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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.



OLD GOLCONDA CLAIM, SONNEMAN GROUP, SOUTH MOUNTAIN, OWYHEE
COUNTY. SILVER-LEAD DEPOSIT SUCCESSFULLY WORKED IN 1873,
NOW BEING REOPENED.



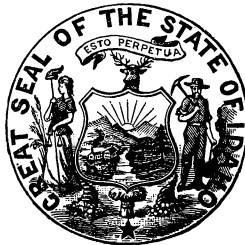
WALLACE, SHOSHONE COUNTY.

EIGHTH ANNUAL REPORT

—OF THE—

Mining Industry of
Idaho

FOR THE YEAR 1906



ROBERT N. BELL

State Inspector of Mines

BOISE, IDAHO, JANUARY 1, 1907.

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, 1906.

Very respectfully,

ROBERT N. BELL,
State Inspector of Mines.

INTRODUCTION

In common with other western mining States, Idaho, during 1906, has enjoyed a very prosperous year of mining activity, production and dividends.

The enhanced values of lead, silver and copper during the year has greatly increased the profits of our producing mines, and while the output is considerably larger than last year, and establishes a new high record in silver and copper, the values of all the metals make a much more conspicuous increase.

The value of the mineral production of the Coeur d'Alene district this year will alone exceed the combined production of the whole State in 1905. The dividends distributed from that famous field will be greatly enhanced all around, and the remarkable performance of the Bunker Hill and Sullivan mine, which distributed to its fortunate stockholder during 1906 two million three hundred forty thousand dollars, is a notable event, and when it is considered that this great profit was derived from a single ore body in the mine at a depth in the dip of the vein of about three thousand feet, the proposition of permanency in Idaho's mineral deposits will be established at least with one magnificent precedent, for this is at once the deepest, richest and most extensive ore development in the State, and probably of its kind in the whole mining world.

This mine has been producing constantly for twenty years, but has only become an important dividend payer within the past three years, as the result of an enormous faith in its permanency and outlay of capital in its devel-

opment at such great depth. It emphasizes the necessity of the investment of capital, knowledge and faith in mining enterprises, and affords an example that should encourage the speculative investment of capital in the development of other true vein, lead-silver deposits of the State that have made a respectable showing in their surface horizons. There are many such whose output in their upper horizons obtained important figures that have been practically dormant since the silver panic in 1893.

FATAL ACCIDENTS

The past year has been less unfortunate in respect to fatal accidents among our mining operatives than the year before. The total number reported is 17, as compared to 20 during 1905, 10 during 1904, and 20 during 1903.

The usual difficulty is experienced in getting accurate statistics of the number of men employed in the mines of the State, for the reason that the mines in many parts of the State work very irregularly, except in the dividend-paying properties, and operators fail to respond to communications requesting such information at the close of the year.

As nearly as can be ascertained, there were approximately seven thousand men employed in the mining operations of Idaho during 1906, which would mean that the number of fatal accidents, per thousand men employed, would amount to 2.42, which is a low percentage, and especially so in the large mines of the north, and will compare favorably in this respect with other mining States where operations of the same magnitude are carried on.

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

Explosion of blasting compounds -----	6
Falling ground -----	4
Falling from staging -----	1 ✓
Tramway accident -----	1 ✓
Falling down chutes and fill-holes -----	4
Handling timber -----	1 ✓
<hr/>	
Total -----	17

In this connection it is gratifying to state that only two of the blasting accidents occurred in the Coeur d'Alenes, where probably as much powder is used in a single day as is used by the balance of the mining operations of the State in a week, and one of these happened in a prospect shaft twenty feet deep.

This is a class of accidents often due to missed holes that occasionally involve an amount of personal risk in the life of the hard-rock miner that calls for a display of nerve fully on a par with the Merrimac incident at Santiago, and in the nature of the business it is inevitable that such work must occasionally demand a victim, yet the showing made speaks highly for the care exercised in the north to avoid such fatalities.

RECOMMENDATIONS

In this connection there can be no question but that the recent improvement in a little cap-crimping device, which is now being generally introduced in the Coeur d'Alenes, is largely responsible for immunity from this cause of fatalities. This device is simply a broad bitted pair of pliers used in making primers that tightens the copper evenly around the end of the fuse and draws up a little parallel lug one-eighth of an inch deep at

the empty end of the cap, insuring a more complete detonation and combustion of the charge, increasing the effect of the blast and minimizing the likelihood of the hole missing fire, or of remnants of the charge being left alive in the bottom of the hole from poor detonation, an imminent danger in the miner's subsequent operation of digging out the loose ground after the blast. This device, together with a profusely illustrated article on blasting and handling powder, fuse and caps to get the safest and best results, was the subject of a paper presented at a meeting of the California Miners' Association at Nevada City, California, during the past year, and reprinted in all the leading mining journals, which should be read and carefully studied by every user of powder, and emphasizes the advantages of a trade journal. Every miner should be a subscriber to one of the leading mining publications of the country, as they make a specialty of telling him what the other fellow is doing in his line of business, the world over, especially in regard to the prevention of accidents. The paper above referred to was subsequently republished in pamphlet form by the California Cap Company of San Francisco, from whom it can be obtained on application and is highly recommended.

The problem of thawing powder is the cause of many accidents and is a hard one to meet with the small operators and prospectors. The safest device for this purpose is the warm water method in a double chambered vessel, keeping the powder out of actual contact with the water, and the constant attendance to the cleanliness from glycerine saturation of the vessel employed.

I have received no legal complaints during the past year from any of the mining operations of the State regarding the unsafe condition of the ground being operated, as to

timbering, etc. Our mining districts are nearly all blessed with a splendid supply of mining timber of the most desirable varieties. It is generally cheap and lavishly used, particularly in the Coeur d'Alenes, where the ground is kept timbered as close up to the face as it is practicable where it is at all loose. In fact, the big operators are just as anxious to avoid serious and fatal accidents as are the employees themselves and afford every reasonable facility for their protection consistent with economic mining.

These mines are generally well ventilated, have good sanitary provisions, and while there is not a really wet mine in the district, the ground is invariably sufficiently damp to hold down the dust, and cases of lead poisoning are of rare occurrence, considering the amount of lead mineral handled; and the conditions under which the men have to work are probably as safe and favorable as obtain in mines of the same magnitude anywhere.

Of course, the question of personal care must always cut a big figure in this connection, for big mining operations are about as full of pitfalls as the skeleton frame of a sky-scraper building, with the added disadvantage of the operation being always carried on by candle light; and there are certain natural hazards to the business which can not be eliminated, but a constant regard for the surrounding conditions on the part of the men should reduce the accident list to a minimum.

Familiarity often breeds contempt in dangerous occupations of dangerous conditions. This is especially true in mining. Men take unnecessary risk in small things that often result disastrously to themselves or their fellow workmen. In spite of repeated warnings, men carelessly leave chutes and fill-holes unguarded; they occasionally put up too light and flimsy cross pieces to build

staging on in setting up machines; take too long chances in barring down or working under loose ground; spitting or repriming missed holes, etc., and they need to be constantly prompted in these matters. To this end a resident deputy inspector would be an advantage in the Coeur d'Alenes.

There are several features and conditions looking to the safety of mine operatives that should become statutory requirements. At the last session of the Legislature, I assisted in drawing a bill which is still available, covering a list of important points in this line, that should be taken up and put through by the mining delegation in the present session.

Our mining industry is yet young and I do not believe in encumbering our statutes with too stringent provisions, such as to discourage outsiders from developing our mineral resources, and the bill referred to might be modified or amended, but there are several features of it that should be given serious consideration, as they provide precautionary measures, especially in regard to fire protection that might prevent disastrous accidents and would be more apt to be regarded than a mine inspector's order, which it is impracticable to stand by and enforce.

This State has been more free from the affliction of wild-cat operators during the past year than formerly, but in this connection I heartily endorse one of the principal papers read before the recent Denver meeting of the American Mining Congress, proposing to pass a law penalizing the work of mining fakirs, and some legislation can be profitably considered on those lines, for we have plenty of meritorious properties in the State that warrant development on legitimate lines; but the attempt to obtain money by flagrant misrepresentation of fact should be legally frowned upon.

STATE MINERAL LAND LAW

In my last annual report, I called attention to the fact that the State owns vast areas of mountain country, a large proportion of which is fine mineral land and good prospecting territory, and the State's rights to it are absolute. The prospector entering upon this land to investigate its mineral resources is a trespasser, and in view of the fact that this same land was selected without any mineral classification, I would emphasize the necessity of some legislation at the present session looking to the encouragement of the prospecting and development of the mineral resources of the State's holdings, unless the proposed forest reserve relinquishments hold good.

Among the other manifold duties of the State Land Board, its field agents are quite frequently called to pass upon and classify mineral discoveries on State lands. This work needs a man trained in that particular line and more properly belongs to this department, and unless the law is changed, it should be available to the Land Board for such work, or to eliminate this proposed extra duty from an already overloaded department, pass such a law as suggested in my last annual report, giving free privileges to the prospector to test the State's holdings for mineral under favorable lease and upon the discovery of a sufficiently valuable deposit, an additional privilege should be given to buy the land at the fixed minimum price of \$10.00 per acre. In this way the State will be enabled to dispose of a lot of rough mountain territory that will have very little value for any other purpose after the timber is removed, which formed its principal value when selected.

DUTIES AND REQUIREMENTS

Like every other department of the State, the business of this office is growing on a par with the rapid increase of the mining industry, and it should be given the advantages enjoyed by some of the appointive offices and be provided with sufficient funds to at least more thoroughly carry on the clerical work involved. We have in Idaho single mining operations of such magnitude as to rank well up among the largest in the United States, that call for managerial talent worth from ten to twenty thousand dollars a year salary, and to properly fill the position, a mine inspector should be able to criticise every department of such an enterprise, which puts the State in the position of requiring a good deal of ability for the small salary the office affords.

This department calls for a mass of correspondence throughout the year on every phase of the mining business, and involves, besides the immense amount of field work, a variety of knowledge in addition to that of a practical miner, to properly fulfill its duties, and unless the salary is raised for the benefit of my successors, to make the position attractive to men of sufficient ability to fulfill its requirements, it will never have an occupant who will seek the position without some other motive of personal advantage than the present small salary affords, and I would suggest that it be raised on a par at least with the next higher salary in the present list of elective State officers.

The writer does not presume to possess but a small measure of the mining and technical knowledge required of this department, and simply works at the duties to the best of his ability, with some degree of success, however,

as evidenced by the splendid popular vote accorded me at the recent fall election, a compliment highly appreciated and gratefully acknowledged.

No one can be more conscious than myself of the detail weaknesses of my annual report, yet such as it is it involves a lot of hard work, to say the least, in its compilation and in gathering the data. It seems to be in good popular demand and well received in its semi-official advertisement feature of the State's mineral resources, and in view of this fact, it is to be regretted that the fund provided for this publication permits of only a very limited issue. The 2,500 copies of my last year's report were practically called for in the first ninety days after its publication, and 10,000 copies could have been advantageously used, and I urgently request that the office fund be sufficiently increased to cover more printing costs and to justify the employment of a clerk.

Idaho miners, as a class, average up in intelligence with the best in the West. They are nearly all English-speaking, American citizens, and a large majority of them native born. That conditions under which they work are, generally speaking, good, is evidenced by the fact that during the four years I have filled the office, I have never received a single legal complaint and only one illegal complaint, sent in by a disgruntled man who had been discharged for inefficiency. This call, however, was answered in person. Under section 7, Inspector of Mines act, the law provides: "Whenever the Inspector of Mines shall receive a formal complaint in writing, signed by three or more persons, setting forth that the mine in which they are employed is dangerous in any respect, he shall in person visit and examine such mine, * * * and order such improvements therein as in his judgment seem justified."

This statute carries several exacting conditions that might be amended and modified in favor of the men, but to make it too easy might work an injustice to the owners by admitting the exercise of spite work. The big mines of the State occasionally encounter temporarily dangerous conditions in the way of heavy creeps and caves, underground and entrance fires that involve extra hazardous work to overcome, but volunteers for such work, no matter how dangerous, are always available beyond the requirements of the case. With these exceptions, however, Idaho mines are generally safe, and the operators usually evince a willingness to comply with any suggestions I make on my annual visits.

HOW THE DUTIES OF THE OFFICE ARE ADMINISTERED AND FUNDS USED

The Mine Inspector's salary is \$150.00 a month and is paid quarterly. He is also provided with a fund of \$2,600 for traveling expenses, to cover the two years' term, and to be paid at the rate of 10 cents a mile for each mile actually traveled in the discharge of official duties. There is also an office fund, the extreme limit of which, under the law, is \$700.00 a year. This is to cover the cost of all expenses for clerk hire, postage stationery, printing and all other office expenses, including the compensation of deputies, with discretionary powers as to the disposal of the funds within the limits prescribed. This office expense fund was raised from \$500.00 to \$700.00 a year at the last session of the Legislature. The law requires an annual report, and the total office expense provision is not sufficient to adequately cover that feature alone.

To follow the full requirements of the law in making this report would involve a mass of printed matter annual-

ly that would be a useless repetition of dry detail and unwarranted cost. I have to draw the line in this respect. I believe, however, that each one of my reports has contained as much matter bearing on the requirements of the office and tending to exhibit the mineral resources of the State, as do all the reports combined of all my predecessors.

With such a limited office fund, I am hampered in the office work seriously. This fund has been exhausted since the middle of the summer, and the cost in that department has been advanced by myself. I go on a trip during my field season, lasting from one to three or four weeks, and come home to find a stack of letters that have to be waded through long-hand, involving more overtime and Sunday work than should be required, and the department should be provided with a stenographer, or at least a sufficient fund to hire one during the busy winter months of office work, and to call one in occasionally during the summer.

It would be advisable to sometimes hire a deputy for special work, and the law admits of this, but there has never been any fund available to pay for such assistance, and I would recommend that the present limited fund available for these office purposes be increased from \$700 \$1,200 a year and that its distribution be left to the discretion of the inspector, with receipts rendered as now provided.

In the matter of the traveling expense fund and its use, I would call attention to the fact that the law provides an allowance of ten cents a mile for each mile actually traveled, with a limit not to exceed \$2,600.00 during the twenty-four month term. Our Inspector of Mines act is practically copied from the Colorado Bureau of Mines law, which has a large appropriation and employs, besides a commissioner and a regular clerk, two regular district in-

spectors. The duties called for in each statute are nearly identical. The traveling costs are as high, if not higher in this State as in Colorado, and it must be manifest that one man must spread his efforts out pretty thin in an endeavor to cover such requirements. Of necessity he must neglect many of the duties called for.

The first requirement of the Inspector of Mines in field work in the statute, is to visit each mining county at least once each year and examine all such mines therein as in his discretion need examining. Traveling in Idaho, away from the railroad, by stage, usually costs ten cents a mile for fare alone, and if livery hire is involved, the cost is a good deal more, not to speak of living and contingent expenses which, on such a trip, combine to run up the cost of such traveling to about twice the State's allowance that a bill can be rendered for, and a man naturally plans his trips to take in the larger and more accessible camps and avoid going behind on this score.

I have gone into this in detail to explain my apparent neglect of some of the remoter mining districts of the State. I have personally visited and am more or less familiar with nearly all of these outlying camps. Their operations are mostly small and usually intermittent, but I seldom fail to give them recognition in my annual review, from personal knowledge and observation or the most reliable sources of information, and also to visit them at any cost where sufficient justification is shown.

The first requirement of the field work of this department absorbs all the traveling expense fund and leaves nothing available for the second provision, which calls for a personal attendance at all fatal and serious accidents, for investigation as to the cause, and to officiate at inquests as the State's witness in the case. This feature of

the work is manifestly impossible of accomplishment without a regular deputy, as it would take one man's entire time, together with the whole traveling expense fund allowance, and in the remoter districts often could not be complied with in time to do any good, on account of the lack of communication and distance to travel. It, consequently, has to be practically eliminated.

My office work and correspondence naturally often antagonizes the schemes of irresponsible promoters and operators who, through ignorance or design, attempt to trade on the profitable mining reputation of the State with wild-cat schemes, and this engenders some personal feeling and criticism; but I look upon it that the investing public have a right to be protected as well as encouraged in their investments in our mineral resources.

My work and travel over the State bring me into touch occasionally with a mineral corpse of considerable merit, that warrants an attempt at revival, and whenever I see a chance to directly assist in putting new life into a dead issue of this kind and the work does not seriously interfere with my other duties I embrace the opportunities.

My pet scheme in this line of work has been an effort to promote the development of the coal resources of Fremont County, whenever I had time to do so, as proof of the existence of an extensive resource of high grade fuel, and its successful development on an extensive scale means more to more of Idaho's citizens and the industrial development of the State than any mineral discovery yet made within its borders; for with equitable freight rates, it should mean a reduction in cost of one of the necessities of life throughout Southern Idaho, of from 20 per cent to 60 per cent.

One of the coal mines, or rather, prospects, of this Fre-

mont field, is being operated at the present time, as a result of my efforts, and is turning out from fifteen to twenty tons of coal a day that is sold to the neighboring settlers at from 50 cents to \$3.50 per ton, according to size of coal, the profits of these sales being consistently put back into the ground for new development. The quality of this coal will compare favorably with the best coal imported into Idaho from Wyoming. This output is playing no small part in the relief of the local coal famine of that region, and is very highly appreciated. I have had the field examined by some of the best known practical coal mine experts in the West, who have expressed very favorable opinions of its extent and future, and I have in my possession an elaborate, detailed report on the field by a very able mining engineer and geologist of international repute, which amply supports my opinion of its merits, and I have every confidence that this infant coal industry of Southeast Idaho will rapidly develop a robust maturity of great importance to the State.

The result of my field work and the information thereby gained is usually immediately given to the public through the medium of the newspapers of the State, and not retained until the close of the year to be given out as a collection of stale obituaries of past events. I have endeavored to impartially treat every proposition I visit according to its merits. These reviews of current mining events in the State are usually written out in detail by myself and given to the newspapers, which are always glad to get them, and I believe they serve a useful purpose.

If the increase of the different funds herewith suggested seems not warranted in the present development of our mining industry, I would especially urge that the increase asked for in the matter of printing and office work, at least be favorably considered.

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IDAHO BY COUNTIES

ADA COUNTY.

There has been considerable activity in the mines and prospects during the year in the well defined mineral belt that traverses the granite mountain slopes along the northeast border of Ada County immediately adjacent to the city of Boise, and the results obtained are such as to warrant the installation of milling machinery in some instances, and the anticipation that important production of gold may be commenced in this locality during 1907.

Big Giant.—The most important progress on this belt was made on the property of the Big Giant Gold Mining Company. This company owns a large group of claims aggregating two hundred forty acres on Big Giant Mountain near the Idaho City road, ten miles northeast of Boise. This property overlaps the Ada-Boise County line, but as Boise County has such a large number of producers and is the banner county for gold production this year, we shall take the liberty of giving Ada County credit for the Big Giant development. This promising mine has been undergoing development steadily for the past year with a crew of fifteen men, who have accomplished two thousand lineal feet of work in tunnels, drifts and raises, principally blocking out ore.

The main mineral features of the property is a large vein in granite that strikes northwest and southeast with a dip about forty-five degrees to the southwest.

The altitude of the main working is five thousand feet above sea level, and the character of the deposit is a true vein filled with quartz richly impregnated with gold bearing iron oxide at the surface, and pyrites at depth. The oxidized ore yields sixty per cent of the values in free gold and sulphide ores, about thirty per cent. The ore body is of great length and width; it is accompanied in places with inclusions of black porphyry and it is possible it may be a replacement of an original dike filled fissure, in which event its permanency to great depth would be es-

tablished. The vein is fully fifty feet wide in places, but at the widest points, the main body is white quartz that is low grade. There is, however, usually a pay course several feet wide accompanying it on one or both walls, richly impregnated with iron pyrites, in the lower level but comparatively free from lead and zinc minerals for which this belt is noted, and according to numerous tests this mineral is susceptible to successful treatment by the cyanide method. The values in gold range from five to fifty dollars per ton, but the average of the extensive resource now exposed in the property is based on about six dollars per ton in gold, which it is believed can be mined and treated with the necessary equipment at a big margin of profit.

The total development of the property aggregates about four thousand feet and the extensive ore resources put in sight are such as to warrant a reduction plant. To this end the company expects to install a mill of two hundred tons daily capacity to be run by electric power. The crushing machinery will be stamps with copper plates for saving the free gold and a cyanide attachment for treating the tailings.

The enterprise is largely backed by local capital and has been handled in a very practical and conservative manner. The president of this company is O. E. Jackson, and the secretary, W. H. Gibson, and W. S. Walker is treasurer, all of Boise, Idaho.

The Last Hope.—This company owns a group of six claims in the mountains above the Gile's ranch and twelve miles northeast of Boise that was equipped late last fall with a three-stamp prospecting mill with which a test run was made before the water supply froze up. The test proved the ore treated to contain a milling value of sixteen dollars per ton. It was mined from a vein a foot wide. Selected ore from this vein produces specimens well sprinkled with native gold. Two tunnels have been run aggregating one hundred and sixty feet in length and their further extension promises profitable results.

Ironsides Mine.—A regrettable accident in connection with the Ironsides mine, twelve miles east of Boise, was the burning and destruction of its ten-stamp mill during the past year. This property has been idle for some time.

It has a record of production approximating something like one hundred thousand dollars in gold. It carries a large, true vein 12 feet wide of fair grade gold milling ore, including a pay streak of higher grade ore containing average values of twenty-five dollars per ton and upwards, that is from one to five feet wide and of considerable length. This vein is a type of deposit very similar to several others in the granite districts of the State that have been large producers. The total underground development of this property approximates two thousand feet and includes a two hundred foot shaft. The latter has been pumped out during the past month for the purpose of having the property examined, sampled and reported on, with a view of its further equipment with a milling plant to be run by electric power.

This work has mostly been done under the direction of Mrs. Hortense Adams of Boise, Idaho, and the results indicate that with the necessary equipment and proper handling, this mine should be made to pay good profits. The accompanying cut gives a good idea of the large size and length of the main ore shoot developed on this property. A good deal of the ore mined from this big stope was shipped crude and ran over \$50 a ton gold, by the car.

Twentieth Century Mine.—This property, consisting of a group of thirty-six lode claims, is situated on Warm Spring Creek, eight miles east of Boise. It was operated throughout the year with a force of four men and now has a total of 2,200 feet of development in cross-cut tunnels and drifts.

There are five veins traversing this group that range from three to forty feet in width, and carry average gold values of from \$3.00 to \$10.00 per ton. The tonnage and values exposed as indicated by constant sampling of the ore bodies as they have been developed during the progress of the work on the mine, are such as to warrant the anticipation of a good big margin of profit, and the company intend to put in a milling plant during the coming summer for their treatment.

The Keltic Gold Mining Company.—This company is developing a large group of claims on Picket Pin Gulch, five miles east of Boise, and also carried a crew of four men during the past year. Their total development is 780

feet of tunnels and drifts. Three hundred feet of this work is along a contact vein between granite and porphyry that is twenty feet wide, and contains average values of \$6.00 per ton in gold and silver.

Another vein on this group, known as the Flannigan vein, is six to eight feet wide and contains some very high gold values by selection at the surface. It has been spotted by shallow work along its course for fully 1,000 feet, and at several of these shallow openings average values of \$10.00 to \$14.00 per ton are found across the full width of the vein. A cross-cut tunnel now 518 feet long is expected to intersect this fissure within a month at a depth of 220 feet, from where it is anticipated extensive and valuable ore reserves can rapidly be exposed by drifting. This company have the machinery for a five-stamp mill on the ground which they intend to erect and put in operation in the spring.

The Picket Pin Gold Mining Company.—This company owns a group of fourteen claims adjoining the Keltic property and employed a crew of three men on development work during five months of the past year. They have 450 feet of tunnels and drifts, exposing a vein four feet wide said to average \$32.00 per ton, including a rich paystreak eight inches wide. Assayed separately, this paystreak carries average values of \$130 per ton in gold and silver. This company also have the machinery for a five-stamp mill on the ground, the erection of which will be commenced right away.

The Boise Vitrified Brick and Pipe Company.—This company, operating in the northern suburb of the city of Boise, has enjoyed a prosperous year and extended its production.

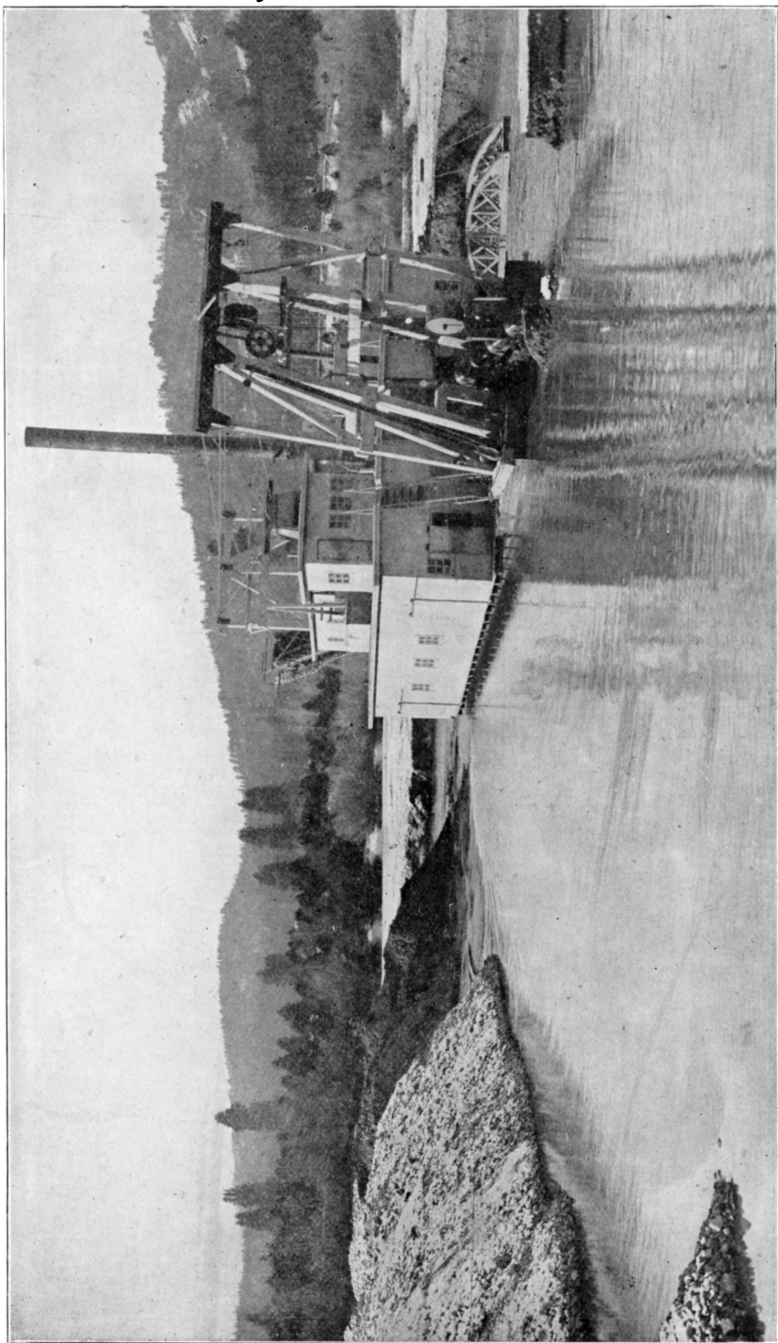
Sand-lime Brick.—In the same locality an enterprise was started for the manufacture of sand-lime brick which has gotten into successful operation and turns out a handsome product of finishing brick in any variety of shades and shapes. This is likely to expand into an important and profitable industry as its resources of raw material are extensive.



**BIG SURFACE STOPE, IRONSIDES MINE, HORNET DISTRICT, TWELVE
MILES EAST OF BOISE, ADA COUNTY.**



**BIG SURFACE STOPE, IRONSIDES MINE, HORNET DISTRICT, TWELVE
MILES EAST OF BOISE, ADA COUNTY.**



NEW RISDON DREDGE OF THE MOLINE MINING COMPANY, NEAR PLACERVILLE, BOISE COUNTY.

BANNOCK COUNTY. ✓

Bannock County, of which Pocatello is the county seat, is surrounded by a number of gold, copper, lead and silver bearing prospects on which a good deal of development work has been done at several points since that portion of the Fort Hall Reservation was thrown open, but the early promise of this district has so far not been realized, although its possibilities have been by no means exhausted.

The Moonlight Mine.—The most interesting development of the past year has been at the Moonlight mine, which has been carrying a small force of men sinking and cross-cutting. The Moonlight shipped two cars of good copper ore in 1904. The work of the past year has been mainly directed in following down the ore and running a big cross-cut tunnel. The sinking operation has revealed a considerable showing of rich bornite mineral that has formerly been found in nuggets and boulders within the well defined fissures that traverse the property, and it was believed by the manager, late last fall, that he would be able to accumulate another carload before the close of the year, of about thirty per cent grade. Whether this anticipation was realized or not the writer is not informed.

The new cross-cut being run on this property is in seven hundred feet and is shortly expected to cut the fissure at considerable depth below the point where the ore occurred in the upper workings.

At another point on this property, a body of gray slate several feet thick was found during the summer that contains an average value of three and one-half per cent copper in the form of carbonate disseminated through the rock.

The Great Western Mine Company.—This property is situated about three and one-half miles southeast of Pocatello. It has been operated during the year with a crew of three men and has a total of nine hundred and seventy-five feet of underground development, disclosing some interesting showings of copper sulphide and carbonate ore. Mr. O. D. Hovey of Pocatello is president and general manager, and Mr. M. T. Cardon of Pocatello is vice president and secretary of the company.

The Fort Hall Mining Company.—This property is situated eight miles south of Pocatello and has the most development of any mine in the district, the principal feature of which is a cross-cut tunnel nearly four thousand feet long that has cut an immense body of porphyry breccia that carries light values in copper. The richest ore occurs at the surface in a dolomite lime formation which carries some rich streaks of mineral, and it is for the purpose of developing this deposit at great depth that the long cross-cut tunnel is being run. The property employed an average of seven men during 1906 and the tunnel was driven ahead one thousand feet. Mr. F. H. Dolland of Chicago is president and Mr. W. M. Odell of Pocatello is secretary and treasurer.

Prospecting and development work was carried on in several claims in the Pocatello district during the year, but nothing of striking importance has been reported.

BINGHAM COUNTY.

Very little mining of importance can be recorded for Bingham County during 1906.

This county made a total shipment of forty-eight ounces of gold during the year, which was mostly derived from small operations along the Snake River. Several attempts at dredging the river were made in the vicinity of Blackfoot, but owing to the excessive irrigation of the rich agricultural country lying on both sides of the river above Blackfoot, the river bed below Blackfoot for ten miles was dry after the middle of the summer, which was a serious drawback to the fine gold operations of that locality.

Some development work was carried on in the Mount Pisgah district on the west side of Cariboo Mountain. Some very interesting deposits of gold and copper-bearing ore occur in this district, associated with porphyry dikes that cut a series of altered sedimentary formations consisting of lime and quartzites.

The Monte Christo property carries some remarkable rich surface float ore running high in copper and gold. This property has over 500 feet of development, but so far the underground work has been unsuccessful in locating the ore channel from which the richest float, above referred to, was derived.

Bingham County, along its northern border, east of Idaho Falls, has an important area of coal-bearing formations that are well worthy of investigation and carry definite promise of containing important deposits of bituminous coal.

At Idaho Falls a power dam has been built across the Snake River by the Idaho Falls Power and Transportation Company and is now being equipped with machinery. When fully harnessed, this site will afford several thousand horsepower and prove a boon to the industrial development of this rich agricultural section, which also has rich tributary mineral resources in the mountains to the west that are likely to develop an important market for power.

BLAINE COUNTY. ✓

The mineral output of Blaine County during 1906, while quite important in the aggregate, shows a serious decline as compared to the previous year.

A great many men are now employed in its principal properties on development, however, and the prospects are good that the district will assume its previous importance in the near future.

Minnie Moore.—The principal cause of the falling off in production was due to the failure of the Minnie Moore mine, which had been the chief producer. This famous property, with a record of mineral output that exceeds eight million dollars in gross values, again experienced serious physical troubles in its lower levels. The vein was cut off by a fault more pronounced than any preceding

disturbance in the mine and beyond which the management was unable to pick up the ore body, although a lot of development work was done to that end.

