunnels on the different properties of the district, several of which are still in the development stage, with tunnels as much as 1,000 to 1,500 feet long.

The Standard-Mammoth and Tiger-Poorman shafts are equipped with powerful Corliss hoisting engines, using flat ropes and reels, designed to hoist from a depth of 2,500 feet and are provided with electrical and ordinary pull bell signal systems, together with electric flashlight call signals. Most of the pumping of the district is done by electric power, which is also applied in a good many other departments of the different operations.

This power is supplied by the Washington Water Power Company of Spokane Falls, Washington, from where it is transmitted into the district, a distance of 100 miles. There is nearly 3,000 horse-power being used from this source at the present time. It is supplied at a cost of about \$50.00 a horse-power a year.

The new Morning tunnel is already over 9,000 feet in length, has tapped the You Like vein and will encounter the Morning vein within another thousand feet.

The Mammoth No. 6 tunnel, through which the product of the Standard-Mammoth Mine is drawn to the surface, is nearly a mile long.

A rock chute in the hanging wall of the vein connects this tunnel with the collar of the Standard-Mammoth shaft 150 feet above, at the Campbell level. This chute is 15 feet square and has a capacity of about 1,500 tons of

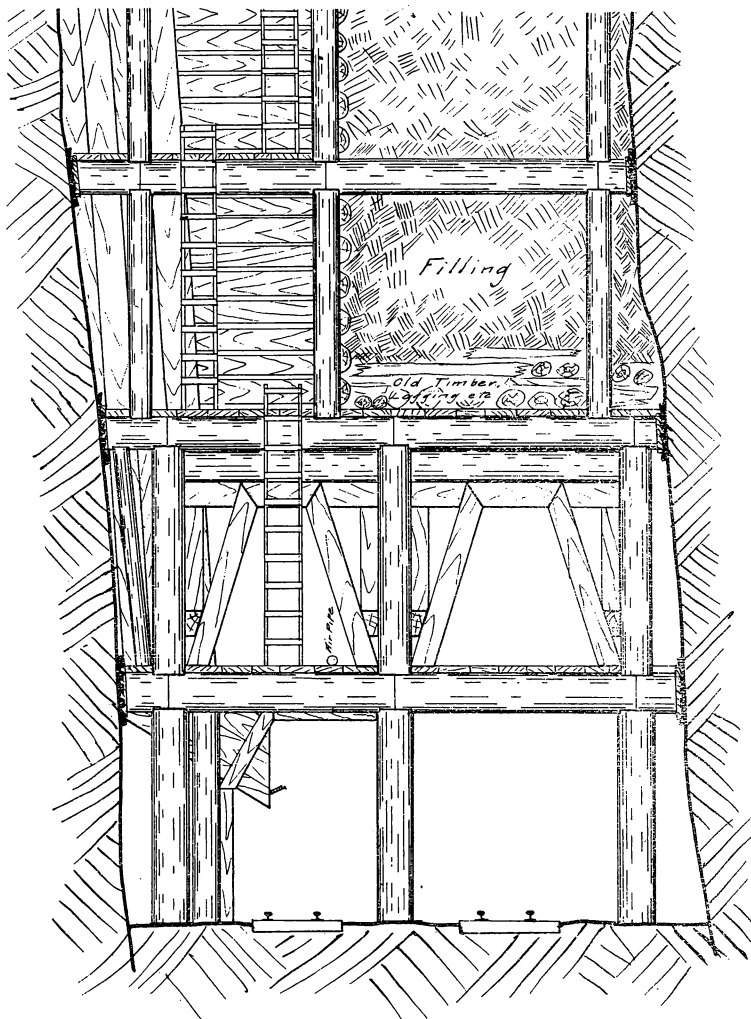
ore. The ore is loaded into skips at the different levels in the main shaft from pockets under the station floors and hoisted to the collar of the shaft, where the skips dump automatically into this big chute.

The outlet of the chute is a solid built steel frame with vertical sliding steel doors, actuated by a compressed air cylinder and piston. The tunnel is very substantially constructed and equipped with electric haulage. The trolley wire is seven feet high above the track, which is laid with thirty-five pound rails set at a 24-inch gauge. The ore cars are of the standard make, with truss frames and bottom dump. They hold four tons each and are run in trains of twelve, drawn by small electric motors made by the General Electric Company, using 500 volts direct current.

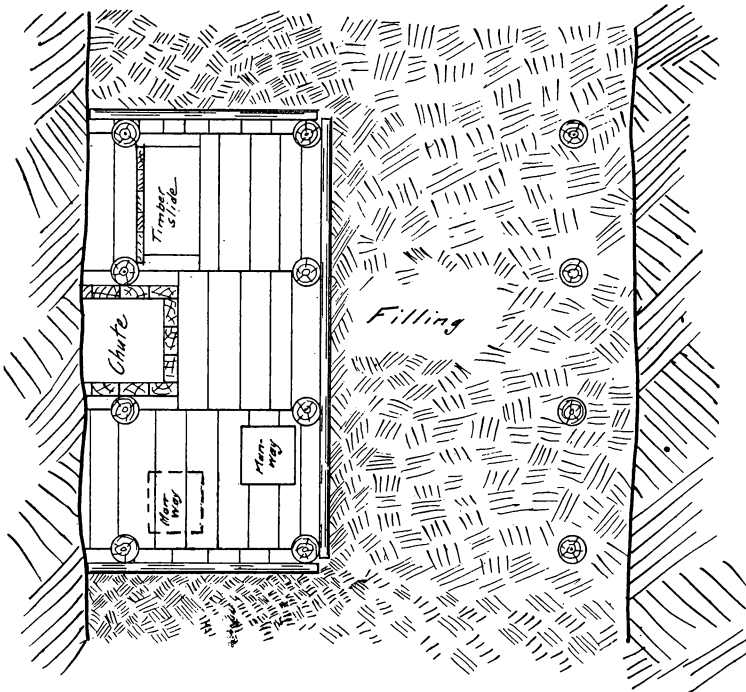
One of these trains handle about 48 or 50 tons of ore and makes a round trip from the ore chute to the railroad bins at the surface and return in twenty minutes, with a motorman and one brakeman. The cars are backed under the lip of the chute and loaded in a very rapid manner. The brakeman, standing on the opposite side of the station moves a thumb switch which actuates the sliding doors and fills the twelve cars within three minutes. This tunnel is used exclusively for ore haulage, all men and material being sent into the mine by way of the Campbell tunnel. The bulk of the ore broken in the district is by machine drills, using compressed air, and the timbering in this, as well as all the other Coeur d'Alene mines, is massive.

The method of mining employed is back stoping and timbering with or without filling. Where the space mined is not more than 15 feet wide, stulls or stull sets are employed. Where the space is over fifteen feet wide, square sets, or modifications of the square set system are used, and the floors are placed nine feet apart in most of the mines. Ten to 16-inch round timbers of red fir are generally employed for caps and posts, with lighter pieces for collar braces, and three-inch plank for flooring. The timbers are framed in the ordinary way on the ground. The principal features of these methods of timbering are illustrated in the accompanying sketches of the different mines.





SECTION THROUGH STANDARD VEIN  
showing stope timbering  
MACE MINES  
FEDERAL MINING AND SMELTING COMPANY.



*SECOND FLOOR PLAN  
showing filling  
MACE MINES  
FEDERAL MINING AND SMELTING COMPANY.*

The main levels are generally placed about 200 feet apart and the timber is handled into the different stopes with small donkey air hoists, the first floor above each main level being generally left open for this purpose, and the weight of the filling above carried on angle braces and reinforced timbering, as shown in the cross section of the Mace mines.