The mine was worked by leasers in the early part of the year, which cleaned up its developed ore resources above the fault and made quite a large shipment of high grade ore. Since then the mill has been operated quite steadily on a large accumulation of tailings, from which seventy-five cars of low grade concentrates were shipped containing about ten per cent lead and thirty ounces silver per ton.

Idaho Consolidated Mines Company.—On the Relief claim, immediately adjoining the Minnie Moore to the northwest on the same vein, owned by the Idaho Consolidated Mines Development Company, a large amount of development work has been done in the past two years and some extensive bodies of concentrating silver-lead ores disclosed, and it is the opinion that further development of these ore bodies may result in their assuming the importance and continuation of the famous Minnie Moore ore channel near by. For the purpose of the further extensive development of this property a large electric hoist is to be installed on the Relief claim, the building for which is already up, and the company proposes to sink a new shaft to great depth, which will be undertaken as soon as the necessary machinery can be installed.

This company is a recent consolidation of interests and is in excellent financial condition for the prosecution of a long campaign of development. It now includes the Minnie Moore mine among its assets and all the old stockholders of the Minnie Moore, including the Schwab interest, are stockholders in the new organization.

It has a very extensive tract of mineral territory, nearly ninety per cent of which is practically virgin and unproven with many fine blossoms of gossen ore that may mean rich silver-lead ore bodies at depth.

Mr. Irwin E. Rockwell is president of the new company and also general manager in present charge of the work, and with his characteristic energy will proceed to explode some scientific theories of how pre-mineral faults evaporate rich ore bodies on their downward course into the earth.

In this he will have a hearty support and encourage-

ment of many practical men familiar with the Minnie Moore bonanza whose ore bodies have been followed down successfully for nearly 1,200 feet, and the electric juice he is going to turn loose on this famous vein has a fine prospect of reviving a "beautiful" mineral corpse back to its previous life and vigor of profitable production.

Oswego Mine.—A short distance north of the Minnie Moore, the Oswego Mining Company was operating a group of two claims during the year with a force of five men and shipped a small car of good mineral. This property is still in the development stage. Its officers are Mr. J. S. Weaver, Bellevue, Idaho, president and general manager; Mr. John K. Horr of Baltimore, Maryland, is vice president, and Mr. James B. Watkins of the same place, is secretary of this company.

Croesus Mine.—One of the most important occurrences in Wood River mining recently is the reopening of the Croesus mine under the management of Mr. S. E. Rigg.

This property is situated three and one-half miles west of Hailey in the diorite formation which forms the hanging-wall country of the Minnie Moore vein a few miles further to the southeast.

The Croesus mine is opened on a fissured zone with great segregated bodies of gold-bearing copper-iron sulphide ore. The ore bodies are usually accompanied by a small dike of diabase or altered basalt.

The strike of the vein is east and west and it dips south at an angle of seventy degrees.

The property is quite extensively developed through a vertical shaft 800 feet deep from which eight levels have been run. Most of these levels, however, are only out a short distance from the shaft and warrant much greater extension. According to the estimate of competent engineers, however, the development now on the mine exposes one hundred thousand tons of measurable ore, with an average gold contents of \$10.00 per ton. The mineral occurs at several points as clean kidneys and masses of sulphide ore that run as much as \$60.00 to \$70.00 per ton gold by the carload lot.

The property is equipped with a ten-stamp mill which was operated during November and December and produced several thousand dollars in free gold together with several carloads of concentrates, carrying about \$40.00 per ton.

The most interesting feature of the Croesus property is the fact that it promises to be in the very near future an important source of rich lead-silver mineral as well as a gold producer.

There has been discovered at the seven hundred foot level of this mine a pronounced fissure vein with a strike and dip almost directly opposite to that of the gold vein that is from four to eight feet wide of ten to twenty per cent concentrating lead-silver ore. This remarkably interesting discovery includes lenses of pure sixty per cent mineral as much as a foot thick. It has been drifted on from the station for one hundred feet and the extension of the ore shoot past the station to the northwest is still to be proven, and as there are some gossen croppings of considerable importance at the surface in that direction it is not unlikely that the ore shoot may prove an extensive one in length. Should this prove to be the case and the mineral maintain its way through to the surface fully seven hundred feet above, the importance of the discovery can be appreciated and would mean an extensive resource of valuable and desirable mineral that may prove of more importance than the gold resource of the mine.

A carload of ore was sorted out from the mineral produced from drifting through the ore shoot to the southeast that sampled sixty per cent lead and forty ounces silver per ton. The clean galena from this vein, while not so high in silver as that found in the sedimentary formations near by, shows the same laminated structure characteristic of the rich silver bearing lead ores of the district and it is not improbable that the silver values may improve in drifting on the ore body.

In addition to the silver contained in this ore, there is also an important associated value of gold amounting to six or seven dollars per ton in the sixty per cent lead ore.

The property during the two months of its operations shipped, besides a car of high grade lead ore, four cars of gold bearing concentrates and crude ore and is likely to continue an important shipper from present appearances.

The mine is now working twenty-five men and the force will be increased when conditions warrant.

The Eureka Mine.—This well known old property at Bullion has been reopened during the year under the man-

agement of Mr. W. A. Wilson of Salt Lake City. The Eureka was one of the rich producers of early days but has been idle for a number of years until reopened under the present management. It is developed with a steep inclined shaft on the vein that is two hundred and sixty-five feet deep with four levels. There is also a long adit tunnel driven on the vein, and independent connections between the different levels.

The ore occurs in shoots and lenses of clean massive mineral that runs very high in lead and silver, carload shipments showing as much as seventy per cent lead and one hundred and thirty ounces silver per ton. The best showing of rich ore is near the present bottom of the shaft. The vein is a very pronounced fissure in limestone and presents splendid possibilities for further development at depth. There are considerable resources of good concentrating ore exposed in the mine and three thousand tons piled up on the dump ready for treatment in a new sixty ton concentrating mill which was just about completed on the first of December and it was hoped to get it into commission before the close of the month. This is a strictly up to date plant and should make a high grade product from the character of the mineral it has to work on. The property is employing twelve men.

The Red Elephant.—About a mile west of the Eureka the Red Elephant mine, owned by the Quincy Junior Mining Company, was operating during the year with a force of twenty men under the same management as the Eureka, and made important shipments of good concentrates from the small mill with which it is equipped. The Red Elephant is looking well in its new lower workings which are quite extensive and new ore developments of importance may be expected from it as the work progresses.

The Nay Aug.—This property was quite actively developed during the year with a force of twenty men and shipped twenty cars of high grade mineral. A new and independent ore body was discovered on the course of the vein that seems likely to develop to considerable commercial importance. This is the third pronounced ore shoot contained on this property. The Nay Aug was operated in the early days and produced considerable rich ore. The old works have never been touched by the

present management, who have developed the present ore showings on virgin portions of the fissure since they took over the property two years ago. A deep adit tunnel has been projected which will be started and run this winter. This will undercut the three distinct ore shoots now known to exist, at considerable depth, especially the one in the old works, which are to be drained at a depth of fully two hundred feet below the lowest level. The ground along this fissure is easy and rapid progress can be made in driving the main tunnel, which will greatly facilitate the extraction of ore and is likely to open new ore channels along its course as the surface of the fissures is covered with debris and the two rich ore bodies now being mined have been disclosed by the present management and afford pointed examples of how incomplete the prospecting of this rich mineral field has been.

This property is owned principally by Portland capitalists. Mr. Charles E. Ladd of Portland, Oregon, is president; Mr. J. J. Williams of Hailey, Idaho, is vice president and general manager, and Mr. J. J. Chambreau of Hailey, Idaho, is secretary.

The Red Cloud.—The old tailing dump of the Red Cloud mine, west of the Nay Aug, was handled over during the year and ten cars of concentrates shipped to market that ran nine per cent lead, eighteen ounces silver and eleven dollars gold per ton.

Wolftone Mine.—The Wolftone group of six claims passed by lease and bond last July to the Eclipse Mining Company. This property had an important record of production in the early days. It carries a strong fissure in limestone quartzites and porphyry and an important system of cross veins.

A new tunnel is being driven on the course of one of these cross veins. It is now in five hundred feet, and three hundred and fifty feet more will bring the tunnel under the old work (where a large body of rich ore was mined) at a depth of four hundred feet.

The cross vein being driven on carries some ore and the surface indications are such that paying values may be encountered as it is extended, and the occurrence of an important body of rich mineral can reasonably be anticipated at the intersection with the main vein.

The ore shipments of this mine have averaged fifty per cent lead and one hundred ounces silver by the car. The present development is well advised and well justified by the showing and history of the property and has excellent prospects of developing a valuable mine.

The Democrat.—The Democrat mine, a short distance northwest of Hailey, was operated by a small force and shipped twelve cars of ore during the year, of which seven cars ran sixty per cent lead and one hundred and twelve ounces silver, and five cars of concentrates made by a hand jig averaged eighteen per cent lead and sixteen ounces silver.

The Dollarhide-Carrie Leonard Mines Company.—At the head of Warm Spring Creek, twelve miles west of Ketchum, the Dollarhide and Carrie Leonard mines were extensively developed during the year under the management of Mr. C. C. Ruthrauff.

The Dollarhide mines carries a well defined vein and a long ore shoot rich in silver, lead and zinc minerals and is equipped with a small concentrating mill which experience proves needs additional machinery for a more complete separation of the zinc and lead and was shut down late in the fall for that purpose.

This mine shipped fifteen cars of good concentrates during the season containing an average value of \$40.00 per ton and is expected to greatly increase this yield next season when the additional equipment has been supplied for the proper separation of the minerals.

At the Carrie Leonard mine this company is carrying on some deep development work and expects to have a Cal-low screen and settling tank installed at the mill with which it is equipped in the spring. The Carrie Leonard has been a large producer in the past but has been idle for several years until taken over by the present company and its anticipated re-entrance to the shipping list next season will be welcomed.

The Silver Fortune.—This is an interesting development enterprise that has been recently taken over by Mrs. C. E. Atwood of Boston and is now being carried on with a small force of men.

It consists of two patented claims that carry a large fissure containing high grade lead ore. The development of this property is very limited so far but has disclosed rich

ore at several points and the size of the vein and character of the mineral it contains promises some interesting results and is well worthy of extensive exploration.

Boulder Group.—This property consists of three patented and sixteen unpatented claims situated on Boulder Creek, a tributary of Wood River, putting in from the high Sawtooth Range above Ketchum, and has been developed during the year with a small force of men. It is owned by the Boulder Consolidated Mining Company, Ltd., of which Colonel M. W. Wood is president and general manager, and Mr. Leo F. Falk is secretary, and the office of the company is at Boise, Idaho. It is a combination of several important claims recently consolidated that carry a variety of interesting deposits of high grade silver-lead mineral in a formation of limestones, slates and shales. The ore occurs as lenses of clean mineral, and also in large bodies of disseminated ore that will make fine concentrating material.

The position of the veins, striking as they do into such an abrupt and high mountain mass as the group covers, afford remarkable natural advantages for adit tunnel work by which method they are now being developed and the interception of the defined ore shoots shown at the surface in the progress of these tunnels should mean extensive backs of mineral and the development of a profitable mining enterprise.

Ketchum.—There were several small leasing operations carried on around Ketchum during the year and one hundred tons of good ore shipped from that locality.

Muldoon District.—At this old district twenty-five miles east of Hailey there has been considerable development work in progress during the year, and at one of its properties an unusual and startling condition was encountered which but for a pure accident, or premonition, on the part of men in charge of the works, might have resulted fatally to two of them. This occurrence was the tapping of an enormous reservoir of water in the tunnel of the Idaho Mining and Improvement Company. This tunnel was being driven on the vein with two shifts of men and was at a point five hundred feet in from the portal and within one hundred twenty-five feet of being vertically under a shoot of rich lead carbonate and galena ore exposed in an upper tunnel. The night shift decided to

lay off on the first of November with a view of making a trip to town. During the night while no one was working, a great body of water broke into the tunnel, presumably at the face which had just passed a porphyry dike, and the flood continued for about forty hours under enormous pressure. The pressure and volume was such that it washed away the car, tools, shop, and a big dump which had been accumulating for a year, as if by magic. Just below the dump a grove of large fir trees, some of them three feet in diameter, were cut out and uprooted by the escaping flood and tossed aside like straws. It cut a gully down the side of the mountain to bedrock in places thirty feet deep, rolling over and pushing aside boulders of many tons weight in its course. It raised the creek out of its banks for four miles. The water was discolored and muddy like yellowish tailings. After forty hours the flow gradually decreased until at the present time there is a stream about one and half inches deep flowing out of the mouth of the tunnel. The tunnel is filled with mud and debris that tapers back to the roof at a point about seventy feet in beyond the entrance. Many pieces of what appears to be calcite casing and quartz crystals are mixed with the debris in the tunnel together with pieces of galena and carbonate ore. A spring which was formerly flowing on the surface nearly over this tunnel and which had been drained by it, has commenced to flow again, which leads to the assumption that the underground reservoir is not yet completely drained but simply choked and dammed up and when open will flow again.

A crew of men have been put to work to clean up this tunnel and underground mystery.

The finding of ore mixed with the debris leads to the assumption that the water came from a great underground channel that traverses the line of the fissure and probably replaced a large chamber deposit of mineral, an important residue of which may still remain and be available when the tunnel is cleaned out and the water completely drained off.

McConnell Mine.—At the old camp of Era, near Arco station on the Lost River branch of the Oregon Short Line Railway, ex-Governor McConnell has been developing an interesting deposit of concentrating silver-lead ore which carries good values in gold also. This mineral occurs im-

pregnating a porphyry dike that is over ten feet wide and said to average from seven to ten per cent lead together with several dollars per ton in gold and silver.

The Horn Silver mine, adjoining this property, had a remarkable surface deposit of high grade silver ore which was very profitably operated a number of years ago, but the company failed to find the same quality of mineral underground, and the enterprise with a fine twenty-stamp mill was abandoned.

The lead ores of that district were not much thought of at that day, but with the present high prices for lead and silver, they are becoming attractive to capital and may develop some considerable importance.

Little Lost River.—On the high mountain slopes north of Little Lost River traversing that end of Blaine County, there was considerable prospecting and development work in progress during the year and a number of handsome showings of lead, silver and copper minerals opened that may make shipping mines with further development in some instances.

The topographical features of the Wood River district, especially in the vicinity of Bullion, Bellevue and Hailey, with their steep outline and smoothly weathered mountain surfaces, closely resembles the topographical features of the Coeur d'Alene lead districts, with the exception that the mountains in this section, especially their southern slopes, are practically devoid of timber, while the Coeur d'Alene mountains are densely timbered.

Some of the Wood River fissures are very well defined and continuous for long distances, and while it is an undeniable fact that they have been faulted and disturbed by movements subsequent to the deposition of the mineral, many of them have been famous producers of high grade ore in their upper horizons, which, in the Minnie Moore, has been followed to a depth of more than one thousand feet on the dip of the vein, and in the light of the remarkable mineral development at great depth in the fissure deposits of our northern district, it would seem that the Wood River fissures were well worthy of extensive exploitation at considerably greater depth than development has yet been carried on at any point, for it has been proven that lead-bearing minerals occurring in fissure veins are remarkable for their staying qualities to great

depth. In this connection many of the old shallow workings of the Wood River district with a favorable surface history of production are well worthy of further investigation by capitalists and at many points promise profitable results.

BEAR LAKE COUNTY.

This county, situated in the extreme southeastern corner of the State, has formerly been noted, in a mineral way, for scattered deposits of copper ore in which limited amounts of high grade mineral has been found, but on the whole the deposits are low grade and no important shipments have been made in recent years. The county, however, has jumped into prominence in a mineral way recently by the discovery and location of some extensive tracts of land containing deposits of phosphate rock and a number of carloads of the mineral have been shipped. This is a desirable non-metallic mineral which is in great demand in the manufacture of high grade fertilizers and for other purposes. The deposits occur like flat dipping coal veins in sedimentary formations that have recently been identified as belonging to the upper carboniferous age. They are being developed to a limited extent after the manner of coal veins or other bedded vein deposits and it is evident from the class of capitalists that are interested in them that they are of prospective great commercial importance and may form the basis of a very profitable industry, as this valuable material is of limited occurrence in the United States and in great demand at rapidly advancing prices. These veins range from a few inches to ten feet wide of very dark colored phosphate rock and carry average values of sixty to seventy per cent calcium phosphate. The total shipments of this mineral during the past year amounted to 6,000 tons which was all mined without sorting and marketed in California.

BOISE COUNTY. ✓

The past year has been marked by an important number of new development enterprises in this famous old gold-producing county, and times have been quite lively by the revival of interest, especially among the old placer and quartz properties of the Boise Basin country.

Reed Diggings.—Probably the most important enterprise of the year in regard to work accomplished and definite prospects of important results in gold production, was the taking over of the old Reed Diggings and a lot of other adjacent property near Placerville by some Spokane capitalists on the advice of the well known mining engineer, Mr. Albert Burch of San Francisco.

This property embraces some of the richest old channel gravel and also original recent stream gravel in the Basin country.

The main bank on the Reed Diggings is from fifty to one hundred feet deep, of fine red glacial gravel containing hardly any coarse boulders. It was very thoroughly tested at considerable expense before the deal was closed, and found to contain average values of from thirty to forty cents per cubic yard. Lack of water has previously retarded the washing and treatment of this immense deposit of rich ground and it has had to wait for the exhaustion of the hydraulic diggings on Grimes Creek before the necessary water supply could be acquired and diverted to this point. Now, however, with such a great bank of rich gravel and plenty of water for its treatment, the proposition should prove one of the most profitable placer enterprises in the State.

The improvements made on this property during the year have consisted of digging fifteen miles of new ditch and cleaning out fifteen miles more of old ditch for the purpose of diverting the water of Grimes Creek over to the Placerville drainage. This work employed a force of one hundred men and a number of teams during the summer under the superintendence of Mr. E. S. Robinson. This ditch was successfully completed and the water conveyed through it last fall. In addition to this the diggings were completely equipped and fitted up with pipes, giants,

sluices, etc., all ready to start extensive operation in the early spring.

The proposition represents a combination of local interest with outside capital. It is incorporated under the name of the Boise Basin Hydraulic and Power Company, with a capital of seventy-five thousand dollars of a par value of one dollar each. It is a close corporation with no stock for sale.

Mr. Albert Burch of San Francisco is president and Mr. E. S. Robinson is superintendent in charge of the work. The other officers and directors of the company are Mr. J. Kennedy Hanley and Mr. A. M. Folsom of Spokane, Washington; Mr. D. W. Ross of Boise, Idaho, and Mrs. R. G. Wood of Placerville, Idaho.

The Woodburn Hydraulic Placers.—The well known old channel hydraulic mine at Idaho City owned by Mr. Harry Woodburn was successfully operated during the past season and made its usual handsome yield of gold at a good profit.

South Africa.—The largest new lode mining enterprises undertaken during the year is probably that of the Old Abe Mining Company at Idaho City. This property is locally better known as the South Africa, and consists of an immense mineralized zone in granite richly impregnated with gold-bearing iron oxide seams.

The zone is several hundred feet wide and is known to contain average values of two and one-half to three dollars per ton in free gold, while the management report that recent development has disclosed richer courses of mineral as large as twenty-five feet wide that run from six to ten dollars per ton.

The property is being equipped with a mill of one hundred tons daily capacity, most of which was on the ground late in the fall. This mill will consist of twenty ordinary stamps and two of the new Nisson pattern stamps, which are said to have great capacity. The work of installing the machinery was stopped in November owing to several carloads of the material getting mixed up in a wreck on the Rio Grande Ry. and the order had to be replaced, which caused a serious delay, but it is believed that all of the machinery will be supplied and the mill gotten into commission by early spring, and the consummation of this enterprise is being looked forward to with much interest locally.

Boulder Creek Mine.—A few miles above the South Africa, the Boulder Creek mines, including the Mollie McCarty, owned by the Moriarity Brothers, was bonded recently for one hundred thousand dollars to an eastern company, which has commenced work on the property and figures on getting the twenty-stamp mill with which it is equipped into commission next season. This property has quite a large amount of development and contains rich ore at several points.

The Gambrinus Mines.—A long power ditch was completed by the Garbrinus Mines Company on Elk Creek for the purpose of supplying power with which to run their mine in the Gambrinus district near by. This company's operations have been seriously retarded by being surrounded by high priced timber claims, making the cost of fuel excessively high at that point, and very little work was done on the mine during the year.

Gold Coin.—A short distance north of the Gambrinus mines the Gold Coin Mining Company, of which Mr. John H. Emery of Idaho City is manager, started operations of further developing their property and putting a mill on it which it was expected to have in operation by the first of the year. The company was employing about twenty men during December. The property is developed by a shaft one hundred sixty-four feet deep with several drifts and raises showing quite a reserve of good ore.

Hay Fork Mine.—This property, situated near the head of Moore Creek, was bonded during the year by Mr. Lee Bunch and is said to be opening up in a very promising manner and a number of shallow tracing cuts shows a continuous vein for over two thousand feet that in places contain very high grade specimen ore and is said to carry big milling values almost at every point where it has been opened.

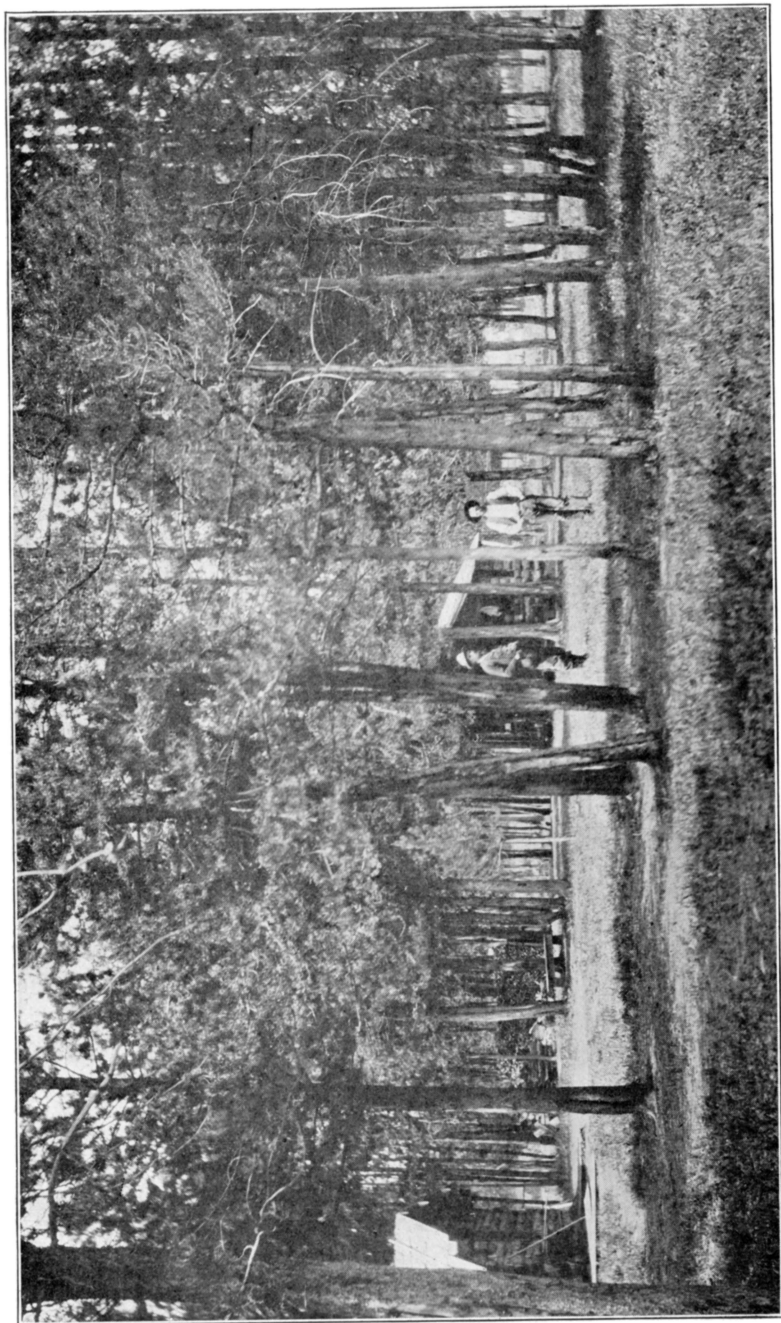
The Edna Mine.—This is an interesting deposit of silver ore of considerable size situated on the Banner road north of Idaho City. A large amount of ore has been blocked out and plans have been formulated for its treatment at the present time.

The Mary Lou Mine.—This mine was taken over by a development company during the year, which is running a twelve hundred foot tunnel to tap the vein at depth.

The Mammoth Mine.—This mine is situated twelve miles



SCENE NEAR WHARTON DAM, SOUTH FORK PAYETTE RIVER, BOISE COUNTY.



BLOOD'S PLACER CAMP, GOLD FORK OF NORTH PAYETTE RIVER, BOISE COUNTY.

east of Pioneerville and was operated during the year by a good force of men under the management of Mr. E. B. True.

The Banner Mine.—Considerable surface preparation was made during the year and plans formulated for the starting of a long cross-cut tunnel to tap this famous old silver property from the slopes of the South Payette River; the tunnel laid out is about one and a half miles long and when completed will undercut the old Banner workings fully fifteen hundred feet below the lowest level. This great cross-cut will also intersect thirteen other known veins, several of which have produced rich ore.

The Banner mine has yielded something like two million dollars in high grade silver ore and is said to have a shoot of very rich mineral in its lowest level. The ground was very wet and costly to mine on account of requiring so much pumping. The present enterprise, if carried through to completion, will drain the mine and greatly facilitate its further development and operation as well as the numerous veins associated with it.

Three men are employed on the property at the present time getting the tunnel started and arrangements made for the establishment of a plant of machinery with which to push the work.

The Belschazzur Mine.—The Belschazzur mine, situated near Quartzburg, has been quite extensively developed and has a large reserve of ore in sight. The property is equipped with an old ten-stamp mill which was moved from the Iowa mine. A number of practical tests were made during the year on ore taken from all parts of the mine which is said to have sampled \$10.20 per ton, but proved only forty per cent free milling.

This property is owned by an incorporated company of which Mr. Petro Hahn is president and Mr. John C. Boyd is secretary and treasurer. No. 517 Victoria Building, St. Louis, Missouri, is the headquarters of the company.

New contracts were let in the fall for six hundred feet of new work on the mine to be done in three different tunnels and the work is expected to be completed by spring, when the company intends to install a new mill of one hundred tons capacity with a cyanide plant attached to treat the tailings, by which method they are said to show good results.

The Moline Milling Company.—This company operated a large Risdon bucket elevator dredge quite successfully for several months during the past year, but the work was seriously interrupted part of the time by accidents to important parts of the machinery.

The ground being operated by this company carries big dredging values and its output of gold would have shown a large profit if the run had not been retarded by hard luck.

The Gold Hill and Iowa Mines.—This famous group of properties at Quartzburg remained practically idle during the year. It is reported to have changed hands recently and that extensive operations will be commenced there next season.

The property of this company is credited with a gold production of two million dollars. It has been opened by two vertical shafts to a depth of only four hundred feet and is locally considered as having a future of great promise for present day methods.

These mines were worked in the early days of the Basin with a very crude milling plant of twenty-five stamps which ran continuously for nearly twenty-five years.

The Sunday Mine.—Adjoining the Gold Hill, the Sunday mine has recently been developed to considerable extent and has exposed a fine reserve of good ore. The work has been carried down to a point, however, where its further prosecution would involve draining of the adjoining Gold Hill and Iowa works, which is too expensive an undertaking for the property to stand.

Ranch Hydraulic Mines.—The usual successful hydraulic season was enjoyed by these well known placer properties owned by Messrs. Leary and Brogan, near Placerville, and a large amount of gravel washed which made a big return of placer gold.

Grimes Pass.—Some rich gold-bearing placer gravel was worked during the season on Grimes Creek above Grimes Pass that yielded some large nuggets.

Parker Mine.—In the same vicinity, about a half mile northeast of the Pass, the Parker lode gold mine was quite extensively developed during the year, and employed a force of twenty men. This property is said to be showing fine ore bodies containing good values. It is being developed by a shaft and is likely to be more extensively

equipped in the near future as recent ore developments seem to warrant an increase in this line which will probably include a milling plant.

Missouri Mine.—This property carries a well defined vein in granite of rather base ore and is being operated by local parties under bond at the present time. It has produced a small shipment of high grade mineral and has considerable promise.

Wharton Power Plant.—North of Grimes Pass near Garden Valley on the South Payette River the Wharton power plant has been developed. The dam across the river has been completed and the water diverted through the sluices. The power house is now in course of construction.

This property has given employment to a large force of men and the management feels sure that it will be completed by early spring. It is expected to develop two thousand H. P. at low water stage. This power will be transmitted electrically to Centerville to operate the Union Company's dredging plant, and the line will be extended to other points in the Basin to supply power for other operation, a large amount of which has already been contracted for.

Bummer Hill.—At the old diggings known as the Bummer Hill, just above Centerville and along the creek below that point, an important investigation was started during the year for the purpose of testing the gravel for the rich contents of monozite sands and other rare earth they are known to contain. A Pinder concentrator was installed and run for several months which met with good success in separating the gold, monozite, etc., that the gravel contains. The test demonstrated a considerable area of gravel beds containing eighty pounds of clean concentrates to the ton of gravel in addition to considerable gold, and it is reported that a plant of one hundred tons daily capacity is to be erected next season. This enterprise is a result of the black sand investigation by Dr. David T. Day at the Portland Exposition.

Deadwood Placers.—At Deadwood Basin forty miles north of Placerville, an extensive tract of gold-bearing gravel was improved and equipped during the past summer under the management of Mr. R. G. Wood. Fifteen hundred feet of new ten-inch steel hydraulic pipe and two giants were packed in and put together, in connection with

six miles of new ditch and a fine reservoir, and a year's food supply put in late in the fall for the purpose of being ready for an early start in the spring.

This property is owned by Boise and Placerville people and comprises six hundred acres of good ground containing big hydraulic values which includes small channels of richer pay.

Deadwood is an old placer camp and was worked to considerable extent by the pioneers of from thirty-five to forty years ago, when it is said to have produced a large amount of gold, and with modern methods of treatment the ground should yield a handsome profit.

Gold Fork Placers.—This extensive property lying east of Long Valley on the Gold Fork tributary of the North Payette River was operated in a small way during the year. It was bonded late last fall to a well known dredging company which proposes to equip the ground with a drill rig and prospect it very extensively next season. This property comprises an extensive area of likely looking flat dredging ground. Some of its bordering bars have produced rich returns to small hydraulic operations and wherever bed-rock has been found in the flat ground it has shown to contain good values for a dredging operation.

The gravel beds of this stream like those around Centerville are also very rich in heavy concentrates consisting of monazite, zircon, ilmanite, and magnetite in addition to the gold, and strong traces of platinum. After thorough testing with the drill, if results prove satisfactory, it is probable that this will prove a scene of very extensive dredging operations that will last for years.

PEARL DISTRICT.

In the well known Pearl district, near the south end of Boise County, some important mining and milling results were accomplished during the year.

Lincoln Mine.—After many reverses, a successful method of economically treating the rather complicated ore of the Lincoln mine has been evolved by Mr. George Z. Edwards, the present manager. Mr. Edwards' extensive experience with cyaniding at the famous Mercur mine in Utah has been invaluable to the solution of this problem. The present method of handling the ore is by amalgamation and concentration, by which the fine concentrates containing most of the lead are separated and form a high

grade shipping product. The coarse concentrates are successfully treated by cyaniding after the elimination of the more refractory parts, with the result that quite a high extraction is made, amounting to seventy-five per cent of the total gold and silver values in the ore, far exceeding anything previously made in the district, and a great deal of credit is due to Mr. Edwards and his associates in solving this metallurgical problem to this extent, which they still hope to improve on.

The lower level of the Lincoln mine, three hundred feet deep, shows a continuous ore shoot one thousand feet long that averages four to five feet wide and eleven dollars per ton, and the company proposes to equip the shaft with a new hoist and sink deeper.

The mill was run quite steadily during the second half of the year and quite a large production made. It was forced to shut down, however, about the middle of December owing to the coal famine.

A new electric motor has been ordered and will be shortly installed to be connected with the Payette power line, which will supply the current for the whole operation of the property, and the prospects for the future successful operation of this property are bright with promise of continued success.

Black Pearl Mine.—This property was actively operated during the year under the management of Mr. R. B. Anderson, and seven hundred fifty feet of new work accomplished underground. The total development on this property, which is opened through a vertical shaft four hundred feet deep, is five thousand six hundred feet, and exposes a large reserve of ore of good grade.

The mill is of the Elspass pattern, and has not proven a very successful grinding device. The treatment employed has been concentration and cyaniding. Like the Lincoln, this is also a difficult ore to treat, and while considerable success has been obtained through persistent effort, it is believed that the extraction can be considerably improved upon, and the management is insistently working to that end, and after extensive investigation of the subject of treating similar ores at other points, the company have about decided to add a tube mill and rapid acting filter press to their plant, which it is believed will give the highest results on this ore.

Mr. E. E. Rodgers of 1410 Borland Building, Chicago, Illinois, is president of this company and Mr. F. C. Rodgers of the same place is secretary.

Leviathan Mine.—This mine, lying immediately above the town of Pearl, is owned by the Whitman Mining Company of which Mr. G. W. Short of Sedan, Kansas, is president, and Mr. W. H. Hutchings of Pearl is superintendent in charge.

The company is employing a force of eight men on development work, principally driving on the vein and opening up ore at considerable depth, and a total of eight hundred lineal feet of underground work was accomplished during the year.

The property carries a total development of two thousand five hundred feet, exposing some handsome bodies of ore.

The principal ore channel traversing this property is the same on which the Black Pearl and the Checkmate mines are developed, and is one of the strongest ore courses in the district and the ore development at this point promises to warrant a milling plant in the near future.

The management now has a thirty-ton car of shipping ore sacked ready for market that samples about eighty dollars gold per ton.

I. X. L. and El Paso.—Following the Pearl belt to the north, the El Paso and I. X. L. mines have been operated with small crews during the past year and considerable important work has been accomplished revealing ore bodies at several points containing good values.

The Kentuck Mines.—Further north, near the Payette River, on the same mineral belt, the United Mines Company operating the old Kentuck mine through a long cross-cut tunnel, employed a force of twenty men during the year and greatly extended its ore development.

This company operated a small concentrating mill for several months and made quite an important shipment of mineral.

It has been demonstrated, however, that the ore of this property can be treated by cyaniding, and the company is planning to ship several carload lots of its ore to different points for practical tests by this method with a view of embracing the most feasible plan in a new mill with which it proposes to equip the property in the near future.

The vein on this property has been tapped at a depth of nine hundred feet below the surface and where it was first encountered it was badly broken up by intersecting dikes. Subsequent drifting and connection, however, by raise through to the upper works together with intermediate levels has carried the development out of this disturbance and has revealed some handsome bodies of clean mineral four to nine feet wide containing far better values than were found in the shallow development of the upper levels, and the extensive ore showing in the mine has demonstrated the importance of deep work on the fissures of this belt and warrant the erection of a large plant for its treatment.

The Nellie Mine.—Adjoining the Kentuck to the north, the Nellie mine is being developed by a long cross-cut tunnel. This property employed a crew of eight men and has been continuously operated throughout the year. It is equipped with an air compressor and machine drills. The tunnel is now in one thousand five hundred seventy feet and from a recent careful survey made on the property, is expected to intersect the large vein with which it is traversed at a point eighteen hundred feet in from the portal.

The tunnel has recently passed through several important stringers or feeders of ore richly impregnated with iron pyrites, and from two to ten inches thick, respectively, that contain average values of from five to ten dollars per ton in gold, and affords significant evidence that the fissure will be well fertilized when encountered. The point at which it will be encountered is fully one thousand feet vertically under the outcrop. This vein on the surface is from eight to ten feet wide and carries average values of about ten dollars per ton in gold.

The Osborne Mine.—A short distance east of the Nellie mine, the Osborne mine, owned by the Idaho Gold Mines Development Company, was quite actively developed during the year, and employed a force of thirty men who accomplished fifteen hundred feet of underground work.

The property is opened through a shaft and several drifts, the lowest one at considerable depth below the level of the Payette River nearby, and is equipped with an electric driven air compressor and hoisting and pumping plant.

A long shoot of good ore is exposed in the mine and the

machinery for a mill of fifty tons daily capacity is on the ground but has not yet been erected. It is the anticipation of the management, however, to have this plant completed by early spring.

The headquarters of the company is No. 170 Broadway, New York, from where its affairs are directed by the Makeever Brothers. Mr. Robert H. Lilley is manager in charge at the mine.

Highland Valley Power Company.—On the new Atlanta road, a short distance above the mouth of Moore Creek, eighteen miles east of Boise, the Highland Valley Power Company is rebuilding its dam across the Boise River.

This important enterprise was partly destroyed by a flood before it was quite completed two years ago.

The primary purpose of this installation is to furnish power to pump water on to the company's placer bars near by, and to furnish power for commercial purposes at Boise and vicinity. A large force of men has been employed on this enterprise during the past year and it is rapidly nearing completion. It will develop when completed two thousand H. P.

The company's placer ground has been extensively tested and proven to contain coarse gold to the value of thirty cents to one dollar per cubic yard, with limited areas that contain much higher values.

CASSIA COUNTY.

Cassia County, situated on the southern border of the State, has recently been the scene of a large investment of capital in a mammoth irrigation enterprise and has received a rapid influx of population within the past two years. Its great sage brush plains have been watered by immense canals from the Snake River and hundreds of successful homes established.

While Cassia County is not noted for its mineral output, it produced a small amount of gold from the fine gold

placer bars along the Snake River and has some good metal veins in the high mountains south of Albion containing good values in gold, silver, lead and copper and accompanying a limestone belt along its foothill borders some remarkably fine lead float is occasionally found, indicating valuable deposits of that mineral.

At the Cumora mine on Connor Creek, considerable development work was done during the year and the ore showing is reported to have been greatly improved.

The non-metallic minerals of Cassia County may prove of large commercial importance in its future industrial development.

These consist of extensive deposits of pure limestone, clay and shale situated in the foothills near Oakley and Albion, and in the headwaters of Goose Creek near the Nevada line, which if brought together at an economical transportation cost, would form the basis of a Portland cement factory.

The Goose Creek plateau is underlaid by a vast area of large seams of lignite, and while none of these have so far developed commercial importance their further intelligent investigation may reveal important resources of domestic fuel, as the conditions under which these lignite beds occur in the recent tertiary sandstones and immense bodies of overlying lava are very favorable to this end.

CUSTER COUNTY.

Custer County, situated in the rugged mountain mass of central Idaho and drained principally through the Salmon River and its numerous tributaries, is favorably constituted geologically for the occurrence of rich metalliferous minerals, which as a matter of fact occur and are widely distributed over its area and have been mined in past years very successfully at a number of points producing a gross value of something over thirty million dollars in gold, silver, lead and copper.

The western half of this county consists principally of granite and eruptive igneous rocks of great variety.

The eastern half consists largely of altered sedimentary formations extensively fissured and intruded with igneous formations.

This county has been noted in the past for ore bodies of exceptional richness, and its reputation in this respect has been substantially maintained by the discoveries of the past year.

Golden Sunbeam Mine.—The Yankee Fork Mining district, consisting of rugged mountain masses of andesite, syenite and rhyolite formations with a variety of their tuffs and breccias, has been noted in the past for some famous gold and silver milling ore bonanza veins, including such well known properties as the Custer, Lucky Boy, Badger, Charles Dickens and Montana mines which have a combined bullion record of ten million dollars.

The upper horizons of these famous old properties have been exhausted and they have been idle as regards production for several years.

The reputation of the district was such, however, to warrant the maintenance of considerable prospecting work, and faith in its future, on the part of the smaller owners, which resulted during the past year in the discovery of a new ore body on the Golden Sunbeam mine that is now manifesting bonanza values and proportions.

This property is situated on Joardan Creek near the Montana mine and has been operated in a desultory manner for three years. It is located on a mountain mass of altered and brecciated rhyolite near one of the main eruptive centers of the district that has subsequently been fissured and permeated with gold-bearing solutions to the extent that the whole mountain side, covering an area of fully two hundred acres, carries low values in gold and silver with defined stringers and fissures of more solidified rock containing richer values.

Operation of the Sunbeam prior to last spring was not very successful owing to the low values of the ore available. The property was equipped with a small Elspass mill and several runs have been made, but the ore was too low grade to pay much profit. In searching for better values, however, Mr. C. E. Gable, the manager, extended one of his tunnels into a new ore course about a year ago that

contained very high grade rock and has since developed a very large shoot which, according to recent reports, has proven a width of thirty feet and a length of over two hundred feet carrying a pay streak ten feet wide which gives milling values in free gold of from fifty to one hundred dollars per ton. Several test runs have been made in the small mill on the property during the past year, demonstrating this tenor in a practical way, and resulting in the production of several thousand ounces of precious bullion, while the great body of mineral accompanying it is of much higher grade than anything formerly worked by the company. The ore is characteristic of the district. It consists of a soft porphyritic rock with fine lines and casings of blue quartz and occasional small vugs and spots of blue silver sulphide mineral. Handsome specimen ore is found in the mass richly sprinkled with light colored native gold that runs up into thousands of dollars in value per ton.

The development of this rich ore body has created quite an interest in the old district and several new stock companies have been formed to develop the territory adjacent to the Golden Sunbeam.

The North Sunbeam Gold Mining Company.—This company has a long cross-cut tunnel under way that is expected to tap the same bonanza ore course during the winter that is being developed on the original Sunbeam ground.

The North Sunbeam Gold Mining Company is incorporated with three hundred thousand shares of a par value of five dollars per share, and Mr. W. T. Oster of Custer, Idaho, is president and general manager.

Several other adjoining properties are known to contain rich ore and in fact have been partially developed in previous years, and other important ore bodies are likely to be discovered in this interesting mass of gold bearing formation, and the further development of these properties seems destined to renew the former glories of this famous old gold producing district.

Oxarna Mine.—Another important new mining enterprise was started during the past year by the Oxarna Gold Mining Company, Ltd., which has acquired a large group of claims adjoining the territory of the Lucky Boy Com-

pany on Custer Mountain which has previously been the richest center of production of the Yankee Fork District.

This company is employing fifteen men and is operating a twenty stamp mill with Wilfley tables and a canvas plant.

The group has a total development of fifteen thousand feet, of which four hundred and ten feet was done during the year. It is reported to have recently exposed some new ore shoots of large size containing milling values of ten to thirty-five dollars per ton in gold and silver.

This company is incorporated for one million shares of a par value of one dollar each. The head office of the company is at Delphos, Ohio. Mr. George Coryell of Custer Idaho, is president, and the secretary is Mr. W. E. Floding of Delphos, Ohio, and Mr. Reginald Coryell is manager at the mine. The company are now running an eleven hundred foot tunnel for the purpose of developing their main ore bodies at a further vertical depth of 300 feet.

Lost Packer Mine.—At the Lost Packer mine on Loon Creek, twenty miles northwest of the Sunbeam property, the company completed the erection of a hundred ton smelting furnace last spring and the plant was blown in early in the summer, but through an accident to the furnace within the first shift of its operation the run did not prove a success and it was reported that it would be impractical to readjust the plant and get started again before winter set in. This proved a serious disappointment, as the Lost Packer is one of the richest deposits of high grade copper-gold ore that has been found anywhere in the west, and a big production was expected from it.

This mine carries a pronounced fissure vein of large size, cutting a formation of eruptive granite with dikes and flows of aplite and hyolite. It carries a pronounced pay streak of nearly clean chalcopyrite that has been extensively developed in length and depth by six adit tunnels with underground connections and carries average values of three to five ounces gold, ten to fifteen ounces silver and fifteen to thirty per cent copper. A 100-pound specimen of this rich ore is now on exhibition in my office.

The property was equipped during the year with an air compressor and machine drill and has carried a large force on development and its resource of high grade minerals

are now said to aggregate something like two million dollars in gross values.

It is reported that the smelter has been readjusted and will be put into commission as soon as the hauling season commences in 1907. Its successful operation should mean a very important increase in the metal output of this county.

Mr. James Ivers of Salt Lake City, Utah, is president of the Lost Packer Company, Mr. Henry Welch of Park City, Utah, is secretary, and Mr. P. Sheahan is manager in charge at the mine.

The Loon Creek District is very extensively fissured and carries quite a number of fine mineral showings, also some extensive tracts of coarse gold placer diggings which have been recently taken over by a Salt Lake company, and are to be extensively equipped and developed in the near future. The other ore showings of the district have not been very energetically developed and seem to have waited the encouragement of the Lost Packer's successful operation and ore treatment.

The district was famous as a placer gold producer thirty years ago, and until the discovery of the Lost Packer in the summer of 1902 was not looked upon as a favorable field for lode mining which demonstrates the extent of undeveloped and favorable mineral territory the interior portion of the State contains.

The Idaho-Montgomery Mines.—At Washington Basin near the head of the east fork of Salmon River, the Empire group of mines was sold during the year to the Idaho-Montgomery Mining Company, of which Mr. Joseph Montgomery of Hailey is president and general manager. This company is incorporated for one million shares of par value of one dollar per share and the enterprise is backed by some Bull Frog, Nevada, capital. The company is working twelve men on development.

This property has been developed by its owner, Mr. George Blackman, single handed most of the time, to a considerable extent during the past fifteen years and his successful disposition of it at a good figure is a fitting reward for his enduring faith in its merits.

This property carries a remarkably interesting deposit of gold bearing mineral consisting of a big zone of quartz

and silicified gangue in walls of eruptive granite. There and seven parallel veins traversing the property that range in width from ten to one hundred feet richly mineralized containing gold values all through associated with a variety of sulphides including pyrites, pyrrhotite, native bismuth, nickel and cobalt minerals.

The bismuth ores are usually associated with high values in gold and silver and big bodies of mineral are said to have been disclosed since this company took hold of the property, that show average values of from six to twenty dollars per ton, while selected ores yield very much higher returns amounting to several hundred dollars per ton in some instances.

The company intends to continue its development steadily until next spring, when it is believed that a large mill will be justified and constructed.

Washington Basin is surrounded by a circle of very high mountain summits carrying some of the loftiest elevations in the State that are principally composed of altered sedimentary formations.

The mountain on the south side of this Basin carries the rich gold and silver bearing lead ore veins of the Bible-Back, Idahoan and other mines, which have a shipping record amounting to several hundred thousand dollars of high grade smelting ore, and the geological conditions of this locality are favorable for important mineral developments.

Washington Basin is conveniently reached by way of the Stanley Basin Road from Ketchum.

Valley Creek Mine.—Near Stanley Basin, the Valley Creek mine was operated during a part of the summer and a considerable amount of ore worked in the twenty stamp mill and cyanide plant with which it is equipped, which resulted in the production of considerable bullion.

This property carries a large vein of ten-dollar gold ore but its association with a little lead makes it rather difficult to treat and a satisfactory extraction of the values has not been made so far. It is anticipated that with additional machinery this difficulty can be overcome and that the mine will become an important producer as it contains good values and large bodies of ore.

Greyhound Mountain Mine.—The management of the

Greyhound Mountain mine are constructing a wagon road from the State wagon road near Cape Horn to its property at Greyhound Mountain. This property has an extensive development of gold-bearing pyritic ore in a large fissure vein five to fifteen feet wide. It was equipped with a small matting furnace, but the excessive cost of getting in coke fuel, which had to be packed on mule backs from the State wagon road near Cape Horn to the mine, a distance of fifteen miles, was too costly to justify further operation. The management have built quite a piece of the wagon road during the past summer, which, when completed, will greatly reduce the cost of hauling material for the property as well as for the adjacent Seafoam and Sheep Mountain districts. This road was made a toll road and should well justify the cost, as the Greyhound and neighboring districts are richly mineralized with smelting ores that invariably carry high precious values.

There are a great many claims owned in that section that have been faithfully represented for the past twenty years. Prior to the big drop in silver, this region produced quite a lot of shipping ore which was packed out to Stanley Basin, then hauled to Ketchum for treatment when the Philadelphia smelter was in operation. The construction of a railroad through that part of the State would develop a very important resource of mineral traffic and doubtless result in the development of a number of its handsome prospects into paying mines.

The Greyhound property is owned by an incorporated company and its shares are largely held by mining men of Boise who have the utmost faith in its future.

Payette Lead District.—This interesting district and its monster fissure veins carrying lead-silver values, situated at the head of Stanley Lake Creek in the Sawtooth range and over on the Payette slope has not yet justified its early promise. A long cross-cut tunnel was driven during the year which intersected one of the principal veins of the system at a depth of two hundred feet. Some ore was found on one wall of the vein which proved to be thirty feet wide, but no drifting was done along this course.

This property is owned by Omaha capitalists, and it is understood that the work will be taken up again next spring and the vein further tested by drifting both ways for an ore shoot.

Several other mines in this locality were worked to some extent and assessment work done to carry their title.

The district has a number of handsome surface showings and it is still believed will develop important ore bodies.

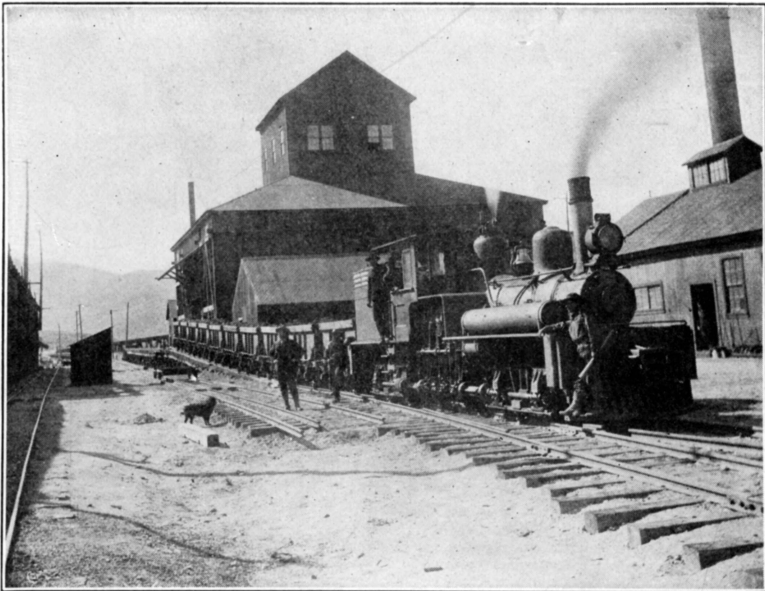
Lead Silver Mines.—Excepting some small crews on development work and leasing operations, Custer County's famous lead-silver belt extending from Slate Creek to the head of Garden Creek near Challis, experienced a dull year. This belt of country has some famous old silver-lead producers and also some large resources of developed ore. Its properties were practically put out of commission by the silver slump in 1893 as they are all remote from railway transportation and involve a wagon haul of from fifty to seventy-five miles, which was justified when silver was worth over one dollar an ounce, and several successful mining enterprises were in progress, but the heavy slump in values of their principal product was more than they could stand at such a distance from market and the chief producers have since remained idle most of the time awaiting better conditions of transportation, or rise in price of their products. The recent marked increase in lead and silver values has had a tendency to call attention to these important resources of high grade smelting ore, and a big consolidation of interests in this section is now being negotiated. Several of the principal properties were examined by expert talent during the year to this end and it is sincerely to be hoped that the results will justify the reopening of these mines, which are capable of furnishing a very important output of the high grade silver-lead minerals.

White Knob Mine.—The most important mining operation in Custer County during the past year in the matter of production was the operation of the Macbeth lease on the White Knob mine at Mackay. This venture enjoyed a very successful year. The lease is in the hands of energetic and practical people, its management being under the personal direction of Mr. Frank M. Leland, who is president and general manager of the leasing company.

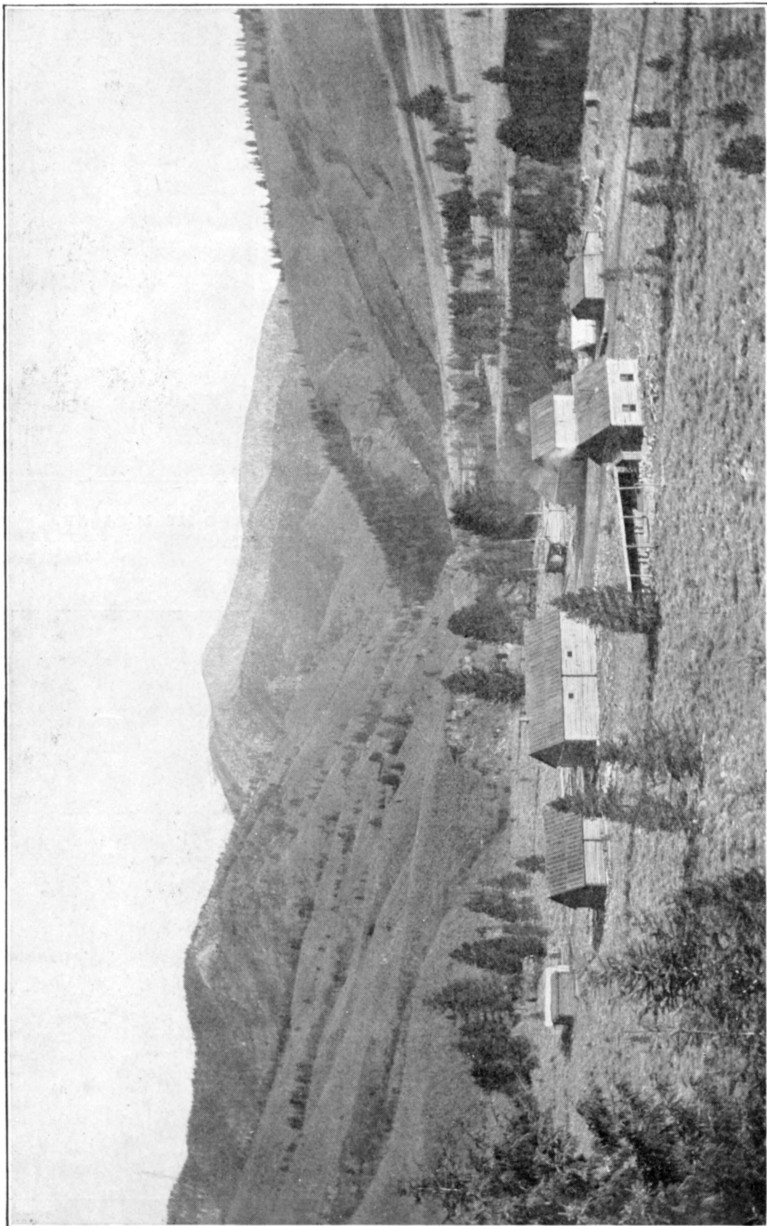
This company worked a force of one hundred men on the White Knob mine after the smelter shut down in the fall of 1905 until March, 1906, and succeeded in developing some extensive bodies of good copper ore, principally in the vicinity of the surface croppings of the deposit.



WHITE KNOB SMELTER, THE TOWN OF MACKAY AND MT. M'CALAB,
11,000 FEET HIGH, CUSTER COUNTY.



SHAY GEARED LOCOMOTIVE AND ORE CARS AT WHITE KNOB
SMELTER, CUSTER COUNTY.



LOON CREEK, NEAR THE LOST PACKER MINE.

The smelter was started in March, and in spite of a disastrous fire which destroyed the entire sampler, machine shop and Shay locomotive, causing the financial loss to the leasers of nearly one hundred thousand dollars, they nevertheless got through fifty thousand tons of ore during the year, which averaged over four per cent copper, together with important values in gold and silver. A creditable showing for a property that had previously established such an unenviable reputation, and speaks volumes for the ability of the men in charge. It justifies, in a measure, the writer's numerous boasts of the possibilities of this deposit and of the probable importance of Custer County's copper resources, and the judgment of the original manager of the White Knob Company, who designed the big smelter with which the property is equipped, to work the surface ore showings that have been mostly responsible for the successful run of the past season. The White Knob carries an interesting display of copper carbonate and oxide minerals scattered over a flat bench of nearly forty acres in extent on a high spur of the White Knob Mountain. The most conspicuous feature of the original surface cropping is an immense body of pure hematite and magnetite iron ore near a contact of eruptive porphyritic granite and pure blue limestone. This contact shows an extensive development of garnet rock and soft gray porphyry with which the ore bodies are associated. They occur in very irregular manner in pockets, kidneys, streaks and lenses over the area described and are mined in big open cuts and quarries.

The property has been developed by a vertical shaft seven hundred feet deep which was subsequently tapped by a long crosscut tunnel and several large bodies of ore were disclosed underground which, however, were mostly low grade and still largely retain their altered condition at this considerable depth. No very extensive drifting was done, however, along the contact line and it is possible that the true vent of the big ore showings of the surface has not yet been disclosed underground. The surface deposits on the property were quite extensively developed under the original manager's administration, an electric railway was built right up to the quarries, and a steam shovel purchased for the economical handling of the ore in the surface work. The trackage and equipment of this electric

railway above the Albert tunnel and the steam shovel were sold off for junk by the last administration on the White Knob prior to the present lease and an attempt was made to convey the surface ores down through a system of raises to the Albert tunnel level seven hundred feet below. This proved impractical, however, and the leasers installed a surface gravity tram during the early part of the summer for handling this most important source of their ore supply down to their big loading bins at the Albert tunnel level from where it was hauled by Shay geared locomotive to the smelter at Mackay, six miles below, over a six per cent grade.

As originally designed, the White Knob smelter, which is of two stacks with a daily capacity of six hundred tons, was intended to make blister copper direct for which method of smelting the ore is especially adapted. Subsequent managers of the property, however, changed the design to a matting plant under which method it is now operated by the leasers, who have to ship in iron sulphides from Bingham, Utah, with which to mix the ore to furnish enough sulphur to make matte. The resulting product reduced from this operation runs about forty per cent copper and from thirty to fifty dollars per ton in gold and silver.

Mr. James C. Climo is the superintendent in charge at the smelter and his slag losses are said not to exceed one-fourth of one per cent when running an average feed of from four to six per cent ore and using thirteen per cent coke fuel.

The leasers have been running only one furnace and treating about two hundred tons of ore a day.

The success of this enterprise has put new life into the town of Mackay throughout the year and afforded an important source of business traffic to the Lost River branch of the Oregon Short Line. It has stimulated interests in other adjacent copper properties in the Mackay District, and in fact, in the whole Lost River section, where considerable new mining work is in progress on a number of other very promising prospects.

Copper Basin Mines.—At Copper Basin, about thirty miles west of Mackay, there exists another important deposit of copper bearing ore that is quite extensive and is largely of the same type as the White Knob with great

croppings of iron ore at the surface associated with copper carbonates, oxide and occasional kidneys of pure bornite. This property, consisting of twenty-one claims and owned by some well known Idaho business men, among whom are Messrs. Reed and Davidson, prominent ranchers of Lost River; Colonel Sharp of Hailey, Mr. Abe Pierce of Pocatello and others, was bonded during the summer for one hundred thousand dollars to Mr. W. H. Plummer of Spokane, Washington, and associates of St. Louis, Missouri, who have put a force of men to work on the property, and plan its extensive development.

These mines have had considerable preliminary prospecting work done upon them and show rich copper values at a dozen different points and their extensive development is likely to disclose another important source of good smelting ore.

Other Prospects.—In the high mountains which form the east extension of the Sawtooth Range immediately south and west of Copper Basin there are a number of very handsome prospects in places showing high values in clean copper and zinc sulphide ore, in others, copper, zinc, iron sulphides combined, and also some prospects showing clean galena. These minerals are invariably associated with important precious values and while they are nearly all in the preliminary prospect stage, they present some splendid opportunities for the investment of capital in working options which can generally be obtained on favorable terms and offer an attractive field for the mineral investor.

ELMORE COUNTY.

Elmore County turned a new leaf in mining progress during 1906, which is likely to prove the most interesting page of its important mining career. The mining products of this county are principally gold. The formations of its northern half are principally eruptive granite traversed by numerous porphyritic intrusions. The topography north of the Snake River plain is rough and rugged but well

watered and timbered and affords excellent natural facilities for economical mining.

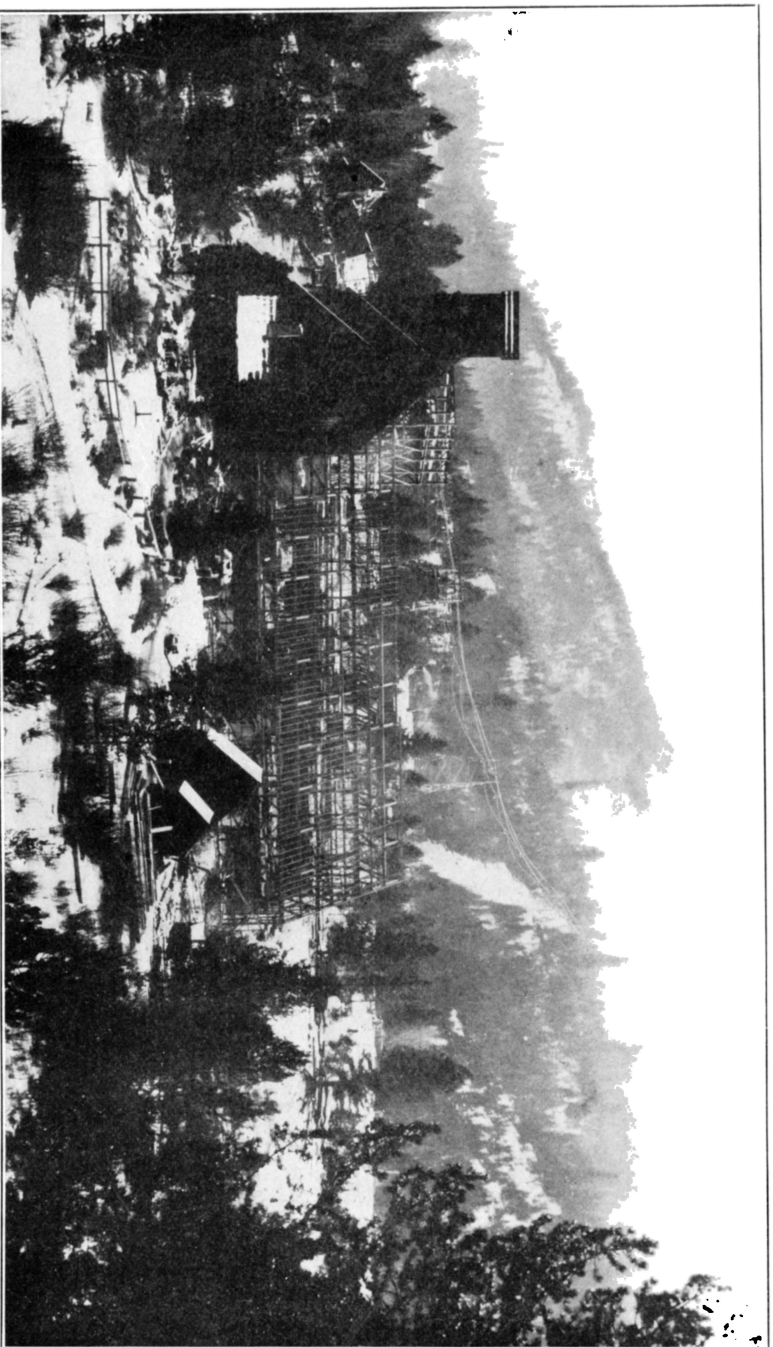
Its mines have been noted for the production of high grade ore and rich placer gold values and many millions of dollars worth of precious bullion have been shipped, particularly from the vicinity of Rocky Bar and Atlanta, both of which were populous and productive camps twenty to thirty years ago.

Atlanta District.—The Atlanta lode, which carries some of the most productive old mines in the Atlanta district, is one of the largest and most pronounced ore-bearing channels in the State and has been compared by well known geologists to the Comstock lode of Nevada for its size and persistency. It is associated with a number of lateral fissures that in several instances have been good producers, and one of them, the Minerva mine, is making a fine output of gold at the present time.