Alternating shoots and manways are placed 20 to 30 feet apart, and every facility for the rapid handling of the ore, timber and waste is afforded.

The ore chutes are built of 4x10 or 6x10 sawed timber, built in long way, excepting in the Wardner Mines, where solid crib chutes and manways are employed, built of 6-inch round timber, on a 40 degree pitch, which work well for handling ore and form easy traveling ways for men.

Almost all the mines have several outlets at different elevations, which afford good, natural ventilation except in the new headings, which are sometimes equipped with electrically driven fans or small water blasts. Some of the deep stopes in the larger mines are warm, but the powder smoke seldom hangs very long. Most of the mines are dry, yet sufficiently damp to hold down the dust, and considering the enormous amount of ore handled, cases of lead poisoning are comparatively rare. There are a few drippy stopes in the Wardner Mines, and the No. 5 tunnel of the Morning is also damp and sloppy, due to the pumping operation from the new shaft, which, however, will soon be connected with the No. 6 tunnel and relieve that condition.

The sanitary condition of the mines are good. Closets are placed on each main level that are provided with plenty of chloride of lime and metal pans which are replaced daily and taken to the surface between shifts, where they are thoroughly cleansed and aired before going back into the mines.

The lineal development of some of these mines is enormous and involves the consumption of a good deal of time in distributing large crews of men to their numerous working faces.

The mines are operated with two shifts—a ten-hour day shift, and 9-hour night shift. At the Standard-Mammoth Mine the morning shift is hauled in with the electric

motor. They leave the mouth of the 3,000-foot Campbell tunnel at a quarter to 7 and are lowered to the different levels of the 1,000-foot vertical shaft in double-decked cages handled by an experienced cager. They get to their working places by about 7:30, take half an hour for lunch in the mine and are all out at the mouth of the Campbell tunnel by 5:30 in the evening.

The same method is employed at the Bunker Hill & Sullivan Mine, where the distance between the two main outlets, at Wardner and Kellogg, is nearly three miles, about half of which has to be traversed twice each shift by the men, as a large proportion of the crew live at Wardner and the balance near Kellogg. In this way the day shift sees very little daylight during the three winter months, as the mines work seven days a week.

In a district where the mines run so steadily as in the Coeur d'Alene, a six-day week rule might be established to the advantage of all concerned, like that being introduced in the big mines of Butte, Montana. I have no doubt such a proposition will meet with objection in some quarters, but it would unquestionably work to the benefit of all concerned in the long run, not only lightening the drudgery of the miners' existence under present methods, but giving the mechanical plants a needed periodical rest and chance for overhauling.

The output of the Bunker Hill & Sullivan Mine, amounting to 1,000 tons a day, is all stoped on day shifts, and only development work and haulage being carried on by the night shift. A large amount of the ground in straight development work is broken by contracts, at so much per foot, in most of the big mines.

The minimum wages paid throughout the district are \$3.50 a day for miners and all underground operators, except in the Wardner Mines, where shovelers receive \$3.00 per day. Foremen are paid \$6.00 to \$7.00 per day; shift bosses, \$4.00 to \$6.00 a day; head blacksmiths, \$4.50; hoisting engineers, \$4.00, generally eight-hour shifts; timbermen, \$3.75 to \$4.00 per day; yard men, \$3.00. The cost of board is \$1.00 per day.

There are about 3,070 men employed in the district, and it is estimated the average wages all through amount to

\$3.60 per day, totaling \$11,052 a day, or \$331,560 per month, or \$3,978,720 a year for wages.

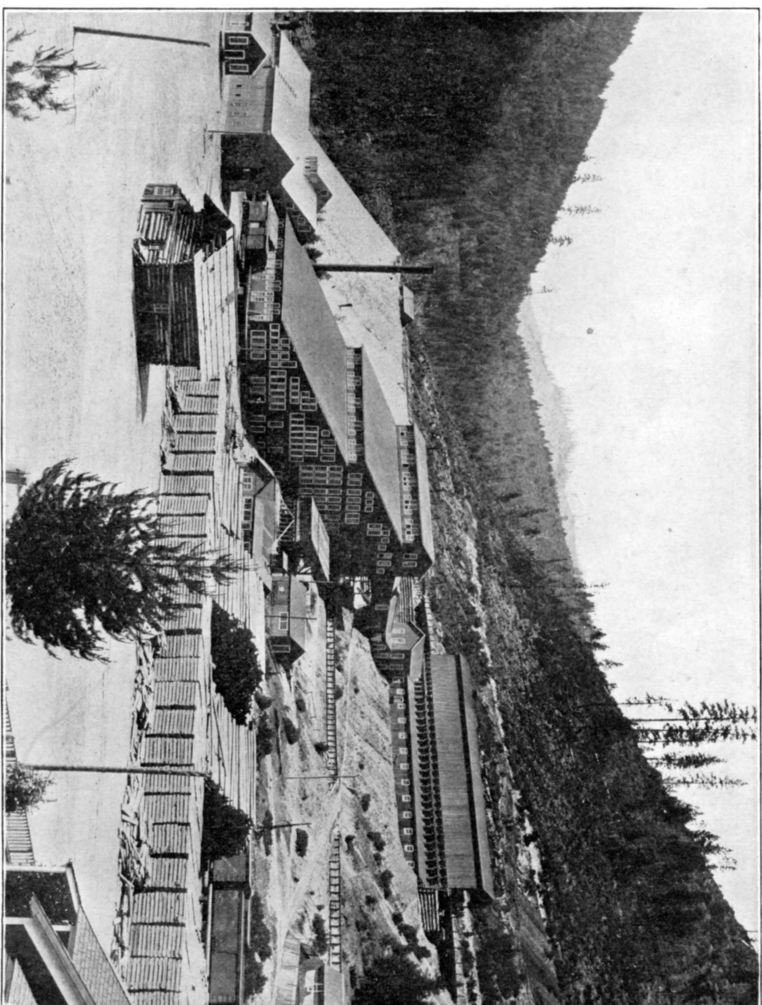
The big companies have a special mechanical department who look closely after all mechanical appliances, especially the hoisting plants, which are generally examined carefully every morning between night shift and day shift.

The cages at the Standard are gone over twice a day, and the ropes regularly once a week. A notable piece of shaft timbering work has been accomplished by Superintendent Pascoe of this mine and a picked crew of men in the Standard shaft. This is a vertical, three-compartment shaft, with two working compartments 4 feet 4 1-2 inches by 5 feet in the clear. This shaft is placed in the hanging wall of the vein and has always given considerable trouble. During 1904 a section of 160 feet above the fourth level had gotten badly out of line and was retimbered and put in splendid shape without stopping the regular hoisting of 1,000 tons of ore per day. The method employed was to cut away the ground around the timber the men being protected in the work by a false set and lagging from falling rocks, and the ground prepared while hoisting was going on.

Between the time the night shift was hoisted and the morning shift was ready to go down the old sets were removed, one each day, and the new timbers placed, one at a time, and the set blocked into line, the ground being cut away around the old timbers for a space of about two feet wide, and the shaft timbers, which are clean, selected red fir twelve by twelve inches, are braced with cedar blocks extending from the ends of the wall plates, end plates and dividers to the solid formation. These blocks are headed with cap boards and wedges, and when any pressure is shown on the main shaft timbers, it can be readily relieved and eased off at the blocking.

This new work has been in use 18 months and has remained in good shape, giving very little trouble but what could readily be gotten at and remedied.

Another section of the shaft in the vicinity of the eighth level, including the station, for a height of 100 feet, is being replaced in the same manner at the present time, and when completed will put the Standard shaft in better



MORNING MILL, 1000 TONS DAILY CAPACITY. TIMBER YARD AND DUMP OF NO. 6 TWO  
MILE CROSS CUT TUNNEL.



NEW CONCENTRATOR, HERCULES MINE, MAXIMUM CAPACITY 500  
TONS A DAY.

shape than it ever was before, and sinking will again be commenced.

*Milling.*—All the ores and concentrates produced by the Coeur d'Alene mines are shipped out of the State for further treatment by smelting. A very large proportion of the material mined is concentrating mineral that will average about 10 per cent lead and 5 ounces silver per ton, and the district contains some very large and elaborate concentrating plants of capacities ranging from 300 to 1,000 tons a days. "The newest addition in this line is the Hercules mill, recently put in commission, near the No. 4 tunnel of the Hercules Mine, on Gorge Gulch, about a mile above Burke.

This is a 300-ton concentrating mill of substantial design and massive construction. It embodies some ideas in concentration and adaptation new to the district, among which may be mentioned motor drives for each mill unit, there being six independent motors driving as many parts of the mill; a novel application of starting current to high torque motors is accomplished by tapping off from secondaries of transformers, 110 volts; when the motors come up to speed the oil switch is thrown over to take the full current voltage; this dispenses entirely with cumbersome compensators. Current is taken from the Washington water power transformer station at Burke, at 2,300 volts, and stepped down to 220 volts for mill service; the mill lights are also tapped off from secondaries of transformers at 110 volts. The mill and power house adjacent are heated by variable steam or hot water plant, according to weather conditions. The mill ore is delivered from mine by trolly trains running from No. 3 level, about one and one-half miles from inside chutes, to upper gravity bin; thence the ore is trammed 1,500 feet down the mountain on an incline gravity tram to the upper mill bins. The equipment of mill proper consists of—

- 1 7x10 Blake type crusher, with 10 H. P. motor.
- 1 9x15 Blake type crusher, with 10 H. P. motor.
- 2 sets Humphrey coarse rolls 16x36.
- 1 coarse elevator.
- 1 middlings elevator.
- 1 fine elevator.
- 1 coarse trommel.



- 1 middlings trommel.
- 2 bull jigs.
- 6 3-compartment jigs.
- 6 2-compartment fine jigs.
- 13 impact screens.
- 2 sets 6x36 Sturtevant high speed centrifugal rolls.
- 12 Wilfley tables.
- 6 Frue vanners.
- 1 7x8 triplex Smith-Vaile power pump, driven by 15 H. P. motor.

"The coarse mill is driven by 25 H. P. motor, the fine mill by 40 H. P. motor, and the slime mill by 50 H. P. motor. The mill is running steadily and bids fair to make a record for saving a high percentage of values."

*Power House.*—A 175 H. P. induction motor, rope driving to line shaft, has just been installed. This co-ordinates with auxiliary water power from two De Remer wheels under 800 and 450 feet heads.

Machine tools in the shape of a Bignall & Keeler pipe and bolt machine and Bickford Radial drill have also been added to the shop equipment."

The average loss in lead and silver in the concentrating operations of the Coeur d'Alene district is said to amount to something like 18 or 20 per cent of the gross value of the feed, and presents considerable room for improvement. Concentrating costs average 16 to 24 cents per ton, and the concentrates shipped will average something like 55 per cent lead and one-half ounce silver to each unit of lead. (A unit of lead is one per cent in a ton of ore, or 20 pounds.) These concentrates are mostly shipped to the different plants of the American Smelting & Refining Company, where they are used as a flux for the treatment of this company's extensive patronage of silicious, dry, silver-gold ore from other States. Smelting charges are \$8.00 per ton on Coeur d'Alene ores and concentrates, and freight charges vary from \$8.00 to \$12.00 per ton.

Wet concentration is a delicate process, and it seems difficult to obtain very high results in the class of minerals this district affords, in spite of the fact that it is a very simple mixture of galena ore, iron carbonate and granular, silicious gangue. There is no reason why the ore should not be reduced to bullion right on the ground or

at some near-by point by several of the properties of this district, as fire concentration of lead ore is a simpler process than wet concentration, and if intelligently handled will give much closer results, and a Coeur d'Alene mine, with an assured capacity of 50 tons of 50 per cent lead mineral a day should be able to treat its own product, as the district affords abundance of free smelting iron and there is also an unlimited supply of pure limestone for flux within thirty-five miles of Wallace.

Fuel is the only element lacking, and that can be obtained as conveniently as at many other smelting centers.

Small smelting plants are about as economically handled as extra large ones, and a good deal more bullion will be recovered to the mine owner than under the present method of shipping and heavy discounts for questionable losses in smelting, and, in addition, such a move would greatly enhance the importance of the metal industry to Idaho and the adjacent territory, while the cost of installation of a lead smelting plant of the same capacity would be no greater than of a concentrating plant, if as high.

There is nothing very intricate about smelting lead ore or refining the bullion. The only bugbear that seems to stand in the way of local advancement in this line seems to be the fear of railway rate discrimination. This fear it is to be hoped will shortly be removed by new Federal legislation. We have an Idaho engineer who went to China a few years after he left college, mined lead-silver ore, smelted it, separated the silver from the bullion and made it into coin of the realm for the Celestials with the crude material and labor at hand. We have a 50-ton lead smelting plant in Custer County, Idaho, that was successfully operated at a distance of 150 miles from railway transportation and produced a million dollars' worth of lead-silver bullion with charcoal fuel and trifling slag losses, and it is doubtful if the total construction and equipment of this little plant amounted to twenty thousand dollars. Its operation paid a net profit of 100 per cent on the capital stock of the company, amounting to \$250,000.00.

*Power.*—The Coeur d'Alene mines and mills use a great deal of water for power in their operations, and for several summers past the supply has been short and has retarded the operation of the mills. This condition is be-

ing rapidly relieved, however, by the application of electric power from Spokane Falls, Washington. The ore production is handled very cheaply between the mines and mills by electric and steam power. Electricity is also employed in several of the long underground levels, four different levels in the Standard-Mammoth mine being equipped in this manner, while all the ore and material of the Bunker Hill & Sullivan Mine and a large portion of the haulage of the Hercules and Morning Mines are also handled by this method at a very low cost per ton. Small motors are used with a direct current of 500 volts, and in the Bunker Hill & Sullivan property handle one thousand tons of ore a day from the chutes in the mine to the mill bins at the surface, a distance of over two miles, at a cost of six cents per ton. Most of the milling plants of the district, excepting the Tiger-Poorman, are located at some distance from the mines, and the ore is handled to several mills over the Northern Pacific and Oregon Railway & Navigation Company's branch lines, over distances varying from five to twenty miles at costs ranging from five to twenty cents per ton.

The Morning No. 5 tunnel is connected with a steam railroad of its own, something over two miles long, built on a 7 per cent grade, which is operated by a Shay geared engine that delivers 1,000 tons of ore a day at a cost of less than ten cents per ton, which includes the delivery of timbers and other supplies to the mine.

Four of the largest properties of the district are now owned by the Federal Mining & Smelting Company and are operated under one general management. These include the Tiger-Poorman, Standard-Mammoth, Morning and Last Chance groups. Every department of the operation of these great mines is in the hands of specialists and has been reduced to a system, resulting in great economy and reduction in operating costs. All of the other producing properties of the district are in the hands of individual companies at present, which is a good thing, for while it is nice to have a cash customer at hand for a developed ore body, the complete domination of a camp by one corporation stifles community interest, an essential thing in the Coeur d'Alenes.