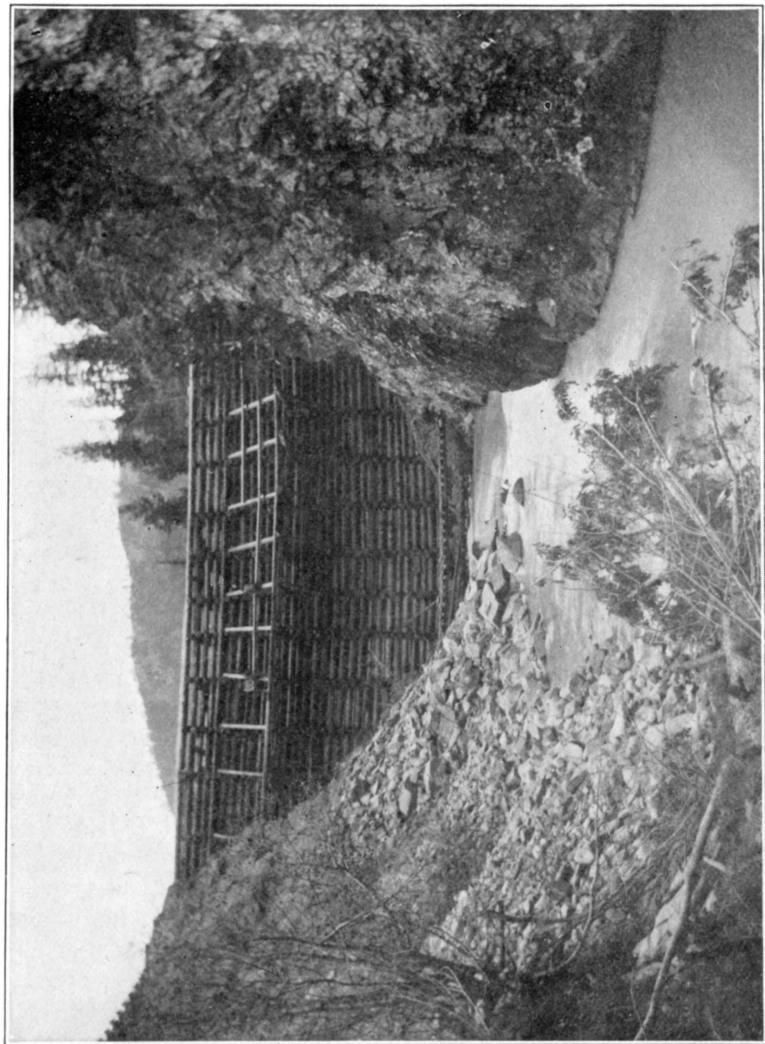
Monarch Mine.—The central and choicest section of the great Atlanta lode is owned by the Atlanta Mines Company, of which T. N. Barnsdall, Esq., the well known Pittsburg capitalist, is the principal owner, and Mr. Daniel Kirby is general manager and under whose personal charge the property has been extensively reopened and developed during the past four years through a vertical shaft, six hundred feet deep, with long levels at one hundred foot intervals in the shaft, and also a long surface adit.

This great lode traversing this property, which is locally better known as the Monarch mine, is from fifty to one hundred feet wide, of altered porphyritic gangue in granite walls and carries two defined ore veins of shattered quartz separated by an intrusive dike of basic igneous rock. These quartz veins invariably carry a wide border on one or both walls of distinctly blue quartz in which the better values are contained. Based on values of five dollars per ton, this property now has developed and in sight, through its shaft works together with the long adit tunnel fully one million tons of ore.

The pronounced pay borders, however, on these big veins that range from five to thirty feet wide contain average values of ten to thirty dollars per ton and quite an extensive reserve of this class of mineral is available. The proportion of values in the ores range about sixty per cent gold and forty per cent silver.



NEW AERIAL TRAM AND MILL UNDER CONSTRUCTION, ATLANTA MINES CO., ATLANTA, ELMORE COUNTY.



ATLANTA MINES CO.'S NEW POWER DAM BELOW ATLANTA IN COURSE OF
CONSTRUCTION, ELMORE COUNTY.

The ores carry traces of antimony and arsenical pyrites and coarse yellow sulphurets of iron, the latter very rich in gold. The mineral is rather difficult to treat and for this reason the mine has not produced largely since the early days, when its enriched surface horizons are said to have yielded secondary ores of very high value that were the chief source of the district's output.

This mine has been fortunate in falling into such strong financial hands. Extensive and repeated tests of large lots of the ore have been submitted to expert metallurgists during the course of the recent development of the mine with the result that a year ago a new mill and other large mechanical equipment was decided upon. These are now all on the ground and are rapidly being placed in position. They consist of a new aerial tramway a mile and three-quarters long which was completed in November and successfully tried out. It has a carrying capacity of twenty-one tons an hour and when in full operation develops forty-two H. P. for use elsewhere. It is of the latest design and carries some important mechanical attachments by which a speed can be governed to a nicety. This tram extends from the Monarch mine, near the summit of Atlanta ridge to the new mill on the Boise River.

A dam has been built across the Boise River and an electric power plant installed capable of developing six hundred H. P. This will supply power to run the air compressor and hoist at the mine, and will also furnish the necessary additional power required to run the mill and leave some for sale to other companies.

The mill, which is now nearly completed, is of one hundred fifty tons daily capacity, and is adapted for treating the ore by amalgamation, concentration and cyaniding, which method has been found to give the highest results of extraction.

With this plant completed and in full operation together with other enterprises under way in the Atlanta district, Elmore County is destined to make one of the most important advances in gold production of any county in the State, and the county is to be congratulated in securing the liberal class of investors and practical operators who have recently become interested in this and other of its mining resources.

Pettit Mine.—Adjoining the Monarch mine to the east,

the Pettit mine on the same lode and ore courses is developed quite extensively by three adit levels and numerous raises and underground connections which has completely blocked ready for extraction ore to the gross value of something like one million dollars, which averages about fourteen dollars per ton in gold and silver. In this direction on the lode the gold tenor of the ore increases and amounts to fully ninety per cent of the combined values, otherwise the ore and veins of the two mines are practically identical, and the lower adit face of the Pettit is within one hundred feet of the long upper tunnel heading of the Monarch mine from the opposite side of the mountain and in a lode of such pronounced strength and permanency this fact practically insures a continuance of the values and ore resources of the Pettit to a further depth of five hundred feet, which would match the lower level of the Monarch mine. This is a strong prospective feature of the Pettit and greatly enhances its value.

The Pettit mine was sold last fall to the Bagdad-Chase Gold Mining Company of Rochester, New York, of which Mr. Wayne Darlington is manager and Mr. C. E. Stevens is superintendent in charge.

This company has commenced the erection of a fifty ton mill which will use the same process as that designed for the Monarch mine. This mill will be strictly first class and up to date all through, and will be run by electric power supplied by the Monarch power plant. The impossibility of obtaining material and machinery and getting it hauled before winter closed in is seriously retarding this enterprise, but everything is being done towards its construction that can be, and next summer will see its completion. In the mean time development is being continued at the mine.

East Atlanta Mine.—The Pettit mine by no means terminates the eastern extension of the great Atlanta lode, as it continues for several thousand feet further to the east and has been found ore bearing at several points in that direction, particularly on the East Atlanta, or Old Chunk mine, where a tunnel of considerable length has been run, and ore discovered containing high values in gold, and a further development of this portion of the lode will doubtless reveal important ore resources.

Minerva Mine.—South of the Monarch mine, over the

crest of the Atlanta ridge, the Minerva mine is developed by a total of twenty-six hundred feet of cross-cut tunnels, drifts and raises, of which six hundred fifty feet was driven during 1906.

This property carries two large fissures containing big shoots of fine milling ore, five to fifteen feet wide, consisting of a shattered quartz and talcy gangue that averages about fourteen dollars per ton in gold and silver, of which a high percentage is gold.

The ore is mined in overhead stopes with square set timbering. It is conveyed through a long cross-cut tunnel from the mouth of which it is transferred by a Leschen two bucket aerial tram to a mill lower down the mountain side on the Yuba River slope.

The mill is of ten one thousand pound stamps, equipped with copper plates and one Wilfey concentrating table. There is also a cyaniding plant in course of construction to treat the tailings, which contain about half of the gross value of the ore, the balance being saved as free gold on the plate.

This mill was not run to its full capacity, but nevertheless made a large production of precious bullion during the year and affords a handsome demonstration of the importance of deep development on the fissures of this district. Before the long tunnel was run that tapped the ore bodies of this mine at a depth of several hundred feet, the proposition was looked upon in a skeptical manner, for the cropping of the vein and its shallow developments were very badly shattered, disturbed and low grade.

This company is running its mill with steam power and using cord wood fuel at a cost of five dollars per cord. Its new cyanide plant is of the Gavin type and of forty tons a day capacity, and it is proposed to install water power with which to operate the entire plant during the summer of 1907.

The cost of timber at this mine is six and one-half cents per lineal foot, and lumber is twenty-three dollars per thousand. The cost of transporting supplies from the railway ranges from one and a half to three cents per pound, according to the season, which will give an idea of the conditions under which this camp has operated.

The Minerva mine and mill employs an average of about thirty men, and the wages for miners is \$3.50 per day of

eight hours; laborers, \$3.00 per day; timbermen, engineers and blacksmiths, \$4.00 per day of eight hours. Mr. W. C. McElheney of Pittsburg, Pa., is president of the company. Mr. W. J. Keough of Atlanta, Idaho, is superintendent in charge of the work.

Other Mines.—Among the other Atlanta mines that were operated to limited extent during the year and have considerable ore resources and future promise, are the Jessie Benton and Atlanta Eagle mines; also the Tahoma mine, both lying north of the Monarch. The latter property was unfortunate in getting tangled up by a company of irresponsible promoters. It has been quite extensively developed in former days and produced a good deal of pay ore, and merits reopening and further extensive development.

The Atlanta Eagle Company's plans were interrupted by the San Francisco disaster, where the owners of this property reside. This property has two good veins, in which important ore shoots are known to exist, and I am informed that the affairs of the company have been adjusted, and that extensive development of the property will shortly be undertaken.

BLACK WARRIOR DISTRICT.

Rico-Mammoth Mine.—The most important operation of the year in the Black Warrior district, twelve miles north of Atlanta, was at the Rico-Mammoth mine, where a force of twenty to thirty men were employed during the summer and considerable development work done on the property, which is reported to have disclosed a pay streak of very rich ore in the vicinity of the original discovery of the mine. This work is being continued this winter. A small Ellspass mill was completed on this property during the summer, which proved, however, poorly adapted for the treatment of its ore, which is a hard quartz and needs stamps for its successful reduction to pulp. This mine also has a small saw mill and several good camp houses. It is owned by the New Century Exploration and Investment Company of Chicago, Illinois. Mr. J. W. McCoy is president; Mr. T. T. Watson is secretary, and Mr. J. T. English is manager of its Idaho mines.

This company owns two other groups of claims in the Black Warrior district on Little Queen's River. They are known as the Upper and Lower Queen's River groups, and

have a total of twenty-two hundred feet of tunnels and raises that have exposed several ore shoots in places of good width and carrying values ranging from seven to ten dollars per ton with occasional specimen values that run very much higher.

The ores of these mines at a shallow depth below their croppings are rather base and will need considerable handling in addition to plate amalgamation to get their values.

The machinery for two Kinkead mills and a small saw mill is on the ground at the Lower Queen's River group, and the company is planning to erect this machinery next summer.

Red Bird.—On the northwest slope of the main Black Warrior Creek near the Little Queen's River divide, the Red Bird group of claims was acquired during the year by the Blue Cap Mining Company of Cleveland, Ohio.

This property carries a well defined vein three feet wide that contains average gold values of fifty dollars per ton, which has been maintained from the surface to the bottom of the sixty foot shaft. A new cross-cut tunnel is now being extended to tap this fissure at considerable depth below the bottom of the shaft.

This property was equipped with a five ton prospecting mill supplied with a concentrating table and copper plates, and with which several test runs were made which demonstrated that the ore is rather difficult to work, as the results produced only show a saving of eight dollars in free gold to the ton on fifty dollar ore. The ore, however, produced a result of a little better than one-half of one per cent concentrates that carry very high values. A four hundred pound lot of these were shipped that yielded gold at the rate of four hundred dollars per ton. A subsequent test from the same ore showed values of fifty to sixty cents per pound in gold.

In addition to these rich concentrates, the coarser sand in the tailings contain high values in gold, but with fine grinding prove to be very susceptible to cyanide treatment and a combination wet process will probably be involved in the successful reduction of this ore. Mr. Ed. Schwerd of Boise is manager of this company.

Imperial.—This claim is owned by Boise people and is situated three thousand feet southwest of the Red Bird on

the same mountain side. It is also developed with a shaft sixty feet deep and carries a pay streak twenty-eight inches wide of fifty dollar gold ore. Like the Red Bird, the ore is difficult to treat and does not yield any better results to amalgamation.

A recent run of eight tons made from this claim gave nine dollars per ton in free gold and some very high grade concentrates.

The formations of the Black Warrior district are principally soft gray granite with numerous dikes of diorite and quartz porphyry, large and small, together with zones of gold bearing granitic rock of great width that carry low values, but might be made to pay handsome profit if handled on a large scale. These are accompanied with a number of small veins containing rich specimen ore.

Pathfinder.—Near the mouth of Little Queen's River, the Pathfinder group of claims is traversed with a large fissure vein said to contain good values, and the company owning it has recently let a contract for a long cross-cut tunnel that is being planned to cut the vein at a depth of four hundred eighty-five feet.

The title to a number of claims in this district is being carried by assessment work in addition to the ones described, and profitable ore bodies are likely to be disclosed as work progresses, as its geological conditions are very favorable.

State Wagon Road.—The present means of access for heavy freight for the Atlanta and Black Warrior districts is by way of Mountainhome, Pine Grove and Rocky Bar, then over a high mountain divide from Rocky Bar, which is on the drainage of the South Boise River to Atlanta on the Middle Boise River.

This summit is noted for deep snows and heavy hauling conditions at all seasons of the year, and has greatly retarded the developments in the Atlanta district and adjacent territory.

During the past two years a wagon road has been in course of construction to connect Boise with Atlanta by way of the Middle Boise River. This road is being built by private subscription and State aid, the State paying about one-half of the cost. It is an extension of a road already existing up the Middle Boise River as far as Twin Springs. That portion of the work to be done by the State with the

exception of about two and one-fourth miles is completed, and there remains about ten miles in addition to this to be built at the Atlanta end by the Atlanta people. The money for this work has already been subscribed and efforts were made to have it done by contract, but owing to the excessive demand for and scarcity of labor during the past season, this work was not undertaken. It seems likely, however, that the road will be put through to completion during the summer of 1907 and will ultimately afford a comparatively easy access to this important district, as the road is at a low elevation, near the river all the way.

Atlanta is, unquestionably, one of the most important gold bearing districts of the State and the success of its operations will afford a fine market for the merchants of Boise, and a reward for their substantial financial aid in the construction of this road.

Rocky Bar District.—At the well known Rocky Bar district, a few miles south of Atlanta, which was made famous by the production of placer gold in the early days, and later by the output of the rich gold quartz deposits of the Ida, Elmore, Pittsburg and other mines, a quiet year has been experienced in mining, although it has been currently reported that extensive development will be undertaken on some of its meritorious properties at an early date.

The placer gravel beds in the vicinity of Junction Bar on the South Boise River, below Rocky Bar, have been tested quite extensively with a heavy traction drilling rig, and high values are reported to have been obtained and plans are underway for the establishment of a large dredging plant at this point.

The ground is rather rocky but can be successfully handled with sufficiently heavy machinery.

The rich production of the tributary streams above this point would indicate that good values may be found in these low lying gravel beds, and a profitable dredging enterprise may result.

Franklin Mine.—The Franklin mine at Pine, owned by R. P. Chatten, was operated during a part of the year with a force of thirty-five men. This property is equipped with a ten stamp mill run by water power. The mill was closed down on account of the ditch freezing up early in the fall. It was operated during five months of the year and made a gross output of fifty thousand dollars. Development is be-

ing carried on with a small force during the winter and new ore shoots have recently been opened up on its lower levels. This work will be pushed in the spring, and another successful milling season is anticipated during 1907.

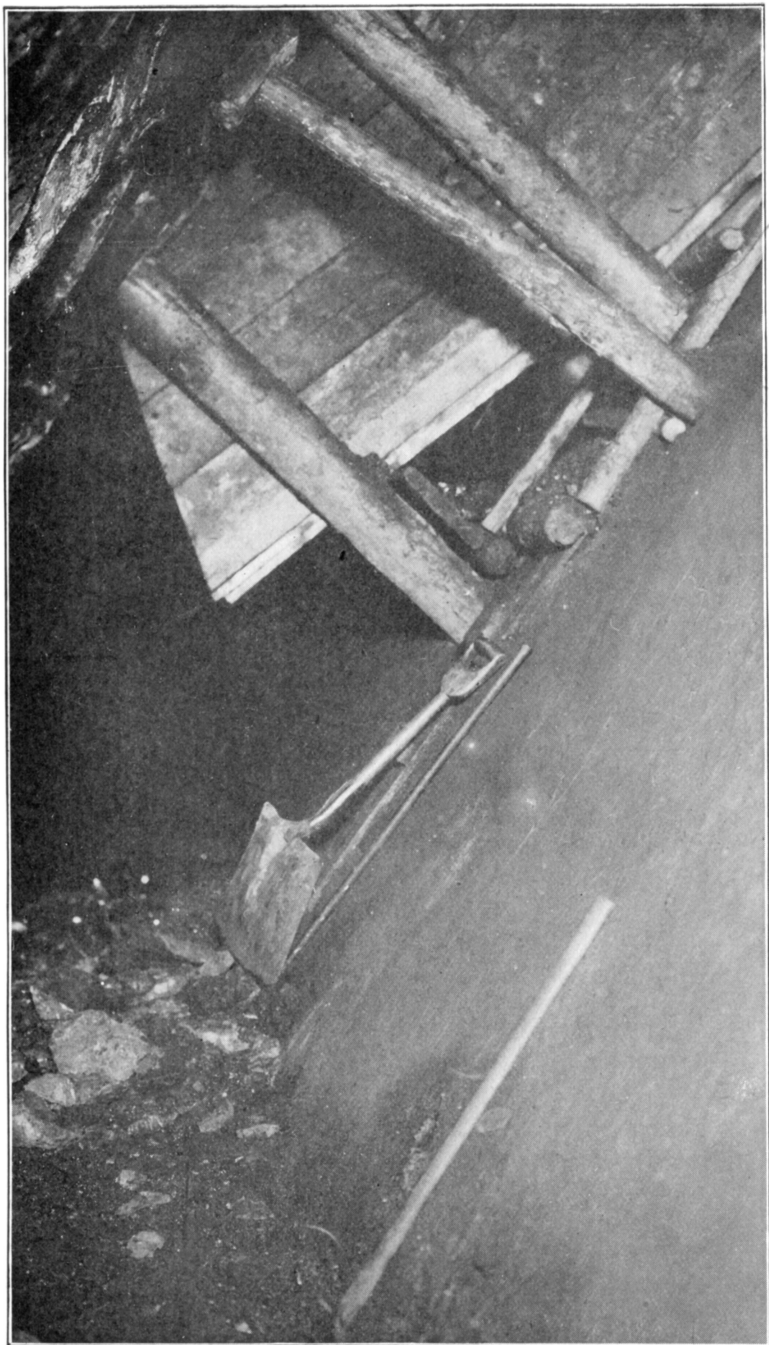
The Mountainview Mine.—The Mountainview mine across the river from the Franklin was being developed during the summer by a long tunnel to tap its ore bodies at considerable depth. This enterprise was seriously interrupted during the year by a disastrous fire which destroyed the mine plant. I understand, however, the work has been resumed.

The Gold King Mine.—This property, after lying idle for several years, was pumped out during the fall months for the purpose of sampling and an examination by the representatives of eastern capital. The Gold King is conveniently situated on the edge of the Boise River plateau and is only twenty-five miles north of Mountainhome. It is developed by a steep incline shaft and winze sunk to a total depth of four hundred fifty feet. It carries a large and very pronounced fissure vein that contains good milling values through a width of five to fifteen feet, in addition to which there was developed in the lower levels an important pay streak ranging from six inches to three feet thick, of fairly clean massive sulphide ore containing gold values of thirty to eighty dollars per ton in carload lots. Several cars of this tenor were shipped to the Salt Lake smelters during a former operation of the mine.

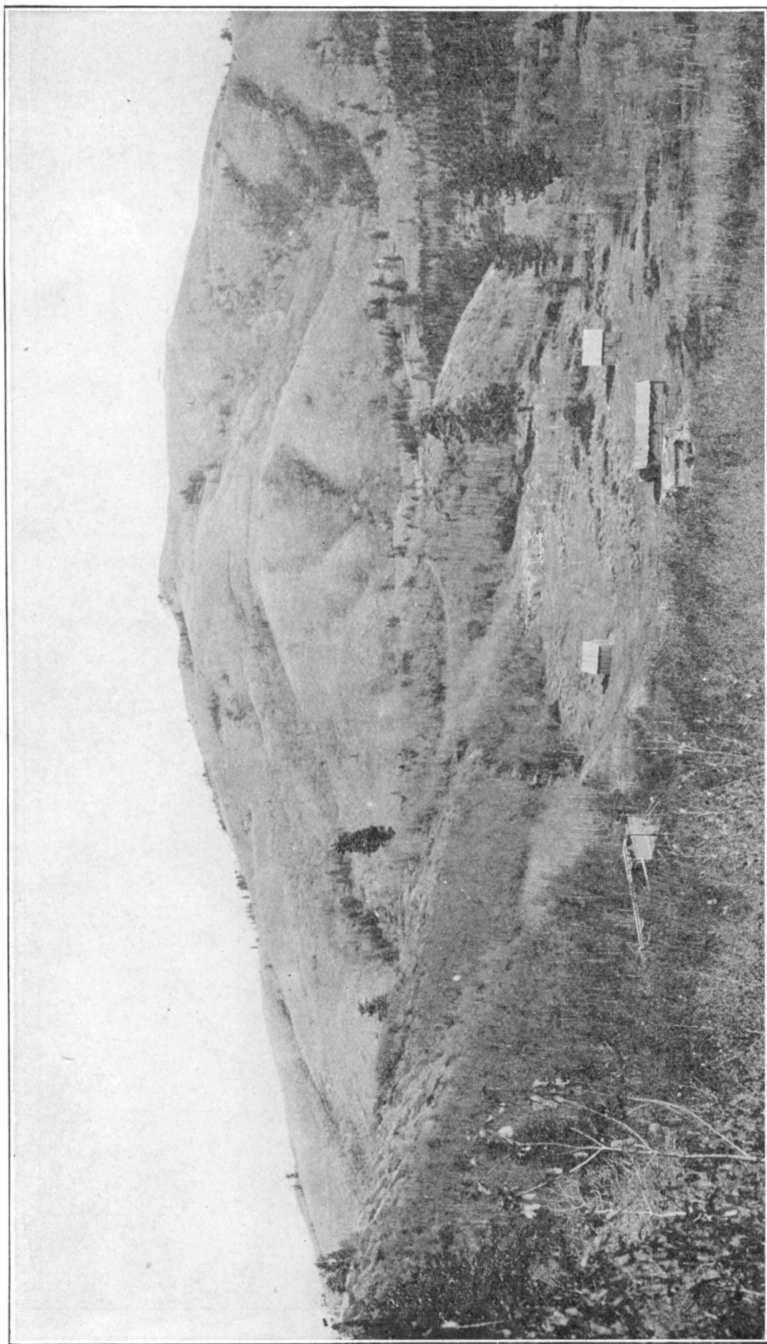
This is a very promising property and it is susceptible of deep development by a cross cut tunnel of no great length from the Boise River canyon near by, which would also afford a convenient milling and power site, and with proper equipment would admit of very economical extraction and treatment of the ores.

Cat Creek Mines.—In the upper drainage of Cat Creek and Wood Creek, a few miles east of Dixie station, some strong and promising fissures are being developed in the granite formation of that section that contain good values in copper, gold and silver. They are of large size and continuous at the surface for hundreds of feet and are likely to develop profitable smelting ore.

One of these enterprises, it is reported, is being backed by representatives of the General Electric Company of New York.



LOADING CHUTE BROWN BEAR COAL VEIN SHOWING SMOOTH HARD
SANDSTONE FOOTWALL OR FLOOR, FREMONT COUNNY.



HORSESHOE COAL CAMP, FREMONT COUNTY.

Gold Eagle Mine.—The most important mining development of the year in the Neal district near the southwestern corner of Elmore County, was the Gold Eagle mine. This mine is only twelve miles distance from Boise. It carries a very pronounced fissure zone in the soft granite formation and is only a short distance from the edge of the Snake River basalt plain. It is opened through an incline shaft sunk on the vein three hundred seventy-five feet deep, from which several levels have been driven, disclosing half a dozen important bodies of rich gold bearing ore of good width. The shaft is being deepened at the present time and new levels will be run.

The property carries a total of six thousand lineal feet of development, of which one thousand feet was made during 1906. It is equipped with a Monadnock roller mill of forty tons daily capacity, which was run for several months during the year and made an important production of free gold, and also shipped seven cars of crude ore containing gold values of one hundred dollars per ton, and two cars of concentrates containing gold values of one hundred twenty dollars per ton.

Twenty men are employed at the property, and it is owned by Mr. C. C. Anderson and Mr. George H. Wyman, both of Boise. Mr. Wyman personally manages the enterprise.

FREMONT COUNTY.

The most important mineral resources of Fremont County so far developed is its coal field on Horseshoe Creek, putting into Teton Basin. This important coal basin contains a series of at least ten workable seams of high grade bituminous coal that vary from two to twelve feet thick with a blossom at one point indicating a seam of coal twenty feet thick.

The successful development of this important resource of fuel would prove a greater benefit to the people of Idaho

than any other mineral resource it has, and I have given a great deal of time and effort to bring it to the attention of capital, and succeeded so far as to have its properties examined by a competent geologist, who made a favorable report on the showing, in the interest of a group of wealthy metal mine operators of northern Idaho, and it seemed an important deal would result, until the question of title came up.

These coal discoveries are situated on unsurveyed public land and the action of the President withdrawing western coal lands from entry threw such doubts upon the prospects of acquiring title, until the matter was acted upon by Congress, that the negotiations were suspended. But these efforts will be continued, and it is believed that private capital will be found to undertake the enterprise as there is manifestly enough coal in this important field to put Idaho independent of its neighboring States in its fuel requirements.

One of these coal claims is being operated at the present time and is furnishing about twenty tons of coal a day to the local trade. It finds a ready market among the farmers in the thickly settled agricultural districts near by when the roads are good for hauling or sleighing.

The seam now being operated is five feet thick with a very hard roof and floor. It has a pitch of forty-five degrees to the southwest and strikes north forty degrees west. It is worked by the room and pillar method. The rooms are turned up the pitch at sixty feet intervals, center to center, along a drift or entry driven on the course of the vein at a depth of eighty feet, where it was intersected by a cross-cut tunnel. The center of the room is driven ahead and coal undermined with the pick on a softer seam, one foot to sixteen inches thick, that lies on the floor or foot wall and then blasted down with a back hole requiring a very small charge of powder. The broken coal slides down to a chute at the narrow outlet of the room.

The seam is very clean from wall to wall, only carrying about four inches of carbonaceous clay. The mine is well ventilated by raises through to the surface and cross-courses through the pillars. A good deal of the coal produced is sold as it runs out at the mine, at \$2.50 per ton. Some of it is screened, and the screened coal sells for \$3.50 per ton, and the slack for 50 cents per ton.

When the sleighing is good, the coal is in big demand. Farmers come from fifty to sixty miles to get their supply, and this little enterprise has materially relieved the recent coal famine of that region.

The mine is only twenty-five miles in an air line from the railroad towns of Rexburg and St. Anthony, but a high ridge intervenes and by way of the wagon road the distance is increased to thirty-five miles.

The coal produced at this mine is high grade. The screened kind will average over ninety per cent actual fuel contents of fixed and volatile carbon. It contains hardly any sulphur, very little moisture or ash, and makes an excellent steam coal and is believed to be adapted for locomotive use.

The ash is reddish brown in color and in the furnace the coal acts a good deal like the coal of the Kemmerer horizon.

The successful development of this field and the extension of a railroad spur should result in reducing the fuel cost of that portion of Idaho in the Snake River basin from thirty to sixty per cent, as this whole territory could be supplied with a down hill pull all the way.

This series of coal veins is contained in unaltered sedimentary formation of cretaceous age probably at the lower Laramie horizon. These formations consist principally of sandstones and blue shale beds with narrow beds of shell limestone and carry a great variety of fossils by which their position could be definitely fixed. The series is undeniably faulted and has been considerably disturbed at its north and south end of the present location. These faults, however, are nearly vertical and at right angles to the strike of the coal seams and would not be likely to rob or destroy the coal seams themselves. These faults occur at long intervals varying from a quarter of a mile to a mile apart.

On one of the properties that has been most extensively developed, the principal seams have been opened and identified by shallow work for a distance of a mile, through which distance these openings line up accurately by a compass survey, which would mean a very extensive resource of fuel on one block alone that should warrant extensive development and equipment.

The position of the veins in regard to their steep dip

would involve a different method of mining than the flatter dipping veins of Wyoming and Utah, but if properly handled would not involve any more expense for developing or mining the coal, as it would slide by gravity to loading chutes, which would reduce the cost of handling materially underground.

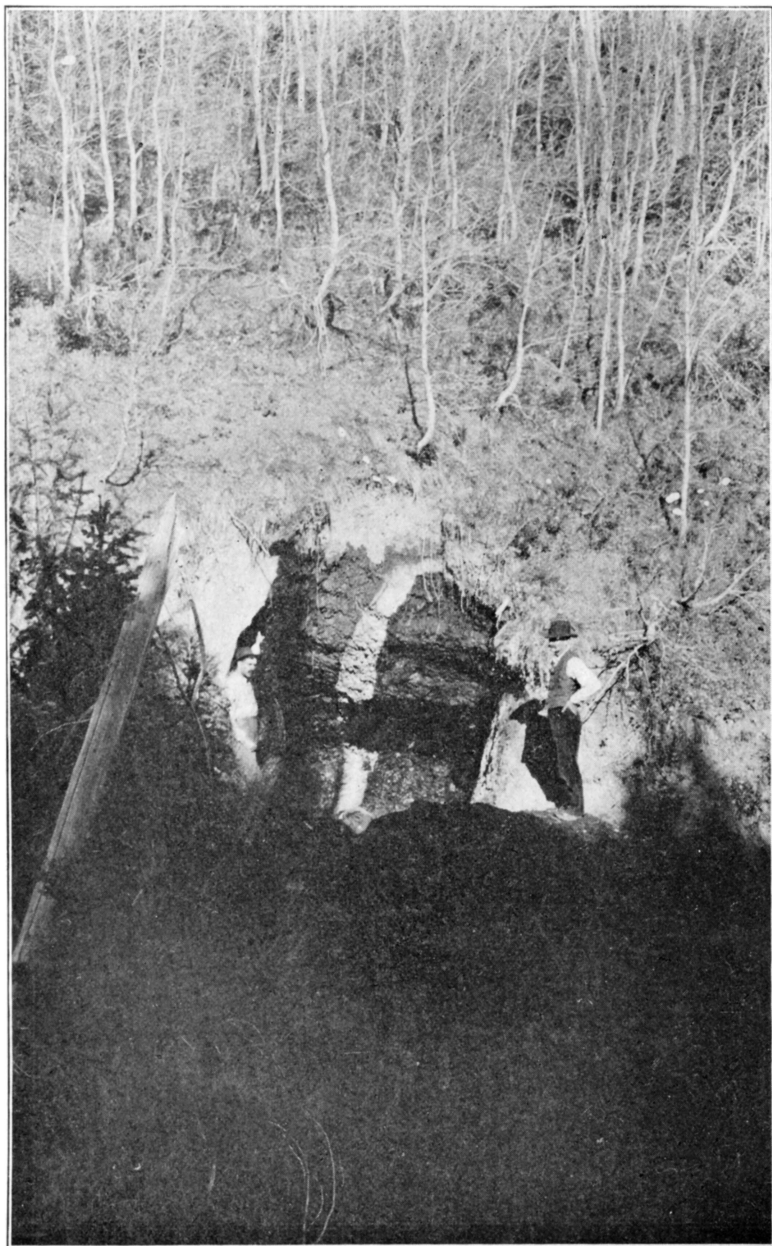
Coal is reported to have been found in a drill hole six hundred fifty feet deep in the middle of the Teton Basin near by, where a ten foot vein is reported to have been penetrated.