There are about 100 new development companies op-

erating in the district at the present time and their holdings embrace both lead-silver, copper and gold deposits. The operation of the Snowstorm lease, of J. H. Heward & Company, was very successfully carried on during the past year, shipping 63,000 tons of ore and resulted in giving the Coeur d'Alenes quite a respectable showing as a copper producer.

The Monitor Mine, another copper property of the true fissure type southeast of the Snowstorm, made a good production of rich copper-sulphide ore for its initial year. Its shipment amounted to 360 tons of 18 per cent mineral which also contained several dollars per ton of gold value in addition to the copper, together with some silver. The shipments from this property are likely to be largely increased during 1906, as it is being quite extensively developed with a good force of men this winter.

There are a number of other properties on the copper belt with great gosseny copper-iron croppings, that indicate extensive resources of copper mineral at depth, and the future output of this metal is likely to be rapidly increased and in time to assume a very important position in the Coeur d'Alene list.

Several gold properties in the vicinity of Murray were operated in a small way during the past year and are credited with a total output of over fifty thousand dollars. The total gold output of this part of the Coeur d'Alene District in the vicinity of Murray since its discovery in 1884 amounts to very nearly five millions of dollars, and its gold resources have merely been scratched as yet and comprise some very extensive deposits of pay rock and placer gravel. One of the prominent quartz properties of this district was equipped with a 20-stamp mill during the past year, which, it is expected, will be shortly gotten into operation and is likely to add quite an additional output of gold during the coming season.

There are a number of fine lead-silver ore deposits in the vicinity of Murray, in addition to its gold resources. Among these the Monarch has been quite extensively developed, has big ore reserves, and shipped ore to the value of \$25,000 during the past year. The Bear Top and Black Horse also made shipments of high-grade lead-silver mineral and carry the earmarks of greatness, as important

sources of this class of ore. A new railway branch has been surveyed to tap this part of the district from the O. R. & N. Ry. at the mouth of the North Fork of the Coeur d'Alene River, and from present indications is likely soon to be built and give this part of the Coeur d'Alenes an outlet that will result in its rapid development in a mineral way, for it certainly has the goods and can produce an important tonnage of railway traffic from the start.

Of the total metal output of the State, during 1905, Shoshone County produced 97 per cent of the lead, 84 per cent of the silver and 87 per cent of the copper. In estimating the metal output and values the figures are based on the gross metal contents of the mineral shipments and average New York quotations on metal for the year, as it is believed that the mines put a good deal more bullion and lead products into commerce than they are credited with on the questionable method of 10 and 5 per cent discount for smelting losses and other sampling salvages that the smelter companies exact.

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## ***WASHINGTON COUNTY.***

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The most important feature of the development of Washington County's varied resources during 1905 was the substantial start made in the extension of the Pacific & Idaho Northern Railway, which was pushed out beyond its former terminus at Council, a distance of ten miles, and it is understood that this extension is going to be continued next year into the splendid timber belt that surrounds Salmon Meadows.

The further extension of this important railway is planned to Lewiston, which will give Idaho the long desired north and south connection. This route will, necessarily, involve some pretty steep grades in getting in and out of the main Salmon River Canyon, but it involves no insurmountable engineering difficulties, and if built would

immediately command an immense traffic from the north end of the State in both lumber and mineral.

Should this extensive plan of railroad building be carried out it is almost certain to involve additional spurs or branches, and one of these extending to the Seven Devils Copper Camp would traverse country that would amply justify its construction.

The route between Council and the Seven Devils has been partly graded already and could be very readily constructed. There is sufficient handsome yellow pine and fir timber alone on this proposed branch to justify its profitable operation for years, and in addition to this the Seven Devils and adjacent districts would afford an important tonnage of mineral traffic.

#### SEVEN DEVILS.

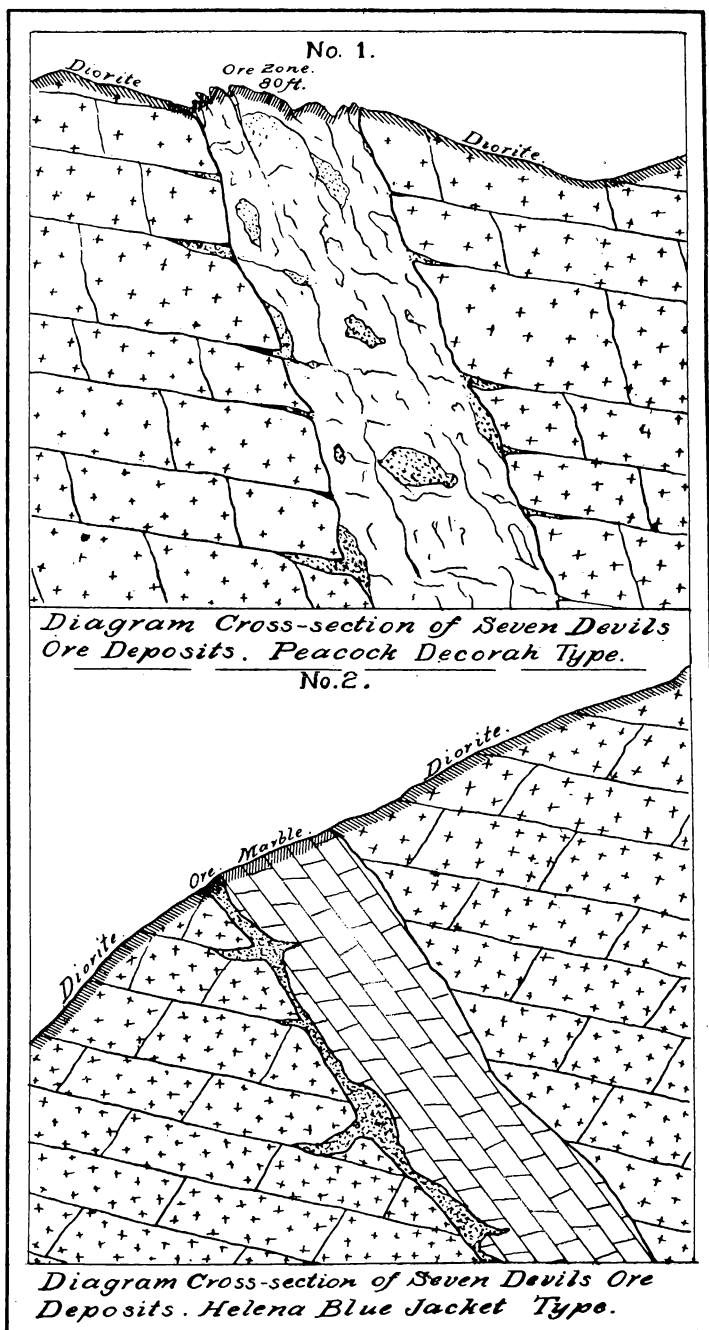
The Seven Devils Copper District, forty miles north of Council, contains some very promising gold and silver-bearing copper ore deposits of comparatively high grade.

This district has been badly handicapped since its discovery by title litigation and some of the rankest kind of mining mismanagement. A large amount of capital has been expended on several of the different properties in the camp, but without any definite results in the way of intelligent development. I understand that the titles have all been cleared up, however, and conditions in that respect quieted.

The ores of this district, as far as developed, have proven largely of secondary carbonate and oxide varieties, with some high-grade bornite mineral. They are contained in a very silicious matrix, and several attempts to smelt them and make bullion on the ground have proven unsuccessful, due, however, largely to the attempts to get along without the excessive cost of coke fuel, the cost of which at such a distance from railway transportation being prohibitive.

The principal geological feature of the Seven Devils District is the broad field of massive gray diorite with included belts or zones of marbelized limestone and excessive development of contact metamorphic minerals, including garnet epidote and associated alteration products.

*Old Peacock Mine.*—There are two quite distinct classes of deposits, which are illustrated in the accom-



panying diagram. The Old Peacock Mine, three and one-half miles in an air-line north of Landore, is a regular mineral farm at the surface and presents an outcrop of granite and iron gangue richly impregnated with copper carbonates and oxides and containing kidneys of massive bornite ore. This great surface display of mineral is 550 feet long by 80 feet wide and occurs near the head of a flat draw that forms the source of one of the steep gulches that feed a tributary to the Snake River. It presents the appearance of a mammoth badger warren. It has been gophered over and quarried and worked by day-light stopes in a most irregular manner by leasers gouging after the rich ore.

This whole mass of surface mineral as it stands today is said to average better than seven per cent copper and two or three dollars in gold and silver, and there are several dump piles containing from 100 to 1,000 tons of cobblings from richer mineral of ten per cent ore.

This property was discovered originally by placer miners who made good money working its soft surface through sluice boxes in the early spring when the snow water was flowing, and some handsome coarse gold specimens are reported to have been found by its early operators, associated with the copper mineral.

A shaft was sunk from the highest part of the exposure 150 feet deep, which was tapped at a depth of 75 feet and some irregular stoping of the ore body has been done. The mine has produced a total of 12,000 tons of ore, which, I am reliably informed, has averaged 15 per cent copper, together with about two dollars in gold and eight ounces in silver per ton.

From the adit tunnel that taps this shallow shaft the ore body was tested by diamond drilling. There were three holes put down, one of them 600 feet, another one 500 feet, a third one 400 feet. The latter hole is said to have been in ore all the way. It was pointed at an angle of 20 degrees from the vertical to the southeast, and the cores brought out ore reported to have represented an ore body of much higher grade than the average of the mine above the adit level. The ore encountered is also said to have continued in the same altered condition and should mean that if the development of the mine were extended below



the depth represented by the bottom of this 400-foot bore hole a very valuable body of secondary enriched sulphide mineral should be encountered when water level is struck, as an enormous amount of leaching must have occurred in such a width and vertical range of oxide mineral.

There are several other properties along this mineral belt, especially in the vicinity of Landore, that resemble and belong to the same class as the Old Peacock. They seem to occupy the position of the original body of limestone that has been transformed by metamorphic action to silicious contact minerals previously referred to, and copper-iron ore. A notable feature of the associated minerals in these deposits is a pronounced development of specularite, a sparkling, scaly, oxide of iron.

The wall rocks of these deposits are the normal, medium grained gray diorite of the district, extending from a point about a mile south of the Old Peacock and on a parallel line a short distance west there are a string of properties of a different type which include the Lockwood, Alaska, Queen, Blue Jacket, Helena and others.

These deposits occur in a contact between a belt of marbelized gray limestone and the normal diorite of the district and carry a subordinate amount of the garnet and other contact minerals. The Helena and Blue Jacket are types of this class and contain lensy kidneys of high-grade bornite ore enclosed in secondary oxides and carbonates. These bodies vary from a few inches to several feet in thickness in local swells.

Both the Helena and Blue Jacket Mines have been developed several hundred feet deep by shafts and adit tunnels, and the latter is reported to have produced between forty and fifty carloads of clean shipping mineral that have averaged between 35 and 50 per cent copper, together with \$10.00 to \$20.00 per ton in gold and silver. This class of ore seems to make off-shoots into the diorite wall, rather than into the limestone, although small stringers are occasionally found branching off into both formations. However, their ores have proven of much higher grade than those of the larger mass, but relatively the less important from the tonnage standpoint, and somewhat irregular and dissected on the contact planes.

*Copper.*—A succession of fine copper prospects have

been found, extending from this high belt of country down to the level of the Snake River, where some handsome showings of rich chalcopyrite ore have been opened at several points. This great Seven Devils Copper belt affords the finest advantage for deep cross-cut tunnel development of any extensive mineral district in the State.

From the White Monument Mine, about midway on the belt described, it is not to exceed three miles in a horizontal line to the point directly over Snake River, while the vertical drop from that point will exceed 6,000 feet, from which the advantages of deep cross-cut tunnel work will be appreciated.

#### LANDORE.

Landore is the present central settlement of the Seven Devils Copper Mining Belt.

This is a well located camp with several good business houses and good hotel accommodations. It is connected with the railroad at Council by daily mail and stage service over good roads and beautiful country which affords a delightful trip in the summer season. This camp is located on Indian Creek, a good sized mountain stream that crosses the copper belt at right angles and would afford sufficient water for good sized concentrating or smelting enterprises.

Its slopes are densely timbered with fine yellow pine, fir and tamarack, and the only important feature of development that the camp has received for the large amount of money that has been spent in it is a system of well-graded roads and trails by which all the mines can be very conveniently reached. This road system also extends down to the Snake River. Some of the best known copper deposits are located right at Landore, where the main belt is about 2,000 feet wide and carries a succession of irregular shaped deposits, some of them of large size, approaching in magnitude the Peacock Mine, previously referred to. Of these the Decora and Arkansas and several others have been developed to considerable extent but to no great depth. Some diamond drilling was done on the Decora and important results are reported to have been obtained.

The principal development on these properties is only 100 feet or so in vertical elevation above the bed of Indian Creek, below which horizon it is probable that perma-

nent water level might be encountered, and a definite change occur in the nature of the ore from oxides to sulphides, if the development were carried down at this point. The plants of the Ladd Metals Company are located here. They consist of small smelting furnaces by which attempts were made to smelt the ores of the district with producer gas fuel made from wood and by reverbatory smelting with cord wood fuel. Both of these attempts, however, seem to have proven dismal failures.

This company purchased about 3,000 tons of ore, which has been banked out and is now piled up at Landore. This ore has been sold to the Oregon Smelting & Refining Company, of Sumpter, Oregon, who have let a contract to have it hauled to Council, and a considerable amount of this mineral was delivered before the close of 1905, at Council, where it is shipped to the company's smelter at Sumpter. This ore is said to contain an average of about 12 per cent copper and several dollars per ton in gold and silver. It is mostly of carbonate and oxide variety, high in silica, but also carrying a good percentage of free iron.

In addition to this several carloads of higher grade mineral have been shipped from the district during the past year that have averaged better than 20 per cent copper, \$2.00 in gold and eleven ounces in silver, which is substantial evidence of the character of ore that the district contains.

There is no development in progress in the camp at the present time, but negotiations for a big deal covering the principal properties of the district are reported to be in progress with heavy capitalists who are said to have had the properties very thoroughly sampled during the past season, and the hope is expressed that a big deal will result and extensive development plans be undertaken during the coming year.

#### UPPER HORNET CREEK.

Near the Seven Devils road, in the tributaries of Upper Hornet Creek that originate in towards Cuddy and Galena Mountain, there has been considerable prospecting in progress of late and a number of promising claims have been located.

*Idaho Group.*—Six miles south of Summit Station the Idaho Group carries a large fissure vein fourteen feet be-

tween walls, that is said to contain average values of \$4 to \$16 per ton in gold and silver.