Two miles east of the five foot vein above described, which is on the Brown Bear coal claim, some smaller seams have been partly developed that run from one to three feet thick and have a flat dip not exceeding ten degrees. These are near the western edge of the Teton Valley and are considered by experts as a further indication that the valley formations are underlaid with coal and probably in a much less disturbed condition than those in the foot hills near by.

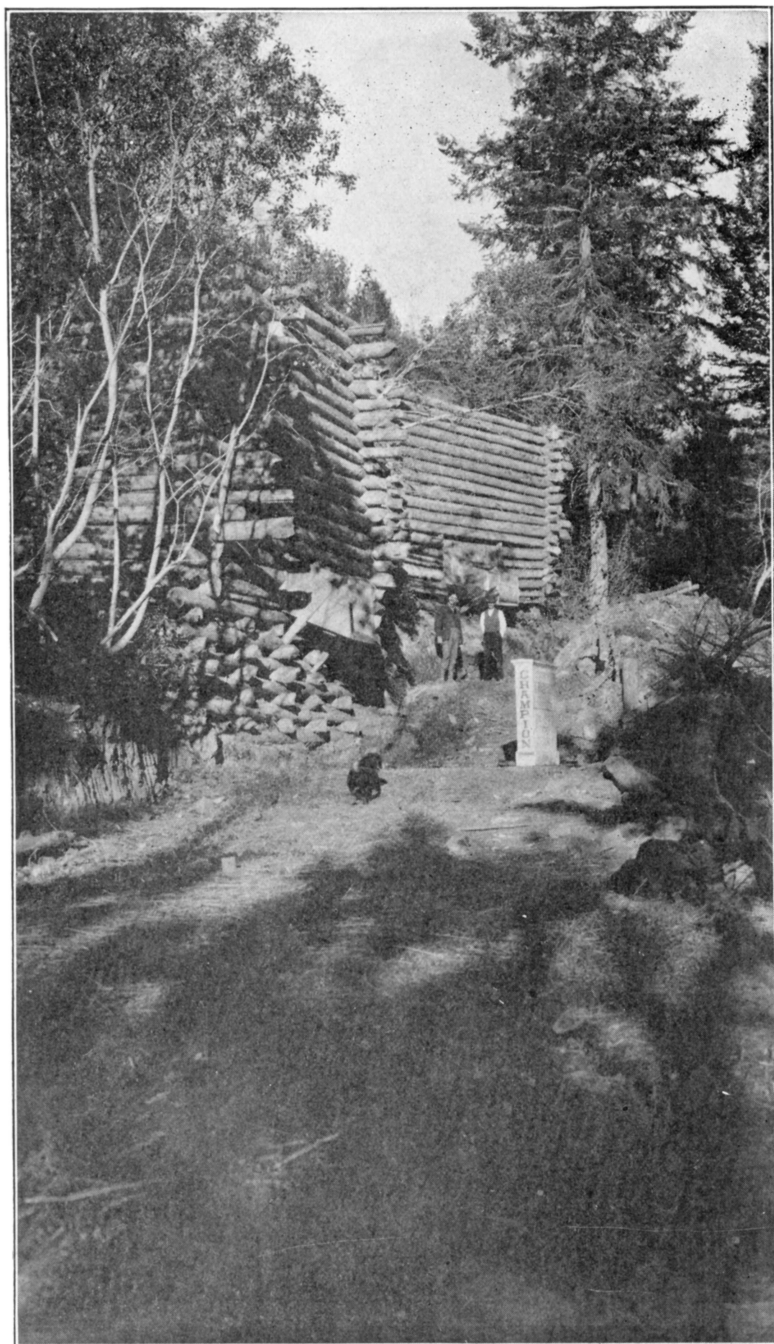
The proposition is an attractive one and worthy of investigation by local capital, as the valley contains lots of deeded land that can be acquired by option at reasonable rates and affords a proposition that would justify the formation of a stock company for the purpose of thoroughly testing the ground by deep drilling.

Faulting and disturbance is of common occurrence in most western coal deposits, which invariably occur in formations of cretaceous age, and have all been subjected to more or less of the disturbing elements of mountain-making processes. These conditions emphasize the necessity for a change in our coal mining law as recently suggested by President Roosevelt, and western coal allotments should be multiplied in area several times to make them attractive to capital as compared to the flat and less disturbed deposits of the east, as coal is a low priced product at best at the mine and the possible margin per ton must always be small.

A coal enterprise to make a paying investment for capital involves a big outlay of money and considerable risk and expense, as it has often been proven that after considerable outlay, seams develop rotten roof or floor or faults, or other objectionable physical conditions that reduces the possible margin of profit and interest that may



HORSESHOE COAL VEIN, TEN FEET WIDE, WITH WHITE CLAY BAND IN CENTER. DISCOVERY CUT, FREMONT COUNTY.



COAL BINS AND SCALES, BROWN BEAR COAL MINE, HORSESHOE CREEK, FREMONT COUNTY.

be made on the necessary capital involved, and these conditions often have necessitated the abandonment of expensive undertakings at large financial loss.

Coal mining is a business for the financially strong and the present coal laws are about as inadequate and unfair as applied to far western coal mining conditions as the abortive apex law is in metal mining, and it is sincerely to be hoped that Congress will take some action at the present session to relieve these conditions.

The coal formations of the upper Horseshoe Creek Basin are overlaid by heavy beds of pure blue and gray lime stones. The coal seams are accompanied in several instances by wide beds of pure blue shale and bands of marl and clay, which with the cheap fuel available would afford an ideal site for a Portland cement manufacturing enterprise, providing a railroad spur was built into that district. The route for such a railway extension is excellent and consists of a plateau country, a very easy grade up the creek right to the coal mines.

This section presents the possibility of developing a very important resource of mineral traffic and is worthy of much closer investigation by transportation interests than it has received.

Fremont County Copper.—At Skull canyon near Kaufman Postoffice, where Fremont County joins the southeastern corner of Lemhi County, an important copper mining enterprise is now under way, and a force of twenty men was employed mining and shipping rich mineral during the closing months of the year.

This property is known as the Weimer mine and was recently acquired by Salt Lake capitalists. It was formerly known as the Paymaster or Towlgreen group and shipped a large amount of rich copper ore twenty years ago.

The new company has acquired a lot of ground near by and is establishing a good camp with a number of substantial buildings, ore bins and sorting tables, and is reported to have shipped out four cars of twenty per cent copper ore carrying fair values in gold and silver during the last two months of the year.

This deposit is a very interesting one. It consists of narrow vertical fissures connecting flat bedded deposits of high grade copper carbonate and oxide ores in blue lime stone, near a very pronounced underlying contact of red-

dish quartzose sandstone. This contact is copper bearing at intervals for fully a mile and has produced rich ore at several points along its course, from shallow development. The present company intends to investigate it at the more favorable points to considerable depth, and the conditions are favorable for the discovery of important bodies of high grade copper mineral.

Following this contact along the steep mountain slopes toward the southeast some fine prospects of lead silver ore and great bodies of iron gosses carrying light values in gold and silver have been discovered and located, and several new mining enterprises are likely to be undertaken in this locality in the near future that may result in important ore developments.

IDAHO COUNTY.

The varied resources of this great mountain county received considerable attention during the past year, and while none of its numerous districts suffered anything in the nature of a boom, several new enterprises were started and some important disclosures of mineral made at a number of its widely scattered districts.

The Dewey Mine.—The Dewey mine at Thunder Mountain was probably the largest single gold producer of the year in Idaho County. It has carried a crew of thirty-five to forty men, and there was accomplished fifteen hundred lineal feet of new development, in addition to which eleven thousand seven hundred eighty-four tons of ore was mined and milled in the ten stamp free gold mill with which the property is equipped. This ore contained an average gross value of \$5.25 per ton and the net saving of gold was eighty-five per cent, which is probably the highest result of any free gold milling operation obtained anywhere in the United States.

The total cost of mining and milling this ore, including

the cost of the new development, depreciation, and everything chargeable to the operation, which is carefully and elaborately carried out and segregated by the management, was \$3.51 per ton. The mill is run by steam power, using cord wood fuel costing \$4.50 per cord. Mine timbers cost six cents per running foot, and lumber \$90.00 per thousand. The cost of transporting supplies from the railroad to the mine is five cents per pound, and drifting is \$10.00 per foot. Miners are paid \$3.50 per day of eight hours shift, and laborers the same. Timbermen, engineers and blacksmiths receive \$4.00 per day.

The ore is crushed coarse through a ten mesh screen with eight hundred fifty pound stamps; straight plate amalgamation is used and no concentration, as the ore contains very little residue that can be saved by concentration.

The deposit from which the ore is taken is a consolidated volcanic mud or tuff and the best values occur in irregular bodies and is mined with square sets. These bodies favor a vertical fracture plain that traverses the center of the deposit, which is a conical shaped butte in a crater basin. The whole butte carries values ranging between two and three dollars per ton, which are a little too low to mine in mass and treat in such a small mill.

Development is being actively carried on at the mine this winter, and, should the results prove favorable, it is likely the present little mill will be greatly enlarged.

The property has been systematically handled during the past four years by E. Haug, and his cost sheet is remarkable, considering the isolation of the property and expensive disadvantages under which it has been operated.

The Sunnyside Mine.—On the opposite side of the Thunder Mountain Summit is situated the Sunnyside mine, which was recently working 45 men. This mine contains a similar looking deposit of volcanic tuff to that of the Dewey mine, and just as completely oxidized and free. It lays in a more flat bedded shape or flow with an overlying sheet of barren quartz porphyry or rhyolite and no definite foot walls.

The best part of the ore body, as now developed, is reported as twenty-five feet thick, five hundred feet wide, and six hundred feet long. It is said to average from five to

ten dollars per ton in gold. If these estimates are right, the property ought to become a good payer, for the management of the Dewey makes handsome profits on less than \$6.00 average values under similar conditions. The property is equipped with a forty stamp mill which is connected with the mine by an aerial tram. This mill is being supplanted with a series of eight Gaevin elecrtto cyanide machines with a total capacity of one hundred tons a day. The property is very extensively developed by adit tunnels, cross-cuts and raises. It has five exits to the surface and is well ventilated.

The position of the deposit admits of mining it quite cheaply by the pillar and stall method, like coal mining.

There has been three thousand lineal feet of drifts and four hundred sixty-nine feet of shafts and raises run since the present management took charge, a large portion of which is said to have been in better ore than was previously developed in the mine.

The mechanical equipment of this property is run by steam power, using cord wood fuel at a cost of \$4.00 per cord. Mine timbers cost six cents per foot, and the cost of transporting supplies and machinery from the railroad to the mine is given at six to eleven cents per pound. Shaft sinking costs \$6.50 to \$8.00 per foot, and drifting \$6.50 per foot.

The minimum wage paid to underground men on this property is \$3.50 per day of eight hours, timbermen \$4.00 per day of eight hours, blacksmiths \$4.00 per day of eight hours, and engineers \$4.50 per day of ten hours.

The mill and tramway on the Sunnyside are of old-fashioned type and are second hand machinery that was bought when the enterprise first started.

There were no other mining operations in the Roosevelt district at all approaching the magnitude of the Dewey and Sunnyside, but a limited amount of development and assessment work was done upon a number of other properties, and the camp contained a total population of one hundred fifty men at the beginning of the winter.

Big Creek District.—Development was continued on several of the best ore deposits of the Big Creek district, forty miles north of Thunder Mountain, during the past year, and some important discoveries of rich ore were made, and

the completion of the wagon road built by State aid and private subscription during the past season will greatly facilitate development work in the future, and probably admit of the profitable shipping of the better grade ores that are being found.

This new wagon road extends from the terminus of the Warrens road on the South Fork summit, above the town of Warrens, across the South Fork of the Salmon River by good substantial wagon bridge, up Elk Creek, and over the summit to the lower Werdenhoff cabin on Smith Creek. This new piece of road, thirty three and one third miles long, and the improvement of a portion of the Warrens road, between the Payette Lakes, by which a number of nasty fords were cut out, was built at a cost of \$28,000, half of which was paid for by the State and the other half by private subscription.

From the present terminus of the new road it will be comparatively an easy matter for the different mining companies to make connection with their different properties, and it is considered by well posted local authorities of that region that it will so facilitate the development of the Big Creek country and admit of ore shipments by wagon that may lead to the extension of a railway branch in there at no very distant date.

The Big Creek country embraces a variety of formations, and ore deposits that vary from quartz fissures with paystreaks of very rich free gold ore to monster big mineralized dikes or zones of gold and silver bearing porphyritic rock, and other phases of mineral deposits. Rich smelting ore containing high values in lead, copper and antimony occur, in addition to their important and sometimes very high grade gold and silver values.

Sunday Mine.—At the Sunday mine a vein ten feet wide has been stripped for two hundred feet along its course and shows a paystreak four to six feet wide carrying average values of eight to ten per cent lead, and twenty-five dollars in gold and silver per ton, with some smaller streaks of clean mineral that run as high as sixty to seventy per cent lead. A shaft has been sunk on this vein, sixty feet deep, which shows eight feet of good ore at the bottom. It has also been opened by a four hundred foot cross-cut tunnel which intersects the vein at a depth of three hundred feet.

A drift one hundred feet long has been driven on the ore which exposes high values, exceeding those on the surface and in the shaft. There is a total of eight hundred feet of development on the property, and four thousand tons of ore exposed that ranges in combined values from ten dollars to one hundred dollars per ton.

Mr. S. D. Edwards and Mr. Charles Miller are the owners.

The Eagle Mine.—This property, consisting of twenty lode claims and situated about three miles west of Logan postoffice, was operated during the year with quite a force of men, and a considerable amount of important development work was accomplished.

For the Eagle ledge a cross-cut tunnel was run three hundred fifty feet, disclosing a vein thirty feet wide at considerable depth. This vein carries some very good grade silver bearing antimonial quartz gangue with numerous seams of blue talc which are also rich in silver and gold.

The new cross-cut now shows a small pay streak rich in free gold, and a wide pay streak several feet thick of a high grade silver ore which it is believed will all pay to ship from this district as back freight next season when the teams come in with supplies over the new road.

The richest ore on the Eagle vein at the surface is one hundred fifty feet ahead of the drift face now being run from the new tunnel, and when it is extended under that point a raise will be made through to the surface, as this rich surface showing contains a defined pay streak of considerable width carrying gold and silver values of two hundred dollars per ton.

It is not unlikely that sufficient ore will be saved and sorted out of this development to much more than pay for its cost, and a profitable shipping mine seems likely to result from this work, even at this remote district; the vein is remarkably strong and its continuity to great depth may safely be anticipated.

North Star Veins.—The North Star vein, now being developed by the Central Idaho Mining Company, carries some very pure antimony ore and with the present demand and exceptional high price for that metal, should become a profitable shipper of antimony ore.

This vein is six feet wide on the surface and average

samples taken from several cross-cuts dug into the crop-pings at intervals along three thousand feet of its course, show average values of twenty-three per cent antimony; while selected ore can readily be sorted out in considerable amounts that run from fifty to sixty per cent antimony.

This is better known locally as the Green property. It carries several ore courses in addition to the one described, another one, three feet wide, gives returns of two hundred dollars per ton in silver and gold, principally silver, and a wide dike of mineralized porphyry, seventy feet wide, is said to average seven dollars per ton in gold and silver; in addition to this, another vein four feet wide carries good copper values as well as gold and silver.

The formation of this part of the district consists of eruptive granite schist, quartzite and silicious lime and a great variety of igneous rocks; it is very extensively fissured, and its physical conditions are favorable for very large bodies of mineral.

Most of these ores are manifestly base and will require smelting for the proper extraction of their value, but these values range so well up at many points as to justify the anticipation of profitable shipping ore under present conditions, which would result in attracting capital to the district and its more complete development and subjection to better means of transportation.

The Moore Mine.—In the same neighborhood, Mr. N. B. Moore worked a small force of men on a large zone of porphyritic quartz carrying a smaller vein of very rich free gold ore that is said to average twenty to fifty dollars per ton.

A three stamp prospecting mill was taken in for this property last fall.

The Mitchell-McCalla Mine.—This mine was worked by two men and has developed a handsome showing of a class of ore like the Sunday mine, rich in lead and silver values as well as gold, and promises to develop a big resource of paying mineral.

The Yates Mine.—At Ramey Ridge, the Yates-Barton group of thirteen claims has been operated steadily by its owners during the past year. This property carries some pronounced veins of fair grade gold ore, and one pay streak from six inches to two feet thick, has been developed that yields remarkable native gold specimen ore.

Two large chunks of quartz are on exhibition from this mine in the cabinet of the Weiser Hotel at Weiser that will sample several thousand dollars per ton in free gold.

Florence Group.—This is another of the well known gold ore developments of this section of the Big Creek drainage. It consists of five claims and adjoins the Yates group on the slopes of Ramey Ridge. It carries quite a lot of preliminary development work, including two hundred feet of tunnel. This work has exposed a quite well defined ore shoot nine hundred feet along on a contact vein in walls of granite and pegmatite. The main vein is from five and one-half to eight feet wide and averages about nine dollars per ton in gold, in addition to which it carries a fairly well defined paystreak of specimen ore two to four inches wide that is said to average two hundred dollars per ton in gold. The vein affords remarkably fine advantages for deep tunnel development, and could be rapidly put in shape to justify the erection of a good sized mill from present appearances.

Crooked Creek.—A short distance east of Ramey Ridge, in the Crooked Creek section, a tributary of Big Creek from the north, some important gold quartz discoveries were made during the past year that promise to form the basis of a good camp. This district carries a system of six or seven parallel veins that have been traced out for fully three miles and contain a succession of ore bodies three to four feet wide with average values of from ten to thirty dollars per ton. The natural advantages of this part of the district in the way of water, timber and tunneling facilities are on a par with those of Ramey Ridge and other tributaries of Big Creek district and afford excellent facilities for economical and rapid work.

The Crooked Creek section has not been very extensively developed yet, but gives exceptional promise for the near future, and is well worth the attention of investors.

The Werdenhoff Mine.—At the Werdenhoff mine, nothing but assessment work was done during last year. In doing this work, however, the men drifted on a small vein that the company's long tunnel passed through near its portal, which is reported to have opened into four feet of good ore.

Crews of five to ten men were employed during the year at the Penn-Idaho mine, and at the Pueblo & Columbia mines, but with what results could not be learned.

Warrens District.—The famous old placer camp of Warrens, forty miles west of Big Creek, experienced a quiet year. The most important operation at this point was the Silver King mine, which produced quite a large amount of good silver gold bearing ore from a small fissure vein in granite that yielded considerable shipments of bullion. The old district contains some extensive tracts of flat lying placer gravel containing good average values and is especially adapted for dredging. Some efforts have been made in this direction, but have been poorly managed and nothing of importance accomplished. With a dredge of proper design and in intelligent hands the Warrens Meadows could undoubtedly produce a good amount of gold at a handsome profit, for competent judges figure this meadow to contain an average value of twenty-five cents per cubic yard through a bank of fine gravel fifteen feet deep and several hundred acres in area.

Resort District.—West of Warrens, about eighteen miles, in the vicinity of Resort postoffice, there are at least half a dozen quite important hydraulic placer operations that are run each year during the high water season for three or four months, and it is estimated that their combined output of gold during the past summer was fully seventy-five thousand dollars.

These placers all carry heavy concentrates, including a great array of coarse corundum crystals, and it is not unlikely a careful search at cleanup time will result in the discovery of some valuable clean crystals of corundum, which are sapphires and may be valuable.

Marshall Lake District.—This very promising gold quartz district, situated in the vicinity of Marshall Lake and Bear Creek, ten to fifteen miles north of Resort, received considerable attention from investors during the closing months of the year, and several important deals are reported in which some well known capitalists and mining men are involved.

This district carries some very interesting deposits in the form of true fissure veins that strike across the deep cut canyons and affords excellent advantages for adit tunnel work.

The formation is schist and eruptive granite with porphyry dikes and the vein filling is a white quartz carrying

remarkable specimen gold ore in places associated with iron and some lead minerals.

As a general thing the veins are not large, but they make up in value what they lack in size, and in some instances carry ore shoots four or five feet wide.

Multnomah Mine.—This property has been prospected to a limited extent by several short openings, and with its big blocks of float quartz gives evidence of containing ore shoots several hundred feet long that will average from two to four feet thick and twenty dollars per ton in gold.

Goodenough Mine.—This property has over fifteen hundred feet of tunnel development which opens up several good ore shoots from two to four feet wide and exposes a large reserve of thirty dollar ore, together with some specimen ore that runs very rich in native gold. A five stamp mill was put on this mine during the fall and an important production of gold is expected from it in the near future.

The Nevada and Gold Crown Claims.—This group has a hundred foot tunnel and carries a vein eighteen inches to four feet wide containing average gold values, in some shallow surface cuts, of from thirty to seventy-five dollars per ton as well as considerable specimen ore of much higher grade.

Fox and Briggs Group.—Situated near the summit of Mount Marshall, this property carries a well defined vein of eighteen inches to three feet wide that can be traced at the surface for considerable distance and carries the characteristic high grade ore of the district.

Schedule Group.—Two and one-half miles southeast of the new Irwin mill, the Schedule group, which has recently been incorporated, carries a small rich vein that is remarkably continuous, and has been followed by shallow tracing cuts for fully three thousand feet.

The full size of this vein is from two to four feet wide, but it appears to carry a defined and quite continuous streak of clean quartz that varies from five to fourteen inches thick containing average values of fifty to one hundred fifty dollars per ton. This vein has produced some of the richest ore from this district. Specimens have been taken from it of considerable size that were nearly one-half gold, and while small, it is of such quality that its

extensive development is likely to result in the profitable production of a large amount of precious bullion.

The veins of this district are nearly all true veins. The country is one of deep erosion and the present apex outcrop of the different properties carrying rich ore have a vertical range of fully fifteen hundred feet, which mean that the values are likely to be maintained to that depth in the higher outcrop veins at least, and justifies considerable confidence of profitable results in their extensive development.

Salmon River Mines.—In the vicinity of Lucille post-office, some promising lode and placer mining development enterprises have been carried on during the year.

The Blue Jacket mine, in this locality, is being developed under lease and bond by the Northwestern Mining Company of Baltimore, Maryland. Mr. Frank E. Johnesse is the manager in charge of this enterprise, which has carried a force of ten men during the year.

This property carries a large fissure zone in diorite and porphyry containing some fine bodies of rich carbonate and sulphide copper ore containing big values in gold and silver.

It is developed by a three hundred foot incline shaft and three short levels.

The position of the vein, striking down a steep mountain side towards the Snake River canyon, affords a splendid adit tunnel site which is being taken advantage of for the deeper development of the deposit.

The property carries a total of eighteen hundred sixty-five feet of development, of which six hundred fifty feet were accomplished during the past year.

The company intends to carry on this work and fully explore the property at considerable depth. It intends to put in a sawmill and build new camp houses in the early spring, as the showing is said to justify the anticipation of an important resource of valuable ore. The Blue Jacket is just over the summit from Lucille, on the Snake River slope, and the new railroad now being built down the Snake River canyon will afford an easy outlet for its products when completed.

The Crandall Placers.—One of the well known placer bar properties of W. N. Crandall near Lucille was disposed

of during the year and is being quite extensively equipped by the United States Placer Company. This ground is noted for coarse nugget gold and is expected to yield very profitable results next season.

McKinlay Mine.—A short distance north of Lucile, the McKinlay mine was operated with a small force of men during the year, and some new ore bodies disclosed containing specimen gold values.

This mine is owned by some Coeur d'Alene people and is looked upon as a very promising deposit. It is developed to considerable depth already and recent reports from there indicate a marked improvement in the ore showing at the lowest level. This property has a small mill in which a successful test run was made during the year.

Idaho Consolidated Copper Company.—At a point four miles below White Bird, this company worked a small force of men during the past year. This enterprise is largely backed by local Grangeville and Camas Prairie people.

Its property carries several veins. One of them is large and contains some very high grade copper ore, and is highly thought of by local investors.

It is being developed by a cross-cut tunnel and shipping values are anticipated when the vein is encountered.

Evergreen Mine.—This property, at Dewey precinct on the South Fork of the Clearwater, six miles east of Grangeville, and several associated groups embracing a total of twenty-eight claims, are recently reported to have formed the basis of a new incorporation.

The combined development of these claims aggregate seven thousand feet in length, principally in tunnels, cross-cuts and raises.

There is also a steep incline shaft two hundred ninety feet deep on the Evergreen proper.

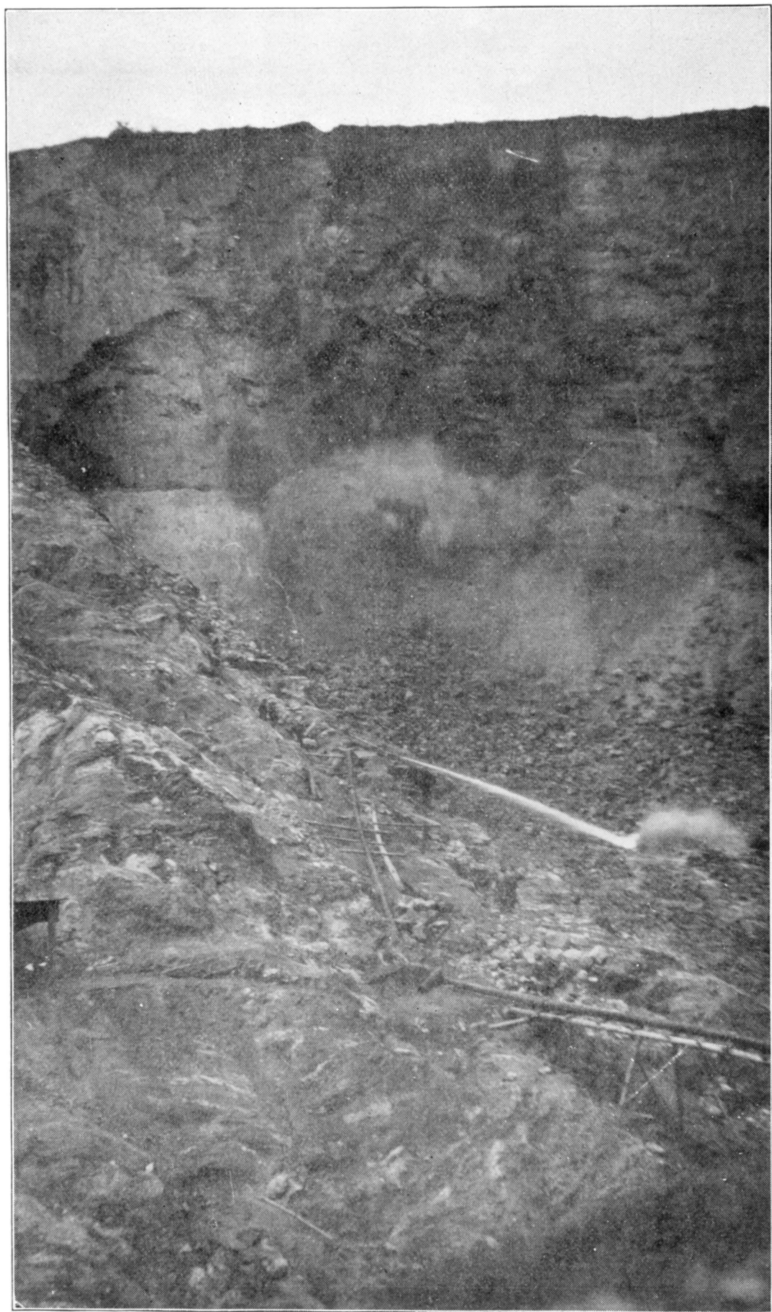
This extensive development exposes a series of six veins of important size ranging from fifteen to fifty feet wide and carries an immense amount of copper-gold bearing ore. Some of this ore contains high values in both copper and gold. In fact, two carload lots of selected mineral have been shipped from the Evergreen that netted one hundred seventy-five dollars per ton and it is believed that



THE MOOSE CREEK PLACERS. PIT IN DEEP DEPOSIT SHOWING 175
FOOT BANK OF GOLD-BEARING GRAVEL, IDAHO COUNTY.



THE MOOSE CREEK PLACERS. GIANT SHOOTING WATER IN GRAVEL
PIT AT DEEP DEPOSIT, IDAHO COUNTY.



INSTANTANEOUS PHOTOGRAPH OF CAVING BANK,
MOOSE CREEK PLACERS, IDAHO COUNTY.

the large bodies of low grade ore exposed in the shallow development of the mines will show a marked increase in value if developed at depth.

A large proportion of the extensive development now on this claim has been done under the management of Mr. A. A. Kincaid, who has handled the work in a very economical manner.

Mr. Kincaid is the leader in the present consolidation of interests and it is manifest from the extensive mineral showing on this great group of claims that with proper equipment and further development at depth, a profitable and extensive mining enterprise may be established.

The local conditions as regards the situation of the property, its accessibility and natural advantages in the way of timber, and water for power, could hardly be excelled, and it is not unlikely that a profitable outcome will result from the present consolidation.

The Dewey Mine.—The Dewey mine, an adjacent property to the above, carrying the same class of ore, and with an important shipping record, is also quite extensively developed, and has large reserves of mineral now in sight.

Other Claims.—Some very promising new prospects containing copper and gold have been discovered and worked during the year, six miles further up the Clearwater from the Dewey and Evergreen, and show definite evidence of developing ore of paying value.

Newsom District.—The Newsom district is one of the active placer mining centers of Idaho County that annually turns out its quota of precious bullion and contains some important hydraulic enterprises. These are principally operated on old channel deposits carrying gravel banks of great depth that in several instances lie high on mountain sides and afford excellent facilities for this method of operation in the way of dump.

The heights of the gravel banks, however, above the present bed of Newsom Creek and its tributaries are such as to involve considerable outlay for ditches to supply the ground with hydraulic pressure.

In my report of 1904, I gave a review of the geological phases of the Moose Creek placers near the Elk City and Stites stage road; since then, these properties have been transferred to eastern people and something like twenty-

five thousand dollars have been expended in the improvement and equipment of the ground.

The twenty-one miles of ditch which is used for conveying water to the claims has been enlarged and the flumes along its course torn out and rebuilt and larger and more substantial structures put in their place. These ditches have been extended with the object of increasing the water supply. A new pipe line has been added and it will afford a supply for two giants for the coming season.

Two new tunnels have been run through a high rimrock that gives access to the lower portions of the deposit of this ancient channel. New camp houses have been erected close to the gravel pits, and several new claims acquired, greatly enlarging the territory of the company, which now totals about six hundred acres.

The gravel banks of this property are among the deepest found in the State and the practical treatment of several hundred thousand yards of this gravel, which has already been washed, produced values ranging from eighteen to twenty-one cents per cubic yard and the property promises to be an excellent producer in the future.

The accompanying cuts will give an idea of the immense body of gold bearing gravel available on this property.

During the last two years this property has been improved entirely by eastern capital. The Messrs. Rhodes Brothers, mine operators, of Chicago, are prominently connected with this enterprise. There are several other extensive gravel deposits being developed in the Newsom District and its future as an important source of placer gold is established.

Iron Crown.—The Newsom district has a number of fine gold bearing lode claims that vary from small rich arrastra seams to big wide zones of mineralized granitic gangue that carry free gold all through which are believed would pay a nice margin of profit on a large scale. The Iron Crown vein is a flat dipping deposit carrying some high grade ore. It is equipped with a small Kinkead mill and made an interesting yield of gold during the past year. This mine has two hundred feet of development with a nice showing of ore in sight and is being successfully handled under lease by Mr. George P. Kelly.

Elk City Basin.—The lode mines of this old placer district attracted a good deal of attention from investors dur-

ing the past year and were investigated by many prominent mining men and capitalists, and the prospects seem bright for the erection of a custom mill, which should prove a paying investment and would greatly encourage development.

Buster Mine.—One of the most important mining transactions in this section during the year was the taking over under a development option of the well known Buster mine one-half mile above Elk City, by Mr. Fred W. Bradley, one of the ablest and most extensive mine operators in the United States. The fact of Mr. Bradley becoming interested in this district is a practical guarantee of the merits and importance of its ore deposits.

The Buster mine is one of the handsomest showings of rich gold bearing ore and types of true vein to be found anywhere in the State. It is a pronounced quartz filled fissure in archean gneiss that stands nearly vertical and is traceable at the surface for several thousand feet. The principal feature of its present development is a shoot of rich ore of considerable length that is ten to twenty feet wide and carries average values through a definite pay streak several feet wide of one hundred dollars per ton in gold with big milling values in the balance of the ore body. This handsome deposit of mineral is now being developed by a shaft and the work will be pushed to considerable depth. It will demonstrate the merits of the district below water level, which so far has never been proven.