This property was bonded to some Chicago people last fall who are working a small force of men in its development this winter, running in an adit tunnel on the vein which stands nearly vertical and can be traced at the surface for more than 4,000 feet. It traverses a steep mountain slope and affords excellent advantages for this method of development.

*Red Boy and Lucky Star.*—The Red Boy and Lucky Star claims are some other new discoveries south of the Idaho Group that also have a large vein of quartz fully 16 feet wide in places that have been cross-cut at two or three points, and show good pannings in free gold.

*Red Iron Group.*—Lower down on Hornet Creek, on the slopes of the mountain one-half mile northeast of the Peck Ranch, in sight of the stage road and only twelve miles from the railroad at Council, the Red Iron Group was developed during the past season by a shallow shaft and considerable drifting. This property carries a thirty-foot vein of massive iron oxide ore at the surface which changes within 20 feet in depth to massive pyritic ore carrying a little copper and small values in gold. A spur vein from this larger one, a few inches wide, shows 7 per cent copper and also fair values in gold and silver.

*Summit Placers.*—About a mile east of the Summit Station, on the stage road, quite high up on the plateau a patch of excellent placer gravel has been discovered below a gold-bearing porphyry dike that contains thirty to fifty cents per cubic yard in coarse gold, but is unfortunately situated too high for any source of water with which to wash it. This mineral belt is a part of the Cuddy Mountain and Heath belt, which is, in turn, practically a continuation of the Seven Devils copper belt, as all their principal ore bodies show a general strike to the northeast and southwest.

The intervening spaces between Cuddy Mountain and the Seven Devils Range is overflowed with the Columbia lava so prevalent to the west, and it is not unlikely that these basalt flows have smothered and covered up other important copper, gold and silver ore deposits.

## HEATH DISTRICT.

The Heath District is situated on the south slope of Cuddy Mountain and is approached from the railway at Cambridge over a very easy road traversing the gentle sloping lava plateau that surrounds Cuddy Mountain.

Heath postoffice is situated on Brownlee Creek, whose well-timbered slopes and considerable flow of water afford excellent conditions for the establishment of a prosperous mining camp.

The ore deposits of Heath and the adjacent Ruthburg are all large sized, and although they are generally low-grade on the average they contain some important courses of high-grade ore and many indications of rich and valuable ore deposits at depth.

The formations of this district, in a cross-section extending at right angles to the belt from the southeast slope of Cuddy Mountain, would show in a southwest direction first the brown Columbia basalt lava, then a wide belt of eruptive granite and quartz-monzonite, forming the main body of the Cuddy Mountain uplift.

This is succeeded to the southwest with immense dikes of porphyry and included belts of gray, marbelized limestone, together with contact metamorphic minerals of garnet and epidote in exceptionally heavy development.

These lime belts and belts of metamorphic mineral are associated with gold and silver-bearing copper ores that are invariably oxides and carbonates at the surface, and where they have been developed show a rapid change to sulphide even at comparatively shallow depth.

Passing on to the southwest, in the vicinity of Ruthburg and Grade Creek, what is locally known as the Black Belt is encountered. This Black Belt receives its name from the fact that it carries several immense dikes of porphyritic rock highly impregnated with black oxide of manganese. Among these black dikes there have been found a number of stringers of very rich dry silver ore. They are among the oldest lode discoveries in the State and were first found by some of the early-day Nevada prospectors.

Two small mills were erected in this section for the treatment of these ores, but the process does not seem to have been very successful or the ore source of high value

was too limited, and where any extensive development was undertaken the dry silver ores changed at depth to lead-silver ores. No big body of lead ore has been encountered, however, in any of these properties.

In some instances, values from 4 to 8 per cent have been found, representing considerable width, but this feature of the district is not exhausted by any means and the belt presents the possibilities of extensive deposits of low-grade concentrating lead-silver ore if its development is pushed to good depth.

*Montezuma.*—The Montezuma zone, embracing one of these great porphyritic dikes of manganese-stained rock is situated on Grade Creek. It is 300 feet wide, and crops out in a bold butte 100 feet high along the side of the canyon, affording a quarrying proposition of immense proportions. It is said to contain an average value of \$9.00 per ton in gold and silver, principally silver. If this estimate is correct, it would seem to present the possibilities of a big source of these metals, and there should be some method of reducing it profitably, even at the values mentioned. This rock is a rich, black-brown color with lots of the characteristic shiny surfaces for which manganese is noted. It is developed to a limited extent by some big surface cuts and one shallow cross-cut tunnel. As soon as the surface of this formation is broken the fresh rock is of a bluish gray color, but it tarnishes within a few months with the usual black bloom of manganese and the joint lines of effervescent and white crusty alum mineral.

The cross-cut tunnel extended to a little further depth shows a blue rather sparry constructed porphyry that evidently contains besides manganese, calcite and siderite crystals. This opening also shows low values in lead, but there appears to be enough of the oxide mineral free from lead at the surface to warrant an enormous tonnage that should be treated by some leaching method successfully, if the values above referred to prove to represent the average contents of the rock.

The formations bounding this great zone are limestone and schisty breccia, made up of particles of old porphyry formations with included pebbles of limestone.

*Hercules Mine.*—The Hercules Mine, to the southwest

of this property, is another big black porphyry zone that has been developed by several hundred feet of tunneling, on which a body of ore 30 feet wide has been disclosed that is said to average 5 to 6 per cent lead and about as many ounces silver per ton. This is a very promising property and worthy of extensive development.

The old Belmont Claim, another property in the same vicinity, has received considerable development and was formerly equipped with a 10-stamp mill with which an attempt was made to work a body of silver-bearing manganese gossan ore by chlorination, but the ore contained just sufficient lead to upset the process, and the attempt was abandoned.

This property carries some small streaks of 40 per cent lead ore that carries 40 ounces in silver and a little gold. Its development, however, is in a very dilapidated condition and is being retimbered by its present owners.

*Galena Mountain Mine.*—The Galena Mountain Mine, on the strike of this belt to the northeast, about four miles from the Montezuma, high up on the summit, also carries a big dike of manganese-stained porphyry, and a narrow streak of massive steel galena ore that swells in places to twelve inches wide and runs 60 per cent lead but rather low in silver—less than 1-10 of an ounce to a unit of lead.

*Railroad Mine.*—In the copper belt of the Heath District the Railroad Mine is the most promising showing. It has been developed with two short cross-cut tunnels, in one of which considerable drifting has been done. This occurs at a contact between gray limestone and a wide belt of blue igneous rock. It is associated with a zone of garnet mineral that is eighty feet wide. At the surface it showed a number of pockets and irregular patches of very high-grade copper carbonate ore, and two or three carloads of this rich mineral were gophered out, piled up at the surface that would run 30 or 40 per cent copper. Most of this handsome mineral, however, has been scattered down the mountain side since it was mined.

In the first cross-cut tunnel, 80 feet below these crop-pings, the condition of the mineral is changing to one of tarnished chalcopyrite ore, with spots of bornite. The ore at these levels seems to impregnate the limestone as

well as the garnet rock and carries good values in gold and silver.

The average of the zone in copper is said to be 2 1-2 per cent, although there are bunches of 10 to 100 pounds of the clean sulphide mineral that will run 30 per cent copper distributed through the gangue of the zone in a very irregular manner.