The association of specks of gray copper and black tellurium with the rich gold bearing iron sulphides contained in this ore body are likely to lead to ore of shipping value that will stand transportation from this somewhat remote district. The result of this development should prove of great interest to Elk City Basin, for the basin carries a number of pronounced fissure veins of the same type as that of the Buster, which at several points contain more or less of the same character of rich gold bearing quartz associated with tellurium and metallic sulphides.

Hogan Mine.—This well known property, situated at Oro Grand, which started the year with so much promise, does not seem to have materialized successfully so far. It is owned by the Crooked River Mining and Milling Company and is equipped with a three hundred ton cyanide plant. It carries an immense zone of altered granitic

gangue that competent mining engineers, who have sampled it, say will average better than three dollars per ton in gold through a width of three hundred feet. It is ideally situated for economical mining and treatment, but whether from the lack of design in the mill involving too high a cost of handling, or the inability to save the values at a sufficiently high percentage is the cause of its failure, I am not able to say, but the operation on the scale it was planned does not seem to have succeeded so far.

A former treatment of the ore of this mine for its free gold values in a twenty stamp mill established a record of sixty cents per ton for mining and milling, but a sufficient saving of gold could not be made by this simple method to afford very important profits, and the cyanide plant was added, the successful handling of which, however, remains yet to be worked out.

Thunder Mountain Gold Company.—In the same vicinity, the Thunder Mountain Gold Company is developing a similar deposit to that of the Hogan mine, and has recently equipped the property with a ten stamp mill, concentrating tables and a small cyanide plant.

This mine carries sixteen hundred feet of development, of which one thousand feet were run during the past year. It carries a great zone or lode of mineralized granitic gangue said to contain an average value of four dollars per ton, and the present plant is intended to thoroughly demonstrate what can be done in the way of treating the ore.

The successful solution of the problem will probably mean the erection of a very much larger plant.

This company is incorporated for one million shares of a par value of one dollar per share. Its headquarters is at No. 308 Pennsylvania Building, Philadelphia, Pa. Mr. Charles E. Skiles is president, and Mr. John W. Mickle is secretary and treasurer, and Mr. S. L. Boyer is manager in charge at the mine. The company is employing fourteen men, and pay \$3.50 per day for miners.

Umatilla Mine.—The Umatilla mine is another interesting lode deposit in the same vicinity that has one thousand feet of development in the form of cross-cuts and drifts on a pronounced vein carrying gold bearing sulphide ore. It is working a force of eight men. Miners receive \$3.50 per day, eight hours shift.

The headquarters is at No. 1416 Hyde Block, Spokane, Washington. Mr. Fred Long is superintendent in charge at the mine.

Buffalo Hump.—This well known mining district has continued to struggle along with very little improvements on its isolated position from bad roads, a condition that ought to be overcome by State aid at the present session of the Legislature by assisting local interest to build a wagon road up on the South Fork of the Clearwater from Grangeville to Oro Grand in the Elk City Basin or to afford a substantial improvement on the present road over the mountain, which would there connect with the Sweeney road to Buffalo Hump at Oro Grande.

Jumbo Mine.—The Jumbo mine, with its twenty stamp mill, has continued to be the most important and productive property of the Buffalo Hump district throughout the past year. The successful treatment of its concentrates, which would represent a handsome profit on the operation, has not yet been completely solved, but is doubtless, with insistent effort, capable of solution, as mineral of the same character is being handled at a high percentage of saving at several other mines in the State carrying the same class of ore, and important advancements in this line in the Hump district can reasonably be anticipated.

Mother Lode No. 2.—This property was among the most actively developed mines in the district during the past year. It forms part of a large group of choice claims owned by the Concord Mining and Milling Company, and carries a big strong fissure traversing the eruptive granite of this district for a long distance.

Its development consists of a vertical shaft three hundred feet deep, and the company intends to carry this opening two hundred feet deeper, then drift at the five hundred foot level extensively and cross-cut the vein at short intervals. This great vein is from ten to thirty feet wide and carries ten feet of good grade milling ore with smaller pay courses that run to quite high values.

Some of the ore contains silver sulphide minerals and is very rich in silver as well as gold and has every appearance of becoming an important producer of precious metal with further development and proper milling equipment.

This property is owned by a wealthy eastern syndicate

which is proceeding cautiously and will doubtless work out a successful solution of its interesting problem.

The Colonel Mine.—This mine is situated between the Mother Lode No. 2 and the Jumbo and is being developed by adit tunnel work. It has a similar large gold bearing quartz fissure to the Mother Lode and contains ore shoots of good value and promises profitable results for further development.

The Dice Group.—This is another promising group of claims situated between the Concord and the Big Buffalo mine that was quite actively developed during the year and is reported to have yielded some very handsome gold specimen ore well sprinkled with coarse wire gold and considerable bodies of quartz of good milling values.

The Crackerjack Mine.—This is another of the well known Hump properties, lying a short distance north of the Dice group. It was operated to some extent during the year and is equipped with a ten stamp mill. Its ores are also rather difficult to treat and a large pile of tailings below the mill are said to carry six or seven dollars per ton in gold.

The Big Buffalo.—Development on the Big Buffalo mine, which has been one of the largest gold producers of the district and formed the axis of the original Buffalo Hump boom in 1898, has been practically suspended during the year. This property is one of the largest and most promising of the district and its extensive development would doubtless afford rich rewards.

A number of other claims were operated in this section during the past year and some new discoveries several miles southeast of the Hump were made which are said to make flattering display of gold ore near the surface.

The veins of this district are large and strong nearly vertical fissures traversing a granite formation and can be followed by bold outcrops for miles.

Their ores are undeniably rather base, but great shoots of mineral containing milling values of six to ten dollars per ton are of common occurrence, and with improved facilities for wagon transportation, the district is destined to afford some large and profitable gold mining operations, and presents some excellent opportunities for investment.

KOOTENAI COUNTY.

Kootenai County is better noted for the production of lumber than mineral, yet its formations are almost altogether of the crystalline metal bearing series, comprising great regions of granite, gneiss, diorite and crystalline metamorphic formations similar to the Coeur d'Alenes series and also embracing several large areas of pure limestone, principally in the Pend d'Oreille region and the territory north of Priest Lake, in connection with which rich silver and lead values have been found at both places. Among its other important mineral possibilities, Kootenai County embraces within its boundaries some of the richest gold placer grounds ever found anywhere in the State, which is saying a good deal, as Idaho has been noted for rich placer deposits.

Tyson District.—Kootenai County's banner placer field is situated on the St. Maries River and the whole upper tributaries of that stream afford excellent prospecting territory for placer gold.

At Tyson Creek, within one-half mile of some of the State's holdings of timber land, which includes sections 35 and 36 in township 44 N., range 1 W. of the Boise meridian, the Tyson Consolidated Mining and Milling Company owns a tract of placer ground that carries sensational values, the stories of which savored of the magnificent districts of Alaska and of the early history of Idaho and California. A cent's worth of gold in a pan of gravel means more than one dollar per cubic yard and is of unusual occurrence in any large body of ground.

I visited this section during July, last, in the interest of the State Land Board to classify a portion of the State's holdings for which mineral leases had been applied for, and when told by the local people of that district that they had some ground which would run from fifty cents to five dollars per pan, the statement seemed incredible, and I had to be shown, as I thought all such ground in Idaho had been exhausted before my arrival in the State over twenty years ago.

Through the courtesy of the Tyson Company's manager,

however, I was enabled to confirm these remarkable stories, and personally assisted in running a cut from a small placer pit into a virgin bank of fine gravel where five pans of compact dirt about eight inches deep above bed rock were washed out separately and yielded the surprising results of sixty cents to five dollars per pan in coarse rough native gold, the smallest piece of which would weigh two or three cents, and they ranged up to one piece weighing seventy cents, with some quartz attached. These remarkable values, of course, are confined to the compact bed-rock pay streak. Pannings were made, however, and values of five to ten cents per pan found in the bank up to within three feet of the grass roots. The gravel bed fills a flat gulch known as Cedar Creek, grown up with dense cedar timber and white pine. It is from five to fifteen feet deep and probably fifty feet wide and contains several streaks of talcy clay. It will be rather difficult to wash but can doubtless be successfully treated with sufficient water and proper appliances. This rich channel is said to be proven for a thousand feet in length up the gulch. It is bordered on both sides by flat tributary draws and low ridges, all of which carry good paying values.

This company's holdings consist of two hundred acres of the choicest placer ground in the district and they figure that fully one-half of their holdings contain one dollar per cubic yard in addition to the rich pay channel herewith described. They have put in a reservoir three hundred feet vertically above the main diggings and a ten inch steel pipe line eight miles long to convey the waters of Olsen Creek from the opposite side of the St. Maries River to this point. A force of thirty to fifty men were employed on this work during last summer and it was so far advanced that the management thinks it will be able to start washing ground with a giant and hydraulic elevator early next summer. The successful accomplishment of this installation should bring Kootenai County rapidly to the front in the list of gold producing counties.

The formation of the bed-rock in these diggings is schist and slate. This prevails over the low weathered mountain slopes of the neighborhood with igneous intrusions and both slopes of Tyson Creek are extensively fissured and traversed by wide and narrow veins of gold bearing quartz, a complex system of which seems to center at the

summit of Green Mountain, a densely timbered, low, conical shaped mountain from which Cedar Gulch takes its course.

Most of these quartz veins carry low values in gold, but occasional shoots have been encountered that run quite high, and some of the smaller veins have produced remarkable specimen values of coarse native gold accompanied by splashes of black tellurium. I have in my office at the present time one such specimen, and the rich panning results referred to in separate vials.

The Tyson Consolidated Company is capitalized at two million dollars, divided into two million shares of a par value of one dollar. Mr. George G. Metzger is president and Mr. O. B. O'Donnell is secretary, and the principal office is located at Toledo, Ohio. Mr. F. W. Haverland is local manager, with headquarters at St. Maries, Idaho.

The improvements on the property so far involve a cash outlay of one hundred thousand dollars, but it seems well justified by the values contained in the ground and its extent, as its successful treatment should prove a very profitable gold mining operation.

On the adjoining State's sections there are several flat tributary draws putting down into Tyson Creek on which a number of locations have been made and quite a number of prospect holes have been dug. Several of these contain good placer values, but there is no water available for washing the ground and it is practically valueless on that account for placer mining purposes, as the values are not sufficiently high to justify the cost of pumping water from the river for its treatment, which would be the only means of obtaining it.

These sections also carry some of the quartz veins referred to, but no paying ore has so far been found on them. Several of the locators are willing to spend their time and money in an effort to find paying mines on this land, and, I believe that it would be policy for the land board not to stand in their way but to give them the privilege of purchasing it in forty acre tracts at auction with the minimum price of ten dollars an acre and ample time to pay for it. The land is densely timbered, but the timber has been sold years ago and it will otherwise remain a dead asset for an indefinite period unless some inducement is offered to develop its probable mineral values.

The White Elephant Mine.—This is one of the largest quartz veins of the district. It is situated in section 2, township 43 N., range 1 W., Boise meridian, and has been developed by five hundred ten feet of adit tunnel work driven on the vein, which is massive white quartz, from five to ten feet wide, permeated with iron oxides, and contains some ore of good milling values, together with occasional specimens of high grade stuff showing native gold. It is owned by the Green Mountain Gold Mining and Milling Company of Spokane, Washington. Mr. John A. Johnson, Jr., is president, and Mr. Arthur W. Davis is secretary. The office of the company is at rooms B and C, Exchange Bank Annex, Spokane.

Three men are employed and miners are paid \$3.50 per day of eight hours. This company is planning the installation of a five stamp mill. Its veins strike into the State's selection and it could use a forty acre tract of the State land to excellent advantage for a tunnel site. This, and other pieces, should be put up at auction, and the choicer ones would probably bring more than ten dollars per acre. There is about eighty acres along the main creek bottom that is fair agricultural land.

Lake Pend d'Oreille Mines.—The mining districts along the southern shores of Lake Pend d'Oreille experienced a rather quiet season. The most important shipments of ore were from the B. F. and H. mine in the Blacktail district, owned by Mr. James A. Evans, which shipped one hundred ten tons of one hundred ounce silver ore. This district has some interesting deposits of rich silver bearing gray copper ore in well defined fissures, cutting the formation of slaty metamorphic rocks and has made an important record of production.

At Lake View district, the Weber mine was sold during the year to an eastern syndicate, which is planning its extensive development and equipment. This mine is situated about five miles above Lake View, on Gold Creek, and carries an immense deposit of dry silver ore consisting of shattered white quartz containing average values of fifteen to thirty ounces silver, together with one to two dollars gold per ton and is susceptible of successful treatment by wet milling methods. The new company proposes to build an electric railway to connect the mine with the lake shore at Lake View, where it has a good mill site and water power.

The Hidden Treasure mine in this district carries a quartz vein containing rich silver chloride ore sprinkled with gray copper and antimonial minerals in a formation of blue limestone. The best pay occurs in a streak from twelve to thirty inches wide and runs about sixty ounces silver per ton. A car of this ore was shipped during the year that yielded nine hundred thirty-two ounces silver and paid a profit of three hundred dollars after the cost of transportation and treatment was deducted. The mine carries quite a wide zone of lower grade ore. Its total development is so far only one hundred thirty-one feet and it bids fair, with further work, to prove a profitable venture.

There are several other very promising deposits of mineral in this district, especially in the vicinity of the Weber mine, that carry very promising shoots of dry silver ore, lead, zinc and antimonial silver ores in a series of scilicious sedimentary formations like the Coeur d'Alene quartzites and slates and are worthy of much more extensive exploration.

At other points around Lake Pend d'Orille, considerable prospecting and development work was in progress during the year. One of the most important enterprises in prospect on the shores of this picturesque body of water is the proposed establishment of a large Portland cement plant by the Washington Brick and Lime Company of Bay View. This company own extensive tracts of pure limestone and have been actively engaged in the manufacture of lime for several years, and the extension of their business to include a large output of Portland cement is an important industrial move to this section, and it is believed will prove a great success, for the materials, both limestone and lime shale, are available in this locality in unlimited quantities.

Just below the mouth of Clark's Fork on the east shore of the lake, some active development was carried on at the Green Monster copper mine and at Trestle Creek, northwest of Hope, a number of promising deposits of gold-bearing sulphide ore were operated during the year, and ore containing good values opened up at several points.

PRIEST LAKE DISTRICT.

Up towards the northern end of Kootenai County, in the high mountains bordering the shores of Priest Lake, there are a number of new mining development enterprises

in progress. The name of this lake on the old maps of Idaho was the Indian name "Kanitsu," which means "Paradise" or "Happy Water," and is very applicable to this beautiful sheet of water and its charming environment. This is the second largest body of water in Idaho and was aptly named by the Indians, for its lofty mountain setting and magnificent forests teeming with game, large and small; its numerous wooded islands, bays and promontories, alternating abrupt shores and sandy beaches; its tributary streams, deep and shallow waters, and great variety of gamy fish, combine to afford an Indian paradise and "Happy hunting ground," indeed, and it remains practically unimpaired except in name, in all its original virgin glories.

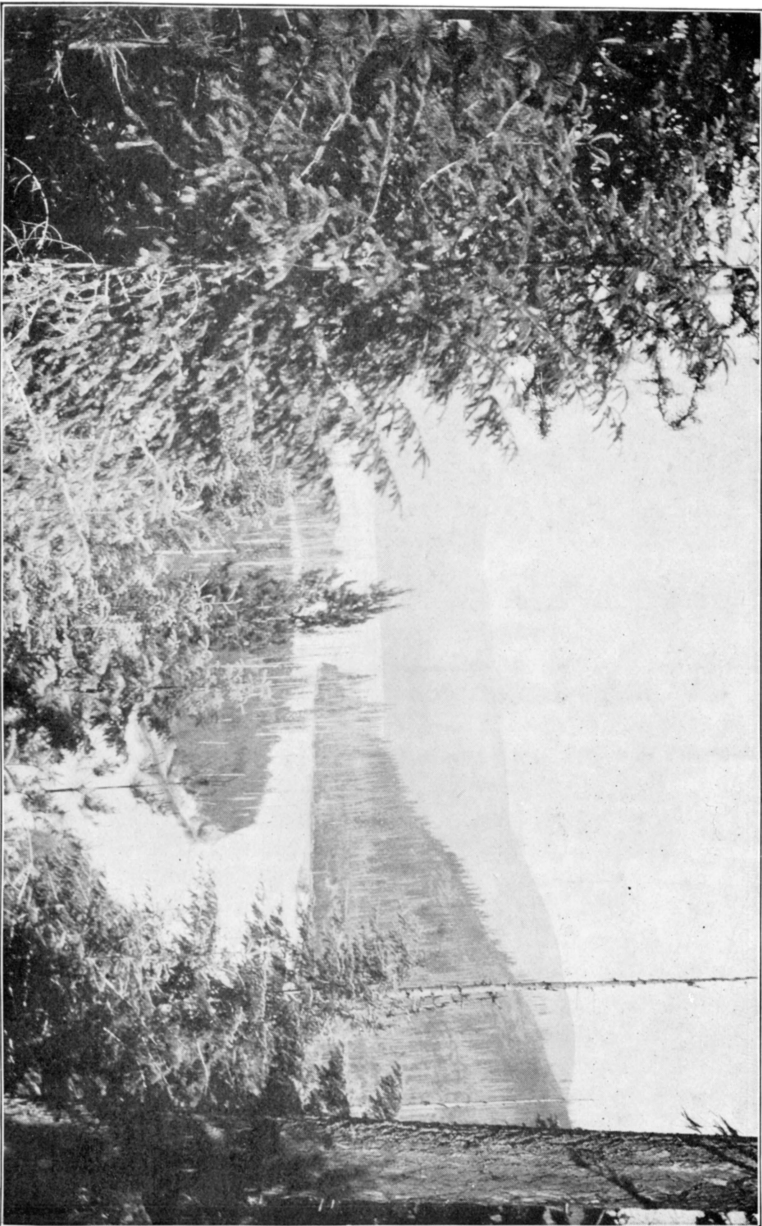
This beautiful region is only twenty-five miles by stage from Priest River station, on the Great Northern Railway, where, during the summer season, one may enjoy rest or sport among indescribable scenes of natural beauty and grandeur, probably unexcelled anywhere in the world.

The principal rock formations at this end of Kootenai County, especially bordering the lake, are granite and diorite igneous eruptive rocks, embracing remnant areas of quartzite slate and quartzite, evidently belonging to the Coeur d'Alene series of metamorphosed sediments.

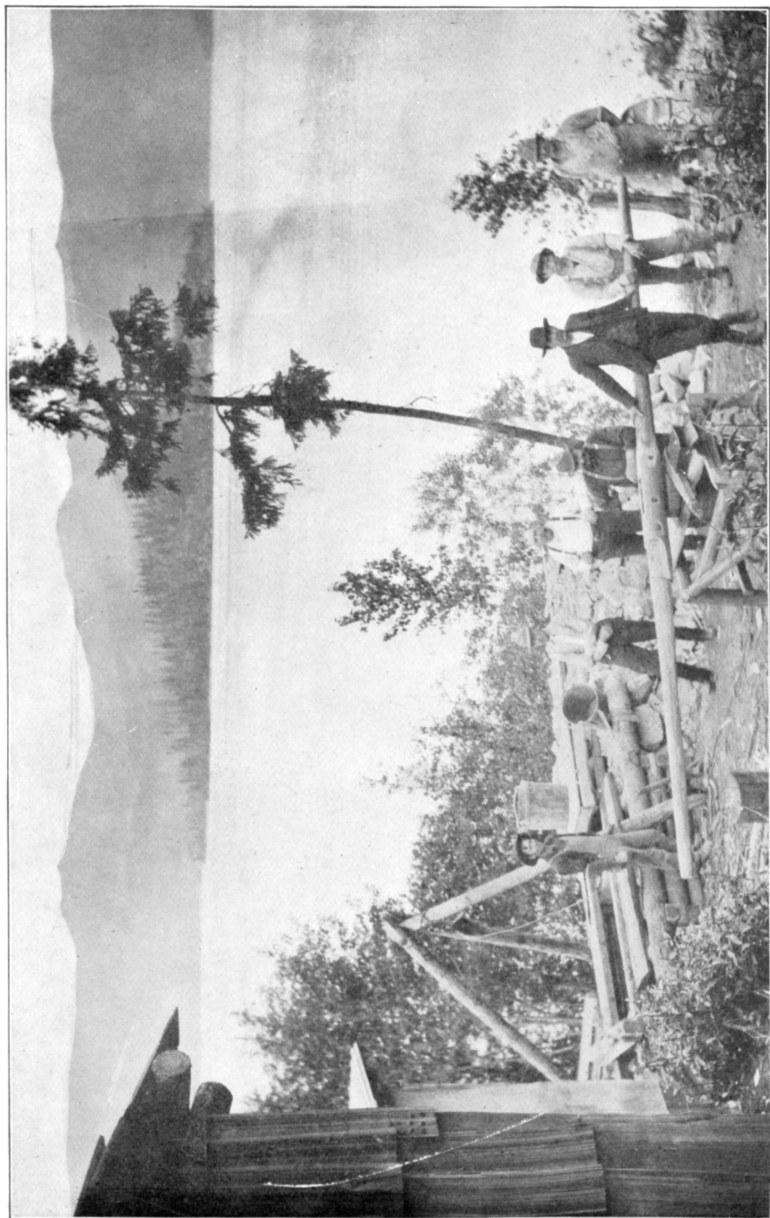
In the upper tributaries of the lake, near the British line, the altered sediments are more extensively developed and also include large belts of schists and blue limestone.

Idaho Continental Mine.—The schist formation at a point twelve miles above the head of the lake carries the ore deposits of the Idaho Continental mine, which probably has one of the best lead ore showings in the State, outside of the Coeur d'Alenes. This great ore course is from ten to thirty feet wide of concentrating mineral at the surface, accompanied with a fairly constant pay streak of clean shipping galena, from a few inches to two feet wide. These fine showings can be followed almost continuously for the full length of three claims of about forty-five hundred feet along the apex of the lode, and under intelligent development should mean an extensive resource of profitable ore at present prices of lead and silver.

Cabinet Range Mine.—Between the Idaho Continental and the head of the lake, the Cabinet Range Mining Com-



PRIEST RIVER NEAR THE IDAHO MINE AT THE OUTLET OF KANITSU (PRIEST) LAKE, ONE OF THE MOST PICTURESQUE MINING DISTRICTS IN THE STATE, KOOTENAI COUNTY.



WOODRAT MINE ON THE SHORE OF KANITSU (PRIEST) LAKE, KOOTENAI COUNTY.

pany were working a force of five men during the summer, developing a 70-foot zone of copper bearing quartzose rock, with a cross-cut tunnel. Selected ore from this deposit has yielded as much as 26 per cent copper, together with good values in gold and silver. Rich lead-silver ore is also found associated with copper ores in this big zone and its owners are sanguine of developing average values across the whole width of the zone that will pay well to concentrate.

This property is owned by an incorporated company and is capitalized at two million shares of a par value of \$1.00 each, and the present value is given at 10 cents per share. Mr. W. M. C. Maybury of Detroit, Mich., is president, and Mr. L. R. Chase of Priest River, has charge of the work.

The Priest Lake Mining Co.—This company owns a large group of claims near the Idaho Continental that has been developed to the extent of approximately a thousand feet of cross-cut tunnels. This group carries a strong quartz fissure containing a pay streak of rich lead-silver ore, and important ore development is anticipated with the further extension of the deepest tunnel, now in 550 feet.

Mountain Chief Mine.—Situated at the head of the lake, the Mountain Chief mine has been opened on a fissure in silicious slate with two tunnels of considerable length and several open cuts. The fissure carries lenses of quartz containing high grade galena ore mixed, in some instances, with massive pyrrhotite and yellow copper sulphide. Some handsome piles of clean mineral of this combination are on hand at the mouth of each tunnel and make a very attractive showing.

Gem Copper Mine Co.—Further down the lake from the Mountain Chief and a short distance back from the shore, on a high mountain spur, the Gem Copper Company are developing a mineral zone 40 feet wide that carries a heavy iron gossan at the surface, containing spots of rich yellow copper sulphide ore and copper carbonates containing good values in both copper, gold and silver. In the same vicinity another mineral zone of honey-combed quartzose rock 100 feet wide, is traceable for two miles, that carries light values in gold and silver and looks like the croppings of a big deposit of iron sulphide mineral that may carry asso-

ciated copper values of importance when the ground-water horizon is reached.

The Pan Handle Copper M. and S. Co.—This company was developing two promising groups of claims during the past year. One of these, known as the "Woodrat Mine," consists of a more or less mineralized zone in altered diorite, with two parallel ore courses forty feet apart that are six and ten feet wide, respectively. The accompanying cut aptly illustrates the interesting situation of this deposit.

It is located right down on the lake shore of Calispel Bay, five miles northwest of Williams' postoffice. In fact, the best ore was found under two feet of water from a boat and the fissure course traced into the shore, as it is very plainly defined in the bed of the lake with rich ore spotted through its apex for a width of 10 feet at the point of discovery. The ore carries high values by selection in copper and lead sulphides. Some assay results have been obtained from this vein that indicate a value of \$90.00 per ton in copper, lead, gold and silver, and the whole width of the vein is said to average \$10.00 per ton at the point of discovery. This vein seems to stand nearly vertical along the northwest wall of the zone. On the opposite wall a vein of clean shattered quartz has been opened by a short tunnel that average about 6 feet wide and contains average gold values of \$5.00 per ton, with occasional kidneys of almost pure chalcopryite ore that run high in copper. A shaft is being sunk between these two ore courses that is down 50 feet, about thirty feet of which is below the level of the lake surface; yet it makes very little water and indicates a tight formation. Recent reports from this property indicate that some very fine ore has been found on the 10 feet vein, and drifting is in progress along its course from a short cross-cut at the bottom of the shaft.

Idaho Mine.—This same company were working a small force of men during the summer on the Idaho mine, two and a half miles below the outlet of the lake on the west side of Priest River. This group of claims carries one of the strongest mineral showings in the district. Its principal feature is a two hundred foot chute of brown iron gossen at the surface, ten to fifteen feet thick, in a steep pitching vein that strikes north and south along the

mountain side, about 500 feet vertically above the river, affording a handsome tunnel site that is being taken advantage of. A twenty foot shaft in the croppings of this fine ore chute proves that the brown gossen ore rapidly changes to a massive pyrrhotite mineral sprinkled with threads and spots of rich chalcopyrite ore in yellow stained quartz. The average values contained in this ore chute, I was informed, run from two to four per cent copper in the shallow surface work, with selected values ranging from ten per cent to twenty per cent copper, and also containing appreciable amounts of gold and silver. A tunnel is now being driven that is expected to tap this ore body at about one hundred ten feet deep. It had already been driven one hundred eight feet and was expected to cut the vein at a point one hundred fifty feet in from the portal. The formation was hard diorite. A good deal of the ore is a massive sulphide mineral that would make desirable material for a hot blast pyritic smelter, where the fuel elements of its high sulphur contents could be taken advantage of in making matte.

Pine Creek District.—This district is situated eight miles northwest of Priest River station, on the Great Northern Railway, and the wagon road approaching it traverses one of the most magnificent forests of white pine timber to be found anywhere in the State, which embraces a single quarter section that is estimated to carry fifteen million feet of this desirable timber, together with an enormous stumpage of other varieties.

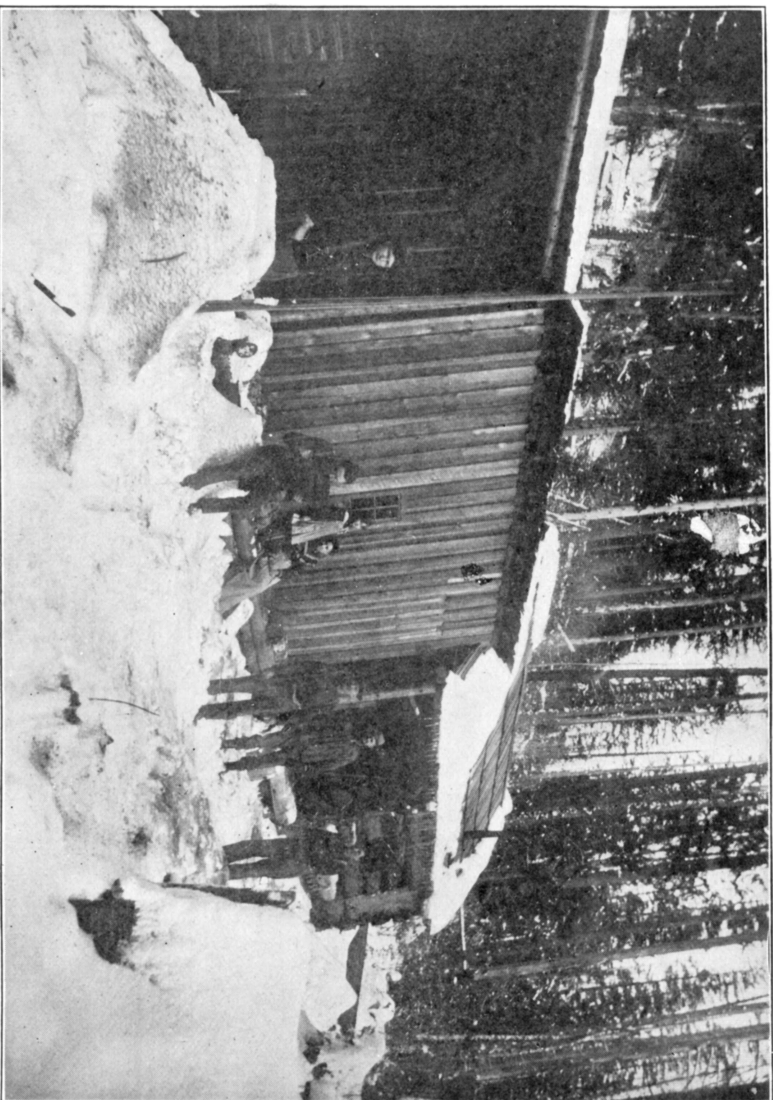
Farmer Jones Mine.—The principal operating mines in this district during the writer's visit along in the summer, was the Farmer Jones and Camp Bird mines. The Farmer Jones mine was being developed in a very intelligent and conservative manner. This property carries a straight gold quartz vein, consisting of a replacement fissure in quartzite near a buried laccolite of diorite porphyry. The writer had often seen thin slabs of native gold specimen ore from this mine in Spokane, but this was the first opportunity I had found to visit it, and I was agreeably surprised to find instead of a narrow rib of frozen quartz, as anticipated, an ore chute of solid quartz more or less honey-combed all through, that ranges from two to four feet thick, and from the surface work already done, apparently continues for at least 400 feet in length. This

surface work consists of numerous shallow cuts and tunnels, exposing several hundred tons of free gold quartz that I was informed will safely average all through \$25.00 per ton in gold and will yield average assay results in several places across the full width of the vein of from fifty to one hundred dollars per ton, while specimens can be readily picked that will duplicate the above figures in ounces of gold per ton, and judging from the pannings of free gold obtainable, I believe these figures are conservative.

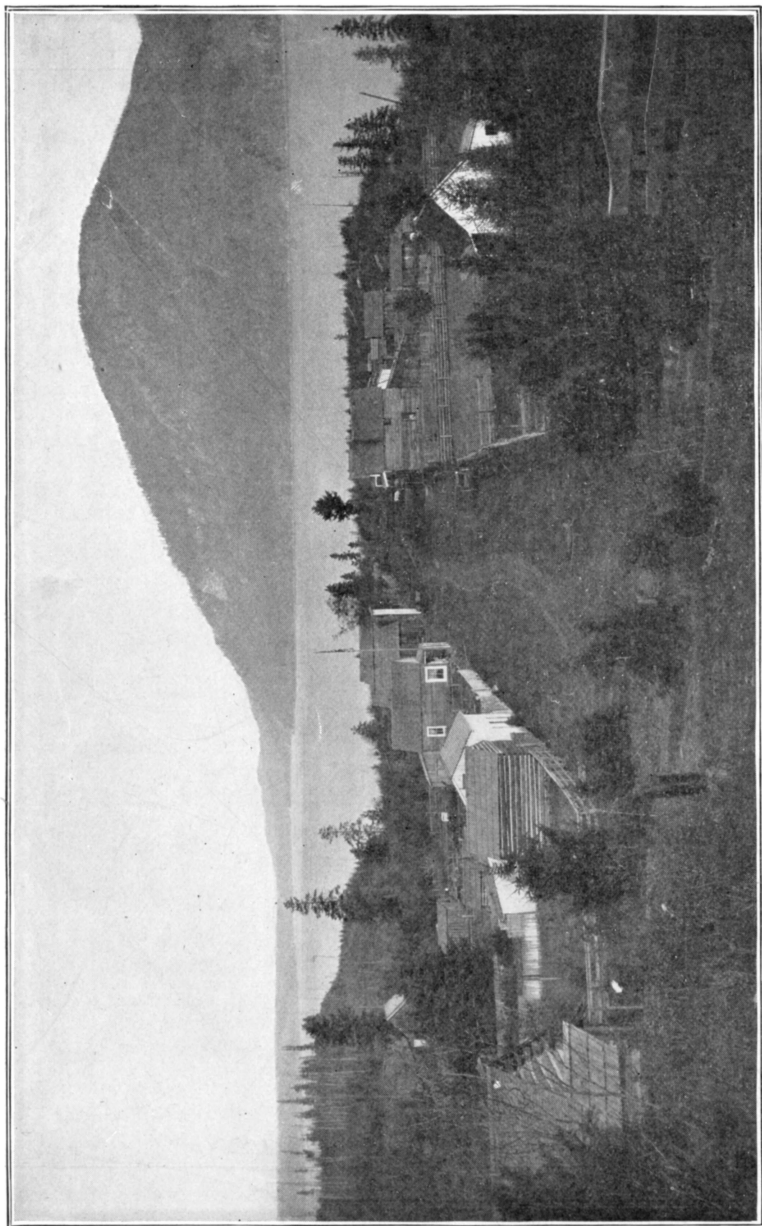
It is evident from a cursory examination of this mine that it now has enough ore in sight, which if treated in a small mill, would pay back the total investment so far involved. The development of this property in the way of adit and cross-cut tunnels totals one thousand feet, of which five hundred fifty feet were driven during the past year, in the form of a well placed cross-cut tunnel that was intended to tap the vein several hundred feet deep. The ^{face} of this tunnel was in diorite formation at the time of the writer's visit. Whether it has since struck the vein or not, I am not informed, but the prospect for its doing so and opening a valuable gold mine, seemed very promising from the amount of ore and evidences of fissuring displayed in the upper works.

This company is planning the erection of a five stamp mill during 1907, to treat the important ore resources it now has developed. It is incorporated with eight hundred thousand shares of a par value of one dollar per share. Mr. G. C. Sutton of Priest River is president and general manager; Mr. M. P. Brown of Spokane, Washington, is vice president. The mine employed an average crew of four men throughout the year.

Camp Bird Mine.—This property lies directly across the gulch from the Farmer Jones and embraces a large group of claims that are traversed with a well defined vein in a formation of porphyry and quartzite. This property is also incorporated and has a share capital of one million five hundred thousand shares of a par value of one dollar each. Mr. C. C. Ricard of Spokane, Washington, is president, and Mr. Eugene Sicard of Priest River, Idaho, is vice president and general manager. The company carry a force of four men on development throughout the year.



CAMP HOUSES, FARMER JONES GOLD MINE, PINE CREEK DISTRICT, NEAR
PRIEST RIVER, KOOTENAI COUNTY.



GLIMPSE OF LAKE PEND D'OREILLE, FROM LAKEVIEW, KOOTENAI COUNTY.
MOUNTAIN IN BACKGROUND IS PURE LIMESTONE.

The vein can be traced for a distance of two thousand feet and is as much as ten feet wide in places. It carries some fine ore, including lead, iron and copper sulphides that run well in silver, and should make rich concentrates. The total development is seven hundred fifty lineal feet of openings, of which three hundred feet was driven during the past year. The principal feature of this development is an adit tunnel started and driven on the vein four hundred feet. Near the face of this tunnel some good ore had been encountered at the time of my visit in July. Another tunnel higher up the mountain is a cross-cut one hundred sixty feet long, which was expected to intersect the vein at a short distance further in, where a fine shoot of ore indicated on the surface should be tapped.

The mountain slopes of Pine Creek, in the neighborhood of the Farmer Jones and Camp Bird mines, carry a number of other good prospects. These, however, were idle at the time of my visit. The whole mountain region tributary to the Priest River drainage is made up of favorable formations for the occurrence of important bodies of metallic minerals and embraces some good prospects that afford interesting opportunities for the investigation of capital, and with proper encouragement are likely to result in the development of profitable mines.

LATAH COUNTY.

As the site of the State University and School of Mines, situated at Moscow, its county seat, Latah County plays an important part in the mining industry of the State in connection with the fine class of mining students graduated from this important institution. A number of these have gone out into the practical life of Idaho's mining industry and made very creditable records as mining engineers, assayers, surveyors, etc.

This institution was equipped during the past year with a complete metallurgical laboratory in which practical

demonstrations can be made in the treatment and reduction of ores and minerals by the various new and up to date methods, which will greatly facilitate the work of this department of the University and prove a great advantage to its students.

Latah's mineral resources are interesting, but have so far not proven very productive. These embrace deposits of copper ore, gold ore and opals, also some important deposits of fine mica which occurs in very large crystals that split into large, clear, thin sheets of good tough texture, and with sufficient development should prove a profitable source of this desirable mineral.

LEMHI COUNTY.

Gilmore Mine.—The Gilmore mine, in Lemhi county's important lead belt, near the head of Lemhi Valley, has continued to maintain its record as the most important mineral producer in this county throughout the year. This is a lead-silver deposit of unusual interest and of great future promise. It has been operated steadily for the past three years and is said to have produced and shipped lead and silver ore to the gross value of something like three hundred thousand dollars, and has at the present time probable ore reserves of a similar value.

This interesting mine is opened on a pronounced replacement fissure in pure blue limestone between two parallel dikes of intrusive diorite. It is developed to a depth of three hundred seventy-five feet through a cross-cut tunnel which intersects the vein at seventy-five feet deep and then through a vertical shaft three hundred feet deep. The most important ore showings of the mine is now exposed between the two hundred and three hundred foot level. At this considerable depth the mine is as dry as a bone and so far has never made a bucket of water.

The ore shoot is four hundred feet long with a core

forty to sixty feet long that is from five to sixteen feet wide of clean hard carbonate of lead galena and brown oxide that averages thirty per cent lead and fifteen ounces of silver per ton. Several other important mineral blossoms on this property promise other rich ore shoots when properly developed. This ore is hoisted and all development of the property carried on with a small ten H. P. gasoline hoist. The milling equipment consists of four home made jigs and a small breaker set to crush the harder material to about twenty mm. size.

The power is furnished by a small steam plant which rounds out the total milling equipment. The mineral is hand fed all through and handled over several times in the process of treatment.

This crude plant makes sixty per cent lead concentrates that run thirty ounces silver. The big dump of coarse tailings below the mill runs sixteen per cent lead and seven or eight ounces silver, while the rich fines are allowed to run to waste down the gulch.

Fifteen hundred tons of mineral was shipped from this property during the past year that is reported to have averaged sixty per cent lead and thirty ounces of silver per ton. The property represents a very small capital investment. It has paid its way since the first few months of its development, and justifies much more extensive development than it has received.

The handsome bodies of rich ore disclosed in the bottom level are likely to continue, or be repeated to an indefinite depth in a fissure of such strength and in such completely oxidized and altered condition. The lime formations inclosing it have been rotted and digested by the solution that brought in the ore minerals and present soft easy ground to work that does not swell and is easily retained with light timbers. Sinking in these formations could be cheaply done and the showing is well worth following to considerable depth, as the prospects are very flattering for the development of one of the important lead ore bodies in the State.

The present total development on the mine is twenty-five hundred feet, of which five hundred forty-five feet were run during the year.

The mining costs at this district are given as follows:

Shaft sinking, fifteen dollars per foot; drifting, seven dollars per foot; mining timbers, five cents per running foot; lumber, twenty dollars per thousand; cost of transporting supplies from the railroad is twelve dollars per ton; the cost of transporting ore to the railroad is ten dollars per ton.

The mine is employing thirty-five men. Miners are paid \$3.50 per day, trammers \$3.00, timbermen \$3.50, laborers \$3.00, all eight hours shift; firemen, \$3.50, twelve hours shift; blacksmiths, \$4.00, nine hours shift; shift bosses \$4.00, nine hours shift.

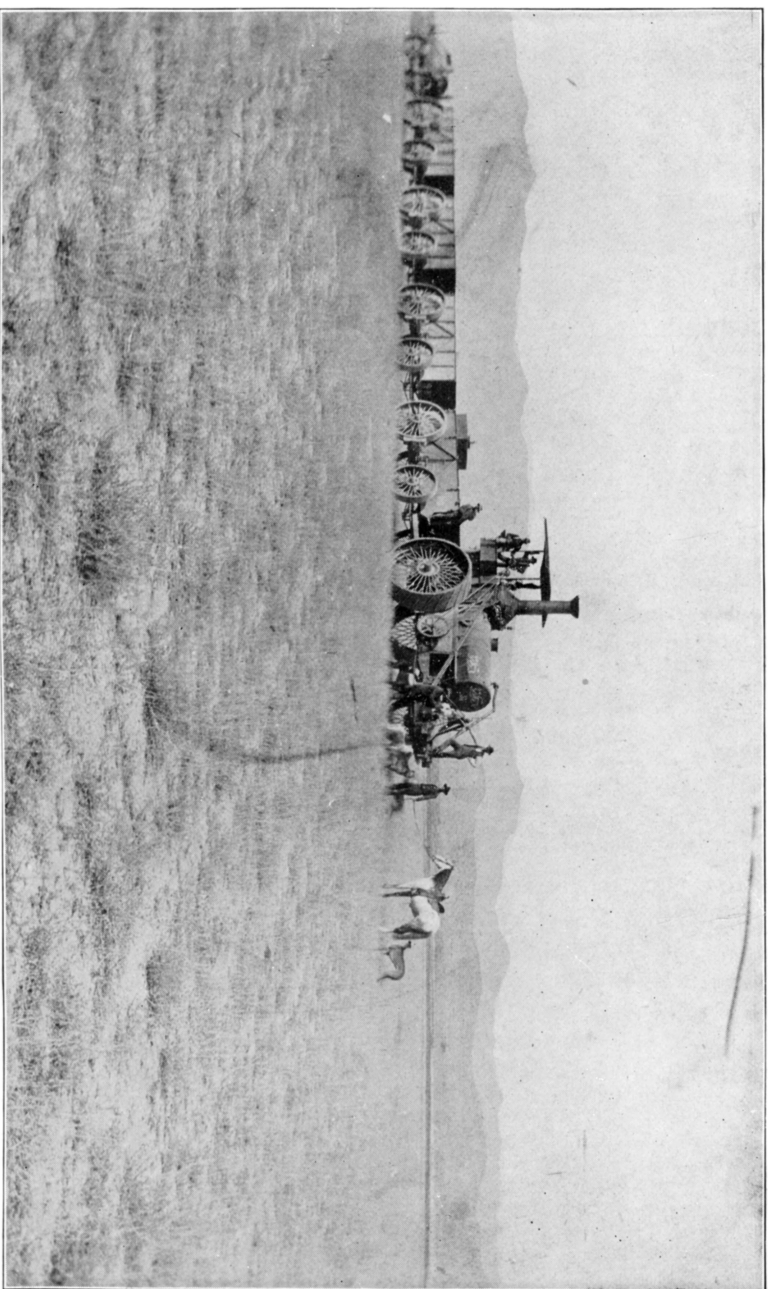
The headquarters of the Gilmore mine is at No. 405 People's Building, Pittsburg, Pa. Mr. A. S. Ross is president, and Mr. W. A. McCutcheon is secretary and treasurer, while Mr. James E. Walker, a former Coeur d'Alene operator, is superintendent in charge at the mine.

Traction Engine Haulage.—This mine is at a disadvantage on account of its location being eighty-five miles from the railway shipping point, which is Dubois, on the Montana division of the Oregon Short Line, and its ores have to stand a wagon haul charge of ten dollars per ton.

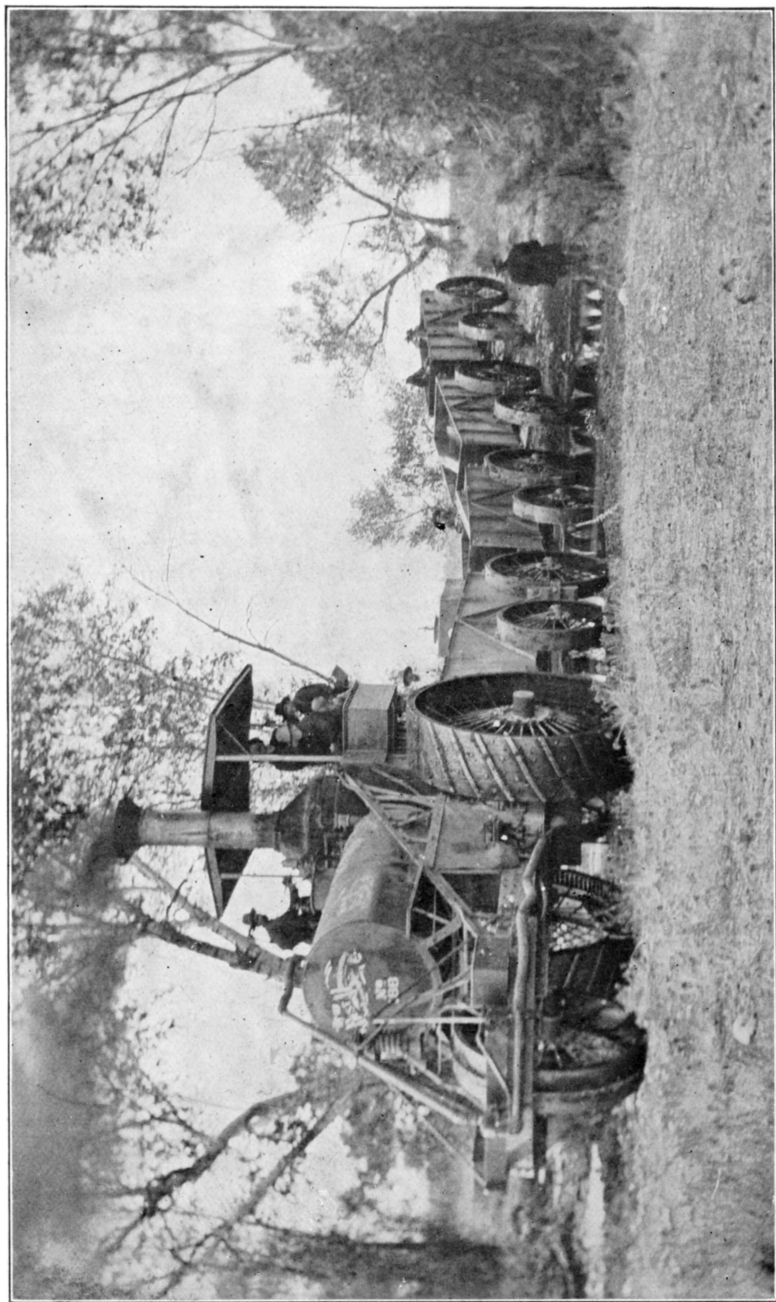
During the past summer a separate corporation was formed to handle the ore to Dubois. This is known as the Dubois and Salmon Transportation Company. It has put a "Best" California traction train on the road consisting of a traction engine of one hundred ten H. P. and four steel wagons of fifteen tons capacity each. The road between the mine and the railroad, with a little bridging across the creeks and irrigating ditches, is an ideal one for this service. The engine was put to a very severe test and made to ford these streams without bridging. It completed four round trips between the mine and the railroad before winter closed in, in four days running time to the trip, pulling a forty ton load. The train travels night and day, using a large acetylene head light. It requires a crew of three men on each shift, the off shift sleeping in a sheep wagon trailed behind the ore cars.

The road followed is a flat valley bottom and desert plain presenting an old lake bed surface of fine gravelly and gritty soil and sagebrush.

There is one hill putting into the mine from the valley three-fourths of a mile long with an average grade of eight



DUBOIS AND SALMON TRANSPORTATION COMPANY'S "BEST" TRACTION TRAIN SURPRISING A NATIVE ON ROAD
TO GILMORE, LENIH COUNTY.



DUBOIS AND SALMON TRANSPORTATION COMPANY'S TRAIN FORDING A CREEK, LEMHI COUNTY.

to ten per cent. The engine climbs this with a train of empties without difficulty when the ground is dry, but unfortunately, this grade was laid out on the shady north slope of the gulch in which the mine is situated and became too slippery for the traction bars to get a hold with the advent of the first snow in the fall.

The engine used, under present conditions, about four tons of coal a day, which is distributed in bins along the route at convenient intervals on the back trip, and finds watering stations at intervals of not over fifteen miles, its tank capacity being good for that distance.

Some strong bridges are being constructed across the creeks, and with these improvements on the present road it is believed by the management that the cost of hauling the ore with this traction train can be reduced to five dollars per ton and still show a handsome margin of profit.

Railway Connection.—A shorter route for a railway connection can be made by way of Junction and Horse Prairie through a very easy pass in the main divide and traversing a rich mining and stock country all the way, connecting with the Oregon Short Line at Armsted, near Dillon, and it is reported that a company has been formed to build a branch line over this route. The consummation of this enterprise would be a God send to this section of Lemhi County, as it would encourage its development and would doubtless lead to the discovery of an extensive resource of lead silver ores, for the great mountain ranges that border the upper Lemhi Valley contain dozens of handsome lead silver prospects that would doubtless in several instances make valuable producers with a sufficient investment of capital.

The geological conditions of this region are closely comparable to some of the important lead silver producing camps of Utah and consist of great bodies of limestone, quartzites and shale cut by intrusive dikes of diorites and porphyry and extensively fissured. It is a region of high elevation with numerous lofty peaks reaching ten thousand feet above sea level, and in spite of the fact that snow falls deep on these high mountain masses during the winter season, there are very few surface streams, which means that the formations are deeply fractured and that the permanent water level is a long way below the surface. This is

borne out by the fact that the most important ore bodies worked in the Texas, Spring Mountain and Nicholia district that border the upper Lemhi and Birch Creek Valleys have never yet reached water level.

The Viola Mine.—The Viola mine, on the opposite side of the valley from the Gilmore, produced five million dollars worth of lead silver ore twenty years ago that was all secondary material. No important bodies of galena were ever found in the mass, and according to the accepted theory of ore deposition based on world wide experience, it is eminently probable that as long as the fissure continues well mineralized with oxidized ore, its valuable secondary ore bodies are likely to be repeated with others at depth until the permanent water level and primary ore, from which they were derived, are encountered.

The Viola ore body was a mass of nearly clean sand carbonate of lead, and carbonate of iron in a shaly limestone above a pronounced contact of massive quartzite. It was twelve hundred feet long and was followed down on a flat dip of about fifteen degrees two hundred feet, where it was cut off by a nearly vertical fault, beyond which the rich lead ore has so far not been found.

The Shear Brothers' Mine.—A short distance north of the Viola fault on the Shear Brothers' group, a body of soft limonite and brown mushy iron oxide that carries a light sprinkling of lead carbonate has been developed with shafts, tunnels and cross-cuts to the extent of a cube of clean oxidized mineral two hundred feet in all dimensions without finding any limit.

The further extensive development of this mass of mineral is likely to lead at depth to another lead or deposit of the magnitude of the Viola near by.

This is one of the prospect offerings that has been a drug on the market in this section for several years at a nominal figure. It is reported to have been tied up by some Pittsburg people with a view of its further exploration, and it is to be hoped that they will get a move on themselves, invest a little capital in it, and give the district a chance to prove itself the coming summer. There is nothing doing at the property at this date.

The Kaufman Mine.—Ten miles southeast of the Viola and on the same pronounced lime, shale and quartzite con-

tact, some Coeur d'Alene capital has recently been interested in a similar extensive showing of oxidized mineral, from which important lead ore developments may be anticipated during the coming year.

This property carries a body of soft red, brown and yellow gossan ore two thousand feet long and ten to fifty feet wide at the outcrop that contains light values in gold and silver all through and at the highest point of its apex, where the vein crosses a steep mountain spur, a streak of lead carbonate ore containing pebbles of galena has been opened in a shaft forty feet deep that contains forty per cent lead, twenty ounces in silver, and five dollars in gold per ton and is associated with a four foot streak of ten per cent concentrating ore, the concentrates of which carry similar important precious values.

This promising prospect of lead ore occurs along the hanging wall side of the iron gossan. It is being developed by a tunnel which will undercut the best lead showing at a depth of two hundred feet, and if the showing is at all improved or even maintained after that work has been accomplished, a shaft one thousand feet deep will be undertaken in its further development.

This is a very interesting mineral region with an important past record of production and a very promising future. It has been practically idle since 1885 until the successful undertaking of the Gilmore enterprise, which, when started, was looked upon as one of the least important prospects of the belt.

The rapid advance in lead and silver values should make this section attractive to investors in this line of mining. This can be appreciated from the statement that the lead production of the Viola was marketed when lead was selling around three dollars a hundred. The same would have twice that value at the present time.

Leadville Mine.—This interesting property is situated down the Lemhi Valley twenty-five miles northwest of the Gilmore mine and three miles northeast of the Junction postoffice. It has a fine ore showing at present development, is in a very promising mineral district that carries some high grade copper as well as lead ores and is noted for good precious values combined with the smelting minerals.

The Leadville mine is owned by an incorporated company known as the Junction Mines Company, of which Mr. A. J. McNab of Salmon is president, Mr. John H. Padgham secretary, and Mr. J. E. Boss manager. Five men are employed, and the total development is three hundred eighty lineal feet, most of which was done during the past year.

The property carries a strong contact fissure in lime and porphyry containing a handsome ore shoot of considerable length of high grade silver lead ore consisting of clean galena and lead carbonate mineral several feet wide in places. Drifting is being continued on the vein and from recent reports is showing evidence of encountering a second ore shoot, and the prospect of the property entering the shipping list during the coming year is very flattering.

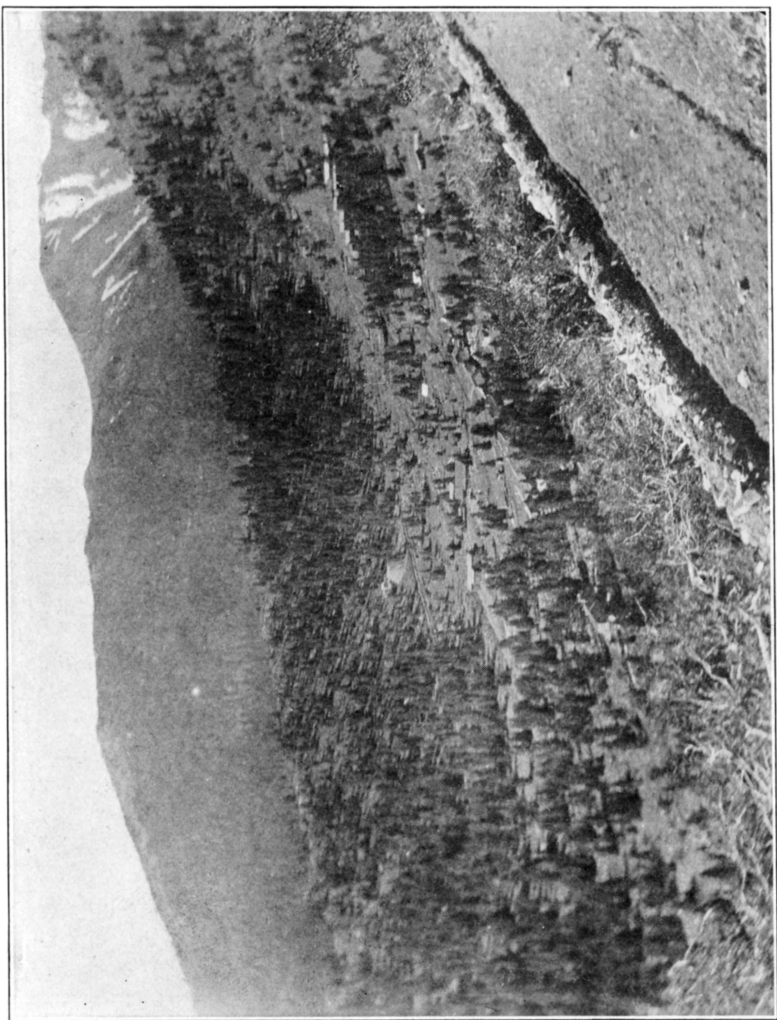
Operating costs at this point are as follows: Mine timbers, two and one-half cents per foot; lumber sixteen dollars per thousand; sinking cost is given at fifteen dollars per foot, and drifting at \$5.50 per foot. Wages paid miners is \$3.50, and laborers \$3.00 per day of eight hours. Mr. D. C. Reed is superintendent in charge of the work.

Copper Queen Mine.—This property, situated on Agency Creek, a few miles east of Fort Lemhi, has been operated in a desultory fashion for a number of years and has made a considerable production. It has passed into the hands of an incorporated company whose headquarters is at Duluth, Minnesota, and is now being more actively developed. It carries a fissure vein in altered sedimentary formations near the main divide of the Rocky Mountains, and contains some good shoots of rich bornite copper ore containing important gold and silver values with occasional specimens of coarse native gold in the clean copper sulphide mineral. The property is equipped with a small concentrating mill and shipped several cars of rich concentrates and crude ore during the past season. Mr. S. S. Mitchell is superintendent in charge.

Virginia Mining Company.—This company is capitalized for one million shares at a par value of one dollar per share under the laws of Arizona. Its principal officers are Mr. M. B. Sowles, president; Mr. W. A. Byers secretary and treasurer, who also acts as manager. Its property consists of a large group of claims on Sandy Creek, a trib-



QUARRYING GOLD ORE, ULYSSES MINE, LEMHI COUNTY.



GILMORE CAMP, MINE AND MILL, LEMHI COUNTY.

utary of Lemhi River, entering that stream a short distance below Fort Lemhi. These claims carry a good many hundred feet of tunnel development, exposing some good shoots of gold bearing quartz in a formation of slaty quartzose rock and are associated with intrusive dikes of diobase and porphyry.

The company has made a number of tests of its different ore showings and found a very favorable extraction of the value as free gold together with concentrates in the form of a mixture of iron, lead and copper sulphide minerals that run high in precious values, and is planning the further extensive development of the claims and their equipment with a milling plant in the near future.

The Climax Mine.—Near the head of the next tributary stream putting into the Lemhi north of Sandy Creek and known as Pratt Creek, the Climax mine has been quite actively developed during the past year and is now employing a force of fifteen men. It is equipped with a ten stamp mill which was moved during the past summer and rebuilt at a more favorable location for the economical handling of the ore. A compressor plant was installed and two hundred sixty-five feet of new work accomplished on the mine. Its total development is quite extensive in the shape of cross-cuts, raises and drifts on a vertical fissure vein in altered sedimentary formations that carries some well defined ore shoots containing good milling values in free gold, and also concentrates, of hematite and pyrites, associated with lead and silver, as well as high gold values that will pay well for shipping to a smelter. The concentrating attachments of the mill consist of three Frue vanners.

This property is near the summit of the main range of the Rockies at an elevation of nine thousand feet. The wages paid are as follows: Miners, \$3.50 per day; laborers, \$3.00 per day, eight hours shift. Mr. F. C. Miller is manager in charge, and Mr. Richard Gies of Great Falls, Montana, is the sole owner.

The U. P. Mine.—This property has recently been purchased by Hon. Frank R. Gooding and associates, whose attention was called to the investment by Mr. R. W. McBride of Salmon City, and is being actively developed at the present time under his management. It is situated near the summit of the Leesburg range near a small glacier

lake at the head of Moore Creek, in sight of and only seven miles distant from Salmon City, the county seat of Lemhi County.

The natural surroundings of this property are ideal for its rapid and economical development, and the writer is quite familiar with its early history.

It carries a true vein that stands nearly vertical and strikes into the bold face of a steep granite slope. This vein is from three to nine feet wide, and readily traceable for three thousand feet of its length. It has been opened by a succession of adit tunnels exposing fine ore shoots of shattered quartz and iron oxides in the two upper tunnels that carry average values of eight to ten dollars per ton in gold.

It has been several years since the writer has visited this property, but it is learned that lately lower adit tunnels have been run on the vein. One of these directly connected with a five stamp mill is reported to have developed ore of very high value in gold running up to as much as three hundred dollars per ton.

Some recent tests were made with the small mill now on the mine which proved that the values were not susceptible to a high degree of extraction with simple plate amalgamation, which is all the equipment the mill has at present, and it is manifest that additional equipment will be needed for the better extraction of the gold.

Some preliminary tests have been made on the ore which indicates that it will yield readily to cyanide treatment, and it is not unlikely that that method will be employed.

The U. P. Mine is one of the most attractive gold lode showings in the county, and is worthy of further extensive development with a view of its subsequent equipment with a much larger and more complete milling plant.

Kittie Burton.—This company, operating the Kittie Burton and Ulysses mines at Indian Creek, thirty-five miles north of Salmon City, is the most important gold producing operation of the county. This property has been producing steadily for several years, first with a five stamp mill, then a thirty stamp mill, which unfortunately was destroyed by fire during the summer of 1905, and it is now being operated with a fifteen stamp mill under the management of Mr. J. Uren, an experienced practical

mining man, formerly of Owyhee County, Idaho, who has made a creditable record since he assumed charge of the property, and in spite of many difficulties has brought the proposition up to a handsome paying basis. The ore deposits of this property was contained in a formation of schisty gneiss associated with a dyke of quartz porphyry.

The Ulysses mine, which is the principal source of the ore supply, has practically been a daylight proposition since it was first opened.

The ore bodies are of considerable thickness, and lie with a flat dip under a shallow over-border of rotten decomposed country rock. The vein has been considerably faulted, big segments of the main ore shoots having dropped down in a succession of short steps which, however, are readily followed from one to the other.

This condition involves a lot of extra handling of waste material, as the cover of the ore is shallow and so soft, it is practically impossible to hold it up with timbering after the ore has been mined, and results in a good deal of deep stripping and open quarry work.

The accompanying illustration shows one of these big quarries and the body of the ore about twenty feet thick with its great overburden of waste and aptly illustrates the method under which a good deal of the ore resources of the mine have been handled.

The values of this great body of gold bearing quartz average \$6.00 to \$10.00 per ton, not all of which is free, and additional treatment is needed to increase the savings obtained on the plates.

In addition to these average values, pay streaks have been encountered occasionally in this vein that run fifteen to twenty dollars per ton, several feet thick, and some very profitable mill runs have occasionally been made on this better class of ore, but a handsome margin is steadily accumulating under the present management on the average values available and the property is in a fair way to recoup its serious financial loss by the destruction of its thirty stamp mill and to be put on a dividend basis.

The ore of this mine is conveyed to the mill over an aerial tram of the Leschen pattern. Water power is used at the mill for a short part of the season during the spring

flood and steam power with cord wood fuel the balance of the year.

The cost of cord wood at this point is \$4.50 per cord. Stull timbers at the mine cost four cents per running foot and lagging fifteen cents each. Lumber is eighteen dollars per thousand and freight from the railway forty dollars per ton. Drifting costs three to five dollars per foot. There is no shaft work on the mine. The ground is dry and no pumping is required. The property carries a crew of thirty-five to forty men, who work eight hours shift, excepting engineers, who work twelve hours. The rate of wages paid is not available, but is probably on the basis of \$3.50 per day for miners.

Mineral Hill District.—The Old Kentuck and Grunter mines of this district with large reserves of fair grade gold ore in sight have remained practically idle during the past year.

The Clipper Bullion mine on the opposite side of the river, which carries a well defined vein of rather low grade and base gold ore, was operated and made to yield quite an important item of gold in a five stamp mill by its owner, Mr. E. S. Suydam, who is one of the most expert amalgamators in the State.

At Pine Creek in this district, the Big Lead Gold Mining Company's group of mines, formerly owned by Mr. Dan Langal and associates, was sold during the past year to a Denver company and was recently being developed with a force of fourteen men. The property is equipped with a ten stamp mill and carries some rich ore, and its resources are said to be making a very gratifying showing.