In places iron pyrites replace the copper pyrites in a more disseminated form, and associated with this class of mineral some spots of white bismuth sulphide have been found that carry silver values in select specimens as high as 550 ounces, together with \$6.00 or \$7.00 in gold, per ton. A new tunnel has been started to tap this ore body at the level of a small parallel creek, and if completed to the zone, and extensively drifted from that level some valuable mineral should be revealed, as the indications are very promising, indeed. However, the formation approaching the vein is very hard and the proposition will require the outlay of considerable money to put it in a paying shape.

*Other Prospects at Heath.*—In addition to the Railroad Mine, there are a number of very promising copper prospects, and also large deposits of massive magnetite and hematite iron, usually associated with zones of limestone or massive garnet rock.

Another form of deposit is a wide dissemination of copper sulphides associated with iron sulphides through the fracture lines, cleavage and shrinkage planes of a wide belt of granitic looking rock that shades into a diabase porphyry and is a thousand feet wide. There is not sufficient work done on this great zone to show what it would average in copper, but its appearance indicates that it may carry zones 100 feet wide or more that will carry enough of the sulphide mineral to pay for concentration. The concentrates from this mass of mineral run from ten to twenty per cent copper and \$3 to \$10 in gold, with a few ounces of silver, and the deposit is of sufficient merit to warrant extensive cross-cutting with a view of showing what changes may take place under the surface.

The Heath belt is continued to the southeast, where, a few miles distant, in another high mountain uplift on the



slope towards the Snake River twenty to thirty miles north of Weiser, some very promising deposits of massive iron ore have been partially developed in the vicinity of the Iron Mountain Mine.

The iron ores of this property, which contains several big, wide bodies, are in places associated with veinlets of very rich oxide of copper and in the deepest development on the Iron Mountain property some promising looking copper sulphides are making their appearance.

The company owning this property have made preparations for sinking a vertical shaft to considerable depth to further explore their ore body.

*Anderson Group of Claims.*—On this course, to the southeast and within seven miles of Weiser, at the Anderson Group of claims, some very rich pannings of rough and ragged placer gold have recently been discovered associated with a vein of brecciated lava cemented together with silicious sinter.

This vein material contains assays of \$7 to \$12 in gold and presents a very interesting condition that seems worthy of investigation and development on the part of its owners.

The steep mountain slopes towards the Snake River Canyon, extending for fifty or sixty miles north of the Iron Mountain property, presents a splendid field for the discovery and development of gold and silver-bearing copper ore deposits, and at several points presents some handsome showings of rich copper mineral.

It is a rough country but readily tributary to the canyon of the Snake River and presents some fine opportunities for the prospector or capitalist.

#### IRON SPRINGS DISTRICT.

On the opposite side of the Seven Devils range from the vicinity of the Peacock Mine, and in a similar variety of medium grained gray diorite and greenstone formations, the Iron Springs district is situated at the head of a tributary of Rapid River.

*Property of the Iron Spring Consolidated Mining Company.*—At this point the Iron Springs Consolidated Mining Company accomplished considerable work during the year and an average force of about forty men were employed.

The principal claims operated by this company were the Iron Chief, White Rose, Jim Blaine, George Washington and Mary claims, and the last three mentioned are said to have shown up some good reserves of pay ore.

This company also installed a cyanide plant which was reported nearly ready to run at the close of the year. Their operations were put under the management of a well-known mining engineer from Spokane and North Idaho, under whose management the properties are likely to be gotten in shape for economical and profitable production.

Some very beautiful specimens of high-grade telluride gold ore are exhibited at the company's office in Weiser from several of the claims mentioned, and sufficient of this mineral is anticipated in the further development of the veins to provide important shipments. Larger bodies of lower-grade ore, however, are depended on for the regular operation of the company's new plant.

#### BLACK LAKE DISTRICT.

Near the head of another Rapid River tributary, a few miles further southeast, the Gold Coin Mining Company's property is equipped with a fine, up-to-date cyanide plant of 100 tons daily capacity that was operated during the first two months of the year on ore from the Summit and Maid of Erin veins, containing an average value of about \$10.00 per ton in gold, which was very successfully treated by the straight cyanide method, showing 90 per cent of the gross value of the ore, and the largest part of the gold output of Washington County for 1905 is credited to this mine.

Owing to an accident, which put the big rock breaker out of commission temporarily, requiring a heavy piece of machinery that could not be gotten in over the deep snow, the mill was forced to suspend operations and has not since been started up, but an extensive plan of development was undertaken at the mine right after the mill shut down, which consisted of a deep cross-cut tunnel which will tap the principal vein of the group at a vertical depth of about 400 feet below its present lowest level. This cross-cut will be 1,400 feet long when completed. It was equipped with an air compressor and machine drill as soon as the plant could be gotten in after the roads opened in the spring and has been extended over half of the dis-

tance required to cut the vein, and the work is progressing at the present time with a good force of men.

This new development will cut the Summit vein of this property at an elevation of only forty feet above the level of Black Lake and is likely to find it in its unaltered sulphide condition.

This vein has been developed to a depth of 500 feet by adit tunnels and has remained in a shattered and completely oxidized condition so far. It is evidently a very pronounced fault fissure and has been subjected to recent movement since it was filled, and probably to considerable leaching of its contained values, and the prospects are promising, to say the least, that a condition of secondary enrichment will be found when the vein is encountered at the new level.

This and other tributaries of the Rapid River contain a number of handsome gold quartz prospects, at several points showing well defined fissure veins in walls of green stone or diorite, in which spots and specimens of rich telluride ores have been found, and it is not unlikely that their continued development may reveal some sensational results in the way of high-grade ore. The district is well watered and timbered, and with the exception of its ruggedness affords some excellent advantages for economical mining development and operation. Should the new extension of the Pacific and Idaho Northern Railway be carried through the Little Salmon and main Salmon River canyons to the northern connection at Grangeville, it will pass within fifteen or sixteen miles of these properties and make them much more accessible.

*Rock Flat Placers.*—A few miles east of Meadows the Rock Flat Mining Company own an extensive tract of promising placer gravel which has been worked to a limited extent and is said to have yielded handsome returns in placer gold, in addition to which the bedrock also contains a wide zone of altered igneous rock which looks like basaltic tuff, in which have been discovered important values in coarse ragged gold and average values are said to be contained in this big bedrock zone across a width of 90 or 100 feet that it is believed will pay for milling operations.

This property was bonded last fall and the new opera-

tors are driving a long cross-cut tunnel to facilitate its drainage and give grades for the sluice boxes.

It is believed that a good deal of the gold-bearing bed-rock material, as well as the placer gravel, can be washed by hydraulic methods and big paying values recovered in this manner. The tunnel is over 600 feet in length, and it is the anticipation of the present operators to have the property equipped and in shape to take advantage of the flood water season next spring, when important gold results are anticipated.

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### **CONCLUSION.**

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The foregoing review of the progress of mining industry of Idaho for 1905 is, necessarily, limited by the fund available for this purpose.

The information given is from personal observation and the best available sources.

The business of the office is growing so rapidly, especially in its clerical aspect, that I find it impossible to personally cover the field with the resources at my command.

The year just past was a record breaker in metal production and yielded a larger amount in profits than ever before, and I think it is safe to say that the net profits and dividends of all the Idaho mines for the past year will closely approximate seven millions of dollars, the largest increase, as usual, being in the Coeur d'Alenes.

A marked revival in mining development was manifested towards the close of the year in several of the older producing counties further south, and the present prospects are that these great results will be again exceeded by the output of 1906. The figures of output are based on the gross metal contents of minerals shipped and average New York quotations on the metals for the year. Silver

is figured on a basis of \$.6035 per ounce; lead, on a basis of \$4.70 per cwt.; copper, \$15.39 per cwt.; zinc, \$5.88 per cwt., and gold, \$20.67 per ounce.

The above are unusually high figures for the baser metals and have largely increased the profits of our producers. If the present national and world-wide prosperity continues they are likely to be maintained or increased through 1906. This is especially true of lead, the price of which is largely controlled by one interest, and in spite of the heavy output of the past year there appears to be no surplus stocks on hand and new sources of supply of lead mineral are not being discovered and developed on a par with the increased demand. In fact, the present and probable new sources of this metal are pretty well circumscribed to well known and comparatively narrow fields, and optimistic students of the subject predict very much higher figures for the metal at no distant date than those ruling at the present time.



## REPORT OF INSPECTOR OF MINES.

|                                    |               |  |
|------------------------------------|---------------|--|
| <b>Ada County.</b>                 |               |  |
| Gold, fine oz., 51.71 .....        | \$ 1,068 84   |  |
| Silver, fine oz., 18.29 .....      | 11 03         |  |
| Total value .....                  | \$ 1,079 87   |  |
| <b>Bannock County.</b>             |               |  |
| Gold, fine oz., 37.00 .....        | \$ 764 79     |  |
| Silver, fine oz., 9.04 .....       | 5 45          |  |
| Total value .....                  | \$ 770 24     |  |
| <b>Bingham County.</b>             |               |  |
| Gold, fine oz., 250.00 .....       | \$ 5,187 50   |  |
| Silver, fine oz., 20.00 .....      | 12 07         |  |
| Total value .....                  | \$ 5,179 57   |  |
| <b>Blaine County.</b>              |               |  |
| Gold, fine oz., 520.00 .....       | \$ 10,748 40  |  |
| Silver, fine oz., 352,756.00 ..... | 212,888 24    |  |
| Lead, lbs., 3,915,810 .....        | 174,043 07    |  |
| Zinc, lbs., 2,094,960 .....        | 123,184 64    |  |
| Total value .....                  | \$ 520,864 64 |  |
| <b>Boise County.</b>               |               |  |
| Gold, fine oz., 10,279.00 .....    | \$ 212,466 93 |  |
| Silver, fine oz., 1,962.00 .....   | 1,184 06      |  |
| Total value .....                  | \$ 213,650 99 |  |
| <b>Canyon County.</b>              |               |  |
| Gold, fine oz., 21.27 .....        | \$ 439 65     |  |
| Silver, fine oz., 2.06 .....       | 1 24          |  |
| Total value .....                  | \$ 440 89     |  |
| <b>Cassia County.</b>              |               |  |
| Gold, fine oz., 22.01 .....        | \$ 454 94     |  |
| Silver, fine oz., 1.90 .....       | 1 14          |  |
| Total value .....                  | \$ 456 08     |  |
| <b>Custer County.</b>              |               |  |
| Gold, fine oz., 1,384.77 .....     | \$ 26,623 19  |  |
| Silver, fine oz., 52,774.13 .....  | 31,851 18     |  |
| Copper, lbs., 684,134 .....        | 105,288 22    |  |
| Lead, lbs., 446,300 .....          | 20,976 10     |  |
| Total value .....                  | \$ 186,738 69 |  |
| <b>Elmore County.</b>              |               |  |
| Gold, fine oz., 6,040.09 .....     | \$ 124,848 66 |  |
| Silver, fine oz., 3,640.01 .....   | 2,196 74      |  |
| Total value .....                  | \$ 127,045 40 |  |
| <b>Idaho County.</b>               |               |  |
| Gold, fine oz., 10,452.26 .....    | \$ 216,048 21 |  |
| Silver, fine oz., 2,740.91 .....   | 1,654 13      |  |
| Total value .....                  | \$ 217,702 34 |  |
| <b>Kootenai County.</b>            |               |  |
| Gold, fine oz., 1,600.25 .....     | \$ 33,077 16  |  |
| Silver, fine oz., 53,000 .....     | 31,985 50     |  |
| Total value .....                  | \$ 65,062 66  |  |
| <b>Latah County.</b>               |               |  |
| Gold, fine oz., 270.40 .....       | \$ 5,589 16   |  |
| Silver, fine oz., 11.27 .....      | 6 80          |  |
| Total value .....                  | \$ 5,595 96   |  |

**Lemhi County.**

|                                   |               |
|-----------------------------------|---------------|
| Gold, fine oz., 6,104.47 .....    | \$ 126,179 39 |
| Silver, fine oz., 52,792.01 ..... | 31,859 97     |
| Lead, lbs., 2,340,765 .....       | 110,015 31    |
| Total value .....                 | \$ 268,055 31 |

**Lincoln County.**

|                              |             |
|------------------------------|-------------|
| Gold, fine oz., 90.48 .....  | \$ 1,870 22 |
| Silver, fine oz., 2.71 ..... | 1 65        |
| Total value .....            | \$ 1,871 87 |

**Nez Perce County.**

|                                |              |
|--------------------------------|--------------|
| Gold, fine oz., 1,606.01 ..... | \$ 33,196 22 |
| Silver, fine oz., 175.25 ..... | 105 76       |
| Total value .....              | \$ 33,301 98 |

**Oneida County.**

|                              |             |
|------------------------------|-------------|
| Gold, fine oz., 200.53 ..... | \$ 4,144 95 |
| Silver, fine oz., 9.09 ..... | 5 48        |
| Total value .....            | \$ 4,150 43 |

**Owyhee County.**

|                                    |               |
|------------------------------------|---------------|
| Gold, fine oz., 17,588.66 .....    | \$ 363,557 69 |
| Silver, fine oz., 845,508.36 ..... | 510,264 29    |
| Total value .....                  | \$ 873,821 89 |

**Shoshone County.**

|                                      |               |
|--------------------------------------|---------------|
| Gold, fine oz., 2,750.00 .....       | \$ 56,842 50  |
| Silver, fine oz., 7,257,634.47 ..... | 4,879,982 40  |
| Copper, lbs., 5,805,000 .....        | 393,389 50    |
| Lead, lbs., 253,988,581 .....        | 11,337,463 30 |
| Zinc, lbs., 80,000 .....             | 4,704 00      |

Total value .....\$17,272,381 70

**Washington County.**

|                                  |              |
|----------------------------------|--------------|
| Gold, fine oz., 1,247.00 .....   | \$ 25,795 49 |
| Silver, fine oz., 3,737.05 ..... | 2,255 30     |
| Copper, lbs., 172,266 .....      | 26,511 73    |

Total value .....\$ 54,562 52

**Totals for State of Idaho.**

|                                  |                 |
|----------------------------------|-----------------|
| Lead, lbs., 260,791,456.00 ..... | \$12,257,193 43 |
| Silver, oz., 8,826,794.55 .....  | 5,196,270 51    |
| Gold, oz., 60,515.91 .....       | 1,250,863 85    |
| Copper, lbs., 6,661,400.00 ..... | 1,025,189 46    |
| Zinc, lbs., 2,174,960.00 .....   | 127,887 89      |

Total value .....\$19,836,409 89

NOTE.—The above values are based on gross metal contents of mineral shipped and average New York quotations for silver, and the base metals, and \$20.67 per ounce for gold.

Based on the old method of quoting the silver output at coinage value, the metal yield of 1905 would show a result of \$25,808,704.34, a total increase over 1904 of \$2,970,404.99, and over 1903, of \$4,752,627.97.



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