Gibbonsville District.—At this well known district the old A. D. & M. mines were sold during the year to eastern capitalists who are working a small crew in their further development. This property carries a number of fissure veins in slate containing high gold values associated with iron pyrites. It was formerly the scene of extensive mining operation and has produced over a million dollars worth of gold bullion.

Gibbonsville is one of the prettiest mining camps in the State. It has lots of virgin territory of good promise, and is likely to be further heard from as a producer in the future.

Silver Creek District.—At Silver Creek, the Rabbit's Foot Mining Company is working twenty men in the further development of its extensive holdings.

This property carries very large deposits of low grade gold ore with narrow streaks of rich rock and will probably require a larger milling plant for its successful treatment.

In the same vicinity, the old Singiser mine, owned by the Oregon-Idaho Mining Company, is working a force of forty men. It has a large vein containing some fair values, but the gold is combined with silver and seems very difficult to treat, although the ore is a simple looking mixture of quartz and silicified volcanic breccia containing no base elements apparent to the eye.

This enterprise has been supplied with a large amount of capital but seems to have been unfortunate in getting the proper quality of gray matter blended with the processes that have been adopted for the treatment of its ores, if the values they contain average as well as reported.

The Yellow Jacket District.—At this district considerable mining development work has been continued during the year, particularly on the Black Eagle group and the Red Jacket group, which are both owned by incorporated companies, who are following the sensible plan of pretty thoroughly demonstrating what their ore resources are, and getting an idea of their method of treatment before going into mill construction.

This district has given employment during the year to from ten to twenty men in mining development work.

Blackbird District.—The Blackbird district, situated twelve miles northeast of the Yellow Jacket, is the banner copper district of Lemhi County and contains some immense deposits of concentrating copper sulphide ore that carry associated values in cobalt and nickle as well as important gold and silver values.

Several of the mines in this district have been developed to considerable extent and a large group of claims has been patented, but the best developed properties have been practically idle for several years waiting better transportation facilities.

The association of nickle and cobalt in these ores has recently attracted the attention of heavy metallurgical in-

terest and a deal was made during the past season on Rose Brothers' group of claims which is now being actively developed with a force of ten men and their cobalt and nickle contents particularly investigated. These claims are known to carry considerable high grade cobalt ore, and the success of the venture will likely induce other investments, as many of the other properties of this district carry important showings of this mineral associated with their copper values.

Leesburg District.—The ore deposits of this old placer camp, fifteen miles west of Salmon City, attracted the attention of a number of mining experts during the past year and several deals are reported to be in progress. One of these, involving the transfer of the old Italian mine, which carries a wide deposit of low grade gold ore that it is believed will justify a large milling plant.

At the Gold Ridge mine a small force has been kept constantly at work on development and sufficient ore resource put in sight to justify the purchase of a mill, the machinery for which is now on the way to the mine.

Lemhi Coal.—The coal deposits near Salmon City, known as the Pollard coal mine, is being operated with a crew of three men and is furnishing an important item of domestic fuel.

Seven miles northwest of Salmon City, the Queen of the Hills gold mines suffered the loss of their compressor plant during the year, which has retarded their developments. Work has since been resumed and the mine is now giving employment to a crew of four men.

Base Ores.—Like almost all the other lode gold producing districts of Idaho, the gold ores of Lemhi County are generally quite base. At a shallow depth under the surface they are usually associated with the sulphides of the baser metals, involving considerable metallurgical knowledge in their treatment, which has been the stumbling block of many of its quartz mining enterprises, as mills have often been erected without sufficient preliminary development and investigation of the proper method of extracting the values.

These ores are of extensive distribution over the county and carry as high selected and average values in gold as many other milling ore districts of the State, and with a

careful preliminary investigation of treatment methods, important producers are likely to be brought in.

The mines of this county are now employing fully three hundred men, who are mostly engaged in development work.

The output of gold during the past year has not been increased over the previous year, but there is more activity amongst the mines than usual, at the present time, and an important advance in this respect may be anticipated during 1907.

Power Development.—Lemhi County is one of the best watered regions in the State. Its numerous streams carry many fine sites for development of water power and a recent incorporation has been made for the purpose of improving one of these opportunities. This is known as the Hydro-Electric Gold Mines and Power Company, of which Mr. Gustav B. Quarles of Salmon City is president and general manager. The assets of this company consist of a large group of patented gold lode claims containing one hundred thousand tons of developed ore that is said to contain an average value of four dollars per ton, which, with the application of cheap power to run the necessary plant for its reduction, is believed to be susceptible to mining and treatment at a handsome margin of profit.

This mine is situated on the south side of the Salmon River canyon near the mouth of the Fourth of July Creek, about sixteen miles north of Salmon City, and only one mile from one of the finest power sites in the county, which has also been acquired by the company, whose purpose it is to develop and improve it with a view of supplying electric power to its own and other mining enterprises of the surrounding region.

This power site consists of an ox bow bend in the Salmon River, which makes a half circle turn about one and a half miles in length with a fall of twenty-five feet in that distance, while the distance across the point is less than one-half mile, and it is proposed to run a tunnel through this narrow point to convey the water of the river to the power site on the opposite end of the big bend. This tunnel would follow the line of an ancient river channel, the "U" shaped bed rock outline of which is clearly de-

fined in the bluffs near the head of the tunnel site. This old channel is filled with gravel, which tapers down rapidly towards the present stream level at the other end of the big bend, and it is very likely that the tunnel could be quite cheaply run as the bed rock formation through which it has to pass appears to be soft, and it is evident from the contour of the gravel bar overlying it that about half of the distance to be traversed by the tunnel would be through gravel. An immense volume of water would be available at this point, as I think the Salmon River at its lower stage carries fully two thousand second-feet and with the head available several thousand horsepower could readily be harnessed which could be increased as the demand for it developed. The availability of cheap power has been one of the most important incentives of mining development in other parts of the State and would doubtless prove a great benefit in that respect in this region.

Without the advantage of hydro-electric power, the famous Trade Dollar mine at Silver City, carrying a force of two hundred fifty men and producing over one-half a million dollars a year, would have been put out of commission and deserted long ago.

Electric power, carried one hundred miles from Spokane Falls to the Coeur d'Alene mines, has reduced the cost of power requirements in that district fifty to seventy per cent, and greatly stimulated the deeper development of its ore bodies.

This Lemhi power project is a very feasible one and is well worthy of hearty support, as it would prove an important feature both in the mining and other commercial developments of the county.

LINCOLN COUNTY.

SNAKE RIVER FINE GOLD.—This county is laid out almost entirely on the broad, desert plains of the central Snake River Valley, and is attracting marked attention at present as a profitable field for the investment of heavy capital

in large irrigation enterprises which will result in changing its desert flora into a blossoming array of profitable crops and happy homes, as it has vast areas of soil that are unsurpassed in depth and quality anywhere in the west.

In the past, the north shore of the Snake River, which forms the southern boundaries of Lincoln County, has given this division of the State some standing in the production of gold, as that section of the river was the scene several years ago of the most successful gold dredging enterprise that has so far ever been realized for the treatment of the extensive beds of fine scale gold bearing gravels for which this stream is noted.

This was the operation of the Sweetzer-Burrows Dredging Company of Minidoka, whose plant and its operation was described in detail in my report of 1904. This plant was a suction dredge that ran several years and handled three thousand cubic yards a day, saving ninety per cent of the gold contents of the gravel raised from the low bars in the stream and along its borders between high and low water mark, where the values concentrate at the short bends of the stream.

This company's operations commenced something like thirteen years ago, when they practically had the choice of the stream, the results obtained, skimming the best layers of gravel to a depth of about six feet, averaged all through less than ten cents per cubic yard. After several years' continuous operation, which resulted in one ten thousand dollar dividend, the enterprise was abandoned as the possible margin of profit was too small to warrant its continuance.

There has been probably a million dollars worth of dredging plants built along the Sanke, but this is the only one that I know of that ever paid a dividend.

The southern Idaho counties bordering the Snake River annually report at the United States Assay Office at Boise with small shipments of gold derived from small sluicing operations along the low bars that border the stream for miles. These small operators are satisfied with two to four dollars a day per man, during the summer. They pick a favorable place along the first terraces that rise ten to twenty feet above high water mark, and afford a little dump, then build what is locally called a "machine,"

consisting of about forty feet of three to four feet sluice, floored with a steel-punched screen in the first box. A sluice head of water, generally derived from some of the big irrigating canals, is diverted on to the ground and sluicing commenced through the flume. The first three to six feet below the soil generally carries the best pay. The fine material drops through the screen and is diverted at right angles on both sides of the sluice through a distributing box on to a series of inclined tables four feet wide and ten feet long, covered with canvas or burlap, on to which the fine material is fed with plenty of water, and the gold and concentrates readily settle about 90 per cent of the gold, and the heavy concentrates being caught on the first four feet of the tables, which is swept up into a tray every few hours by diverting the pulp and turning on clear water. The concentrates and gold are stored until a sufficient batch is accumulated, then run through a small arrastra, or grinding pan, in which quick silver is added and the gold amalgamates perfectly after a few hours grinding.

This simple device, intelligently handled, will save 90 per cent of the visible fine gold of the Snake River gravels. It is applicable, too, to big dredging operations and has never been improved upon by any patented process in practical use in this field.

Personally, I am sceptical about the invisible gold contents of these gravel deposits, except the coated gold which is readily recognized. The Snake River's fine gold is finer than any natural placer gold I know of. It is high grade and worth \$19.50 per ounce, but requires fully 1,500 colors to weigh one cent in value, yet under a powerful microscope, each color is an individual nugget showing abrasion marks. These particles are often coated, touched or spotted with a crystalline white film of some foreign substance that looks like silica under the glass, and this is what makes it necessary to polish it in a grinding pan before it will amalgamate freely. The size of the particles range within comparatively narrow limits, but there is no gradual shading from the smaller colors into impalpable dust, and if the gravel contains any invisible gold that can not be recognized in an ordinary pan with the naked

eye, it must be locked up in the particles of heavy concentrates.

Platinum.—The recent experiments of Dr. David T. Day of the United States Geological Survey at Portland, Oregon, on the heavy placer concentrates of the Pacific slope, to determine their value in other metals and minerals besides gold, included a number of samples of Snake River concentrates which almost invariably yielded from a trace to quite an appreciable amount of platinum, but I doubt if many of the results obtained were from representative samples; and while the subject is an interesting one and well worthy of close and intelligent investigation, in the present state of the platinum market, I am afraid the platinum values are too thinly scattered along this stream, unless they prove to be combined with the concentrates. The actual contents of magnetite and similar heavy residues in these gravel beds, as nearly as I can figure, is from one-fourth to one-third of one per cent of the gravel, and that when their visible free gold contents is properly amalgamated out, the residue will not assay over five dollars per ton gold.

I visited the point on Snake River from which the highest result in platinum was reported during the progress of the Portland Fair, which yielded platinum at the rate of .018 of an ounce per ton and several hundred dollars gold per ton, from the same sample, and learned that it was selected from the first burlap on one of the "machine" tables, with the fine gold left in, and probably represented a concentration of several thousand to one. A subsequent sample of clean, black concentrates taken from below the grinding pan, after the free gold had been amalgamated out, was sent to Doctor Day and gave a result of \$3 gold per ton and only a trace of platinum.

The statements of irresponsible promoters about Snake River gravel beds running from 25 cents to a dollar or over per cubic yard in gold are usually gross exaggerations, in my experience; for while such values do exist along this stream, they usually occur as thin, skim layers an inch or two thick, with a foot or two of comparatively barren gravel in between the layers, and I seriously doubt that there exists a bed of gravel anywhere on Snake River of any area in extent that will average over 25 cents

per cubic yard where a depth of ten feet is worked. There are some favorable areas where 10 cents to 15 cents per cubic yard can be obtained. The gravel is usually well worn and small and affords ideal conditions for dredging, and with a large enough plant and intelligent handling, may be made to pay, but the possible margin of profit, working for its gold contents alone, would be small and unattractive, unless associated values of gold or platinum, not apparent to the eye and to ordinary methods of saving, can be recovered.

That platinum exists in metallic form, associated with the gold in these gravel beds, can not be questioned, for while it can rarely be seen in panning, it invariably shows in cleaning amalgam. In the operation of the Sweetzer-Borrows dredge near Minidoka, it was always observed at clean-up time as grey metallic particles floating on the quick when the hard amalgam was thinned down with more quick for the purpose of separating foreign matter from the gold. A quarter of an ounce of clean platinum recovered in this manner is now in the possession of Mr. Lewis Sweetzer of Rupert, Idaho, one of the owners of the dredge enterprise above referred to. It is perfectly clean grey metal in scaly particles and about as fine as the fine gold.

An extensive dredging operation would doubtless accumulate considerable platinum in this way, but whether it could be successfully separated and of sufficient quantity to cut any important figure in the result, remains to be seen.

I have gone into this detail for the purpose of putting intending investors in Snake River fine gold enterprises on their guard against exaggerated statements of these matters. People are often led into enterprises of this kind on the unwarranted promise of great profits, lose their money and are ever after sore against the State. While it is possible that moderate profits may be made from the proper handling of these deposits, they are generally low grade and exaggerated statements of their values should be liberally discounted.

There are two or three enterprises afoot at different points along the river now which I believe are being gone at in a practical manner and will test the problem of sav-

ing the possible profit in the by-products of the gravel, in addition to its gold contents. One of these is being undertaken at a point on the Oregon side of the river a short distance below Weiser, Idaho, and another at a point a short distance above American Falls, Idaho, and the results of their efforts are anticipated with much interest, for if any margin of profit at all can be made, in which platinum metal would cut any figure in the output, the results would be important to the country at large on account of the high value and present scarcity of this useful metal, for the business might be greatly extended, as there are billions of yards of these low grade gold and platinum bearing gravels along the banks of Snake River.

Contrary to the experience with other gold placer deposits, the Snake River gold does not increase in quantity as bed rock is approached, and is nearly always more plentiful between present and ancient high and low water mark in the gravel banks than at the deeper horizons.

The stream has been absolutely stopped for several days at two points along its course within the past two years by the completion of the Milner and Minidoka dams, and its bed rock laid bare for miles, when its potholes and crevices were searched in vain for paying gold values.

The Government dam at Minidoka has raised the water over an adjacent high terrace carrying an old river bed that contains some of the best values in fine gold I know of at any point along the Snake. This is known as Diamond bar, and the shallow water now covering it affords a constant pond to float a chain bucket, or suction dredge, either one of which is adapted for treating this ground, and I understand a company has been formed to put a dredge on this ground and take advantage of the favorable situation created by the big Government irrigation enterprise.

NEZ PERCE COUNTY.

With the acquisition of a slice of the southern end of Shoshone County, Nez Perce County acquired the famous old Pierce City mining district.

Pierce is the original camp from which Idaho's famous placer mining history dates, and has been a constant producer of gold for the past forty-five years. Its easily available, rich and shallow diggings that could be treated by hand methods are pretty well exhausted, but there still remains some extensive flat tracts of gravel deposits that contain excellent values for operation by the necessary mechanical equipment and are especially adapted for dredging and hydraulic elevator work, as the gravel of this district is rather small and the bed rock of rotten granite generally soft.

Associated with the placers of this district are a number of gold-bearing vein deposits that have been developed in several instances with very encouraging results, and, in fact, have formed an important part of the gold production of this district, whose total output for the past year will aggregate the respectable sum of seventy-five thousand dollars, a figure that conditions indicate will be largely increased during 1907.

The Idaho Company, Ltd..—The gravel deposit of this company was successfully operated by a Risdon dredge with three and one-fourth foot buckets during the past season. This machine was started May fifteenth and ran until November, handling about one thousand yards a day.

The ground that was worked this season was mostly old tailings that yielded ten cents per cubic yard in gold at a cost of seven cents per cubic yard, including all charges.

This dredge was worked through the tailings to new ground, which will be handled during the next season's run, that has been quite extensively tested and found to contain an average value of twenty to twenty-five cents per cubic yard, on which a very handsome margin of profit is anticipated.

The success of this enterprise is such that the company

is considering the construction of another dredge of much larger capacity, as it has sufficient ground to last for fifteen years with two machines.

The American Placer Mine.—This is another well known and extensive placer deposit of the Pierce district. It is situated about seven miles west of Pierce City, on Orofino Creek and comprises four hundred acres of choice placer land containing saveable gold of values amounting to from twenty to thirty cents per cubic yard.

This property is being operated under lease by Mr. James M. Porter of Spokane, Washington. It was formerly operated by a bed rock flume, which, on account of the flat grade of the ground, proved unsuccessful in not being able to carry off sufficient material. This difficulty has been overcome in the present operation by the introduction of a Ruble elevator, which has solved the problem of successful treatment of this deposit, and may be of interest to placer miners elsewhere, as it is one of the simplest and most efficient devices ever invented for ground adapted for its use, according to the opinion of practical placer miners who have used this device in extensive operation here and at other places.

The Ruble elevator was exhibited at the Portland Fair, where it attracted a good deal of attention from placer miners. It is an inexpensive one to build and operate. From four to six thousand feet of lumber and about two thousand pounds of strap and sheet iron, bolts and nails, are the materials required, and a good carpenter with two or three helpers can build the elevator in three or four days. The one on the American placer mine, herewith described, costs about two hundred dollars.

This elevator is a combination of grizzly, elevator and undercurrent, and has a decided advantage over other elevators in respect that it screens the fine sand and gravel, which carries the gold from the boulders while it is all being elevated. The fine material and its precious contents passing through the grizzly, drops into an apartment with a tight, smooth, inclined floor, down which it is washed by the spent water from the giant into the sluice boxes, where the gold is separated from the sand and gravel by the ordinary process of sluice box and riffles, to finer table concentration, if desirable.

The elevator on the American mine is what is called the 25-foot elevator, the small size, and consists of an inclined chute somewhat similar to that used in loading cattle or other live stock into freight cars. The mouth of this chute at bedrock is fourteen feet wide, which narrows to eight and one-half feet in a length of twelve feet. The sides are seven feet high, double boarded with inch lumber. The bottom of this section, the apron, which is built on an incline of about twenty-five degrees from the horizon, is also double boarded, as is also three or four feet next above the apron proper, extending over the sluice box, which runs crosswise under the inclined chute or elevator. The elevator or chute extends upward from the apron on the same slope or incline, twenty-five feet, at a uniform width of eight and one-half feet. This last twenty-five feet consists of a grizzly made of 2x5 inch lumber 8 feet long, with two inch spaces between the grizzly bars, through which all the fine material and gold drop into the tight inclined box beneath, which box is eight and one-half feet wide, ten inches deep, and thence passes into the sluice box, while the rocks, boulders, etc., pass on up through the elevator and are dumped behind. The sides of the elevator are double boarded about four feet high and single boarded three feet higher.

The grizzly bars (2x5-inch lumber) are given a slight bevel and upon each a strap of iron three inches wide, three-eighths inch thick, eight and one-half feet long, is bolted, the bolt heads being counter sunk to avoid friction. This prevents the boulders sliding back, neither do they catch on the bars as they travel upward, as the dip of the grating in the bar is greater than the incline of the elevator. The elevator giant is not placed directly at the mouth of the elevator, but from fifty to seventy-five feet distant. This affords a receiving space in front of the elevator that will hold several hundred cubic yards of gravel. It is not necessary to elevate the gravel as fast as it is driven to the elevator, as with other elevators. This elevator can not choke up. Since starting operations with this elevator, a change has been made to No. 3 giants with five and three-quarter inch nozzles, which handle all the water through one giant instead of two. The present method of working is to use all the water through the field

giant, driving the gravel around and piling it up in front of the elevator, then changing the water to the elevator giant and driving the gravel through the elevator. While this is being done the field giant can be moved if necessary, while the whole volume of water is at work practically all the time. Experiment has shown that about 25 per cent more work can be done with the same amount of water by the latter method than by the former.

The elevator is on rollers and is easily moved. When the boulders and waste material has filled in behind the elevator, all the space will contain, the bedrock is cleaned up, the apron taken off or raised, a horse is hitched to the elevator, by capstan, the elevator is moved nearer to the gravel bank and away from the waste pile, the apron placed in position and operations begun again.

At the American mine, boulders the size of 32x18x16 inches were elevated twenty-two feet high, with a four inch nozzle under a head of a little over one hundred feet. Anything the field giant can drive to the elevator can be put through. Dividing the water into equal parts, the field giant can not keep the elevator giant supplied with gravel. Using large enough giants and nozzles to handle all the water through one nozzle, it requires one pipeman and two laborers on the day shift, and one pipeman on the night shift to operate the American placer mine. The laborers move the field giant while the elevator giant is using the water, break up boulders, with powder, that are too large to handle with the water, clear off brush, move the elevator when necessary, and work at anything that is to be done.

This simple machine, where sufficient water is available and the ground conditions favorable for its use, is likely to prove an important feature in the the treatment of flat lying gravel deposits, as it seems to possess superior points to any other device so far used for elevating placer gravel. It handles a much larger boulder than is possible with other types of elevators and save a good deal of hand labor in that respect and is said to have from thirty to fifty per cent more efficiency than any other machinery used for the same purpose with a hydraulic jet.

It is manufactured by the Ruble Brothers of Golden, Oregon, who issue a pamphlet describing its chief points

and adaptability and giving a number of interesting illustrations of the machine in working order, together with a list of testimonials from people who have put it to very severe tests.

OWYHEE COUNTY.

The mining progress of the past year in this old reliable gold and silver producing county has been punctuated by a number of important features.

DeLamar Mine.—The successful adaptation of the new mill built on the DeLamar mine for the closer treatment of its ores and saving of values has been retarded by the reason of the new development in the methods being employed involving unforeseen difficulties, also by reason of aggravating delays of getting the necessary machinery to complete the plant.

At last accounts, this had all arrived and was being put in place and it is not unlikely that the property will again assume its important position in the matter of bullion production and probably exceed its record of recent years.

During all the time that the new milling plant has been under process of reconstruction a large force of men has been kept employed in the development of the old mine, and also opening up new ore reserves on the company's extensive tract of territory over the DeLamar ridge, in what is known as the Summercamp ground.

The mill tunnel has been refitted and the connection made to the main workings of the mine above, which has greatly improved the ventilation, and the property is in splendid shape for ore production; it has a reserve of pay mineral in sight at the present time that will take several years to exhaust with the present milling plant of one

hundred tons a day capacity, if further development of new ore deposits were to cease right now.

This company's property is of very extensive area and has several interesting features and undeveloped problems that warrant further investigation and in some instances promise bonanza results. The management is wide awake to these opportunities for finding new ore sources and is taking advantage of them as conditions warrant, and with the present healthy physical conditions and ore in sight displayed by the property, it seems no exaggerated prediction that it will safely reach the ten million mark in production and will exceed that figure, for its record is closely approaching nine million dollars now. Nearly three millions of its output has been paid in dividends.

The Trade Dollar Consolidated Mine.—This reliable old producer has continued to yield its precious values with the regularity of clock work, and in spite of the scarcity of labor and the extraordinary amount of personal attention demanded by its manager, Mr. Frederick Irwin, in connection with the expansion of the company's great power plant at Swan Falls, the rich ore reserves in the mine are still maintained at such magnitude as to warrant the continued operation of its twenty stamp mill for several years ahead besides making its normal great output for the current year.

This property employed an average of about two hundred and eight men, who were made happy during the fall by a general advance in wages all through.

This is one of the oldest eight hour shift mines in the State, and the former rate of three dollars per day for miners has been raised to \$3.50 and \$3.75 for machine miners, \$3.25 for hand work, timbermen \$3.75, laborers \$3.00, engineers \$3.75, motormen \$3.50, electricians \$4.00, blacksmiths \$4.00, carpenters \$4.00. Wood at this camp costs \$10.00 per cord, mine timbers twenty cents per foot, lumber \$40.00 per thousand, and freight from the railway \$12.00 per ton.

This property carries one of the most extensively developed veins in the State. Its total development aggregates eighty thousand lineal feet (of which five thousand five hundred eighty-five feet was run in 1906). The principal feature of this development is a succession of cross-cut and

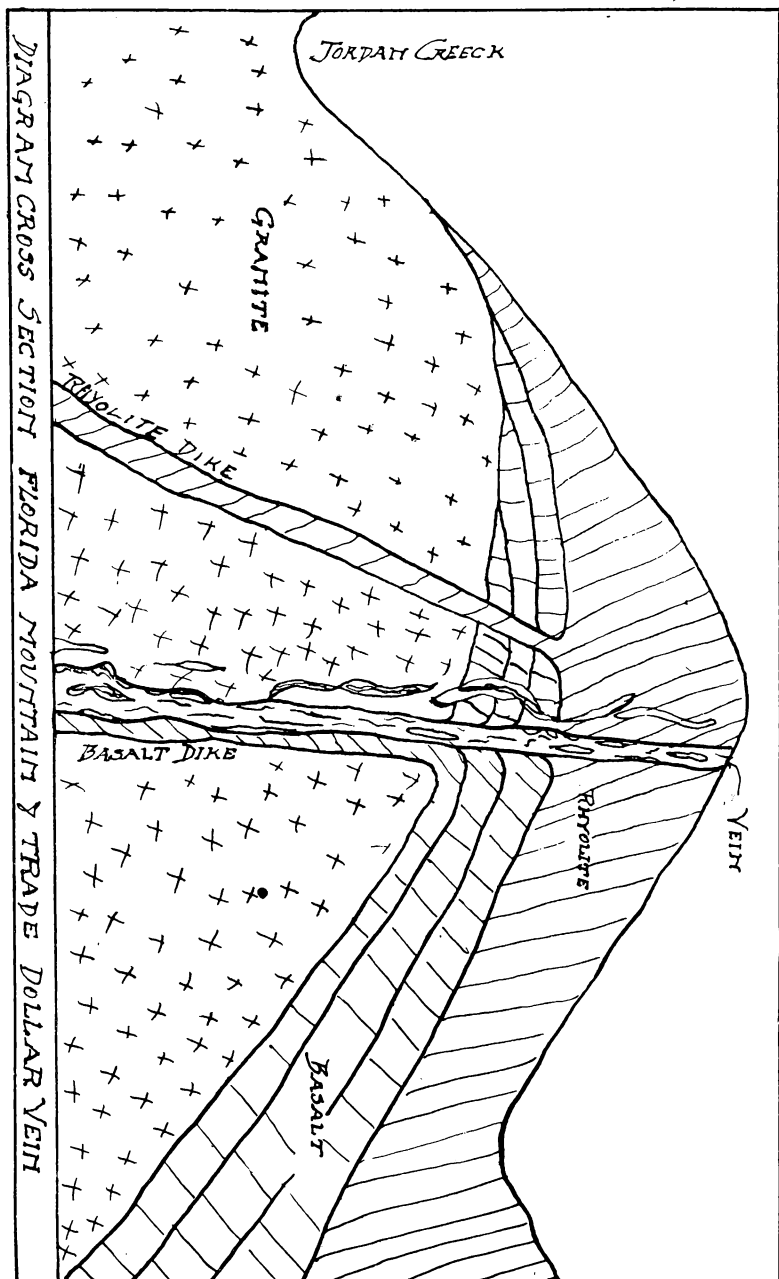
adit tunnels with underground connections that have been carried entirely through Florida Mountain for a distance of over two miles. The main avenue is a long drain tunnel extending from the mill back under the main workings that is now thirteen thousand feet in length and gains a vertical depth under the highest crest of the vein of seventeen hundred feet. This tunnel is equipped for electric haulage and through it all the ore is delivered to the mill at a very nominal cost, and it has opened up to convenient means of exploring some extensive virgin stretches along the course of the vein that are affording handsome results. All the power requirements of this extensive mining and milling operation are supplied from the company's power plant at Swan Falls, which is furnished at a very low cost, and, in fact, is a principal feature of the successful extraction and treatment of the ore, as the cost of steam power in this district is practically prohibitive.

All the active development of this mine is kept up in elegant shape and every reasonable precaution for the protection of the men is taken.

The drain tunnel makes a dry mine and affords excellent ventilation all through, excepting in new headings, which are supplied with electrically driven fans, and the operation affords a desirable place for men to work.

The Trade Dollar vein is a very interesting deposit of tertiary age. The actual pay course from which its great record of production has been made, amounting to over twelve million dollars, does not exceed a foot in width, but has been remarkably persistent in both length and depth. It is probably the only productive vein in the State that cuts a basalt formation in its course. The wall rock at the cropping of this rich fissure is in rhyolite. At a little further depth it passes through a sheeted deposit of basalt, and passes on down into the underlying granite formation which forms the core of the mountain. The accompanying sketch aptly illustrates this condition.

Trade Dollar Vein.—The basalt herewith described is of the Columbia variety and of a little earlier date than the recent black basalt of the Snake River plain. The ore is a comby white quartz and is accompanied below the basalt sheet by a persistent narrow dike of the same formation, which is unquestionably the vent of the great sur-



face flow of this rock and was subsequently a conduit of hot silicious waters carrying rich gold and silver values, accompanied with deposition of argentite and chalcopyrite, which occurs in crustified lines, particularly along the borders of the quartz fillings next to the walls of the fissures. Segregations of pure argentite occur that contain bonanza values. The writer handled a specimen of this mineral in one of the deeper levels last fall that weighed several pounds and contained seventy per cent of its weight in silver and very high values in gold.

The company's power plant at Seven Falls on the Snake River has recently been greatly increased in capacity and a transmission line built to convey the juice for commercial power development to Nampa, Caldwell and Boise. This power is also supplied to the other mines of the Silver City district, and is a boon to their economical development, as the country is practically devoid of timber and the cost of wood or coal for steam makes its use prohibitive.

The Trade Dollar is still good for a long life of profitable production, from its present appearance; with a new drainage level to sink from which makes its development to great depth possible, and the property affords an excellent example of up to date mining and milling practice.

The ore is treated in a twenty stamp wet crushing mill using direct concentration on Wilfley tables and Fruevanners which recovers about seventy-five per cent of its values. A total saving of ninety-four per cent of the gold and silver value of the ore is made at a total cost of two and 90-100 dollars per ton, and the difference between the concentration recovery and the total saving is gained by working the tailings in amalgamating pans and settlers without further grinding by the addition of mercury, together with a little blue stone and salt with steam heat. The average value of the ore as it goes into the mill ranges from thirty to forty dollars per ton of which about three-fourths is silver and one-fourth gold. The concentrates which are shipped to the smelters run something over two thousand dollars per ton.

The Potosi Mine.—This old property, situated right in Silver City, was taken over by the Potosi Mining Company, Ltd., during the year and is being reopened and

further developed with a crew of twelve men at the present time. It is developed through a shaft which is down two hundred two feet. The shaft has been retimbered and two hundred eighty feet of new work run, up to December 1st, since the new company took hold.

The mine has a record of rich ore production in former days and the new work has encountered some very encouraging results. The vein strikes north and south and dips west at a steep angle. The ore occurs in shoots, one hundred feet or so in length. The values run in gold, silver, lead and copper, and the rich pay mineral ranges from one to two feet in width and about one hundred dollars per ton in value.

Drifts are now being pushed out from the lower station on the Potosi vein and cross-cuts run to explore a parallel ledge known as the Knickerbocker, which formerly produced high grade ore in some shallow development.

The president of this company is Mr. D. C. Nevins and Mr. W. F. Summercamp is secretary and treasurer, both of Weiser, Idaho, while Mr. J. E. Masters is superintendent in charge.

The mine is near the center of this rich district and is locally well thought of. The company is planning the erection of a compressor plant and machine drills, also a mill for the reduction of the ore when the development has advanced sufficiently.

The mine is now operated with a thirty horsepower electric hoist, using twelve hundred pound steel buckets and capable of handling ten tons of material an hour; an electrical driven Gould station pump handles the water.

Banner Mine.—This is one of the new development enterprises of the Silver City district and is owned by an incorporated company. It is capitalized for one million shares of a par value of one dollar each, and the present value is reported to be two dollars per share.

The holdings of this company comprise one hundred fifty acres of mineral territory that is traversed by a fissure vein a short distance west of a parallel with the Trade Dollar. It is being developed by a cross-cut tunnel from which the vein can be drifted on at considerable depth. The Banner vein, in a shallow upper tunnel and drift, makes a very handsome showing. It is of the same char-

acter and carries the same class of minerals as the famous Trade Dollar near by. The wall rocks in these upper workings are rhyolite, and some very rich specimen ore has been found in the upper tunnel, where the vein is of good size, three to eight feet wide, and carries excellent milling values on the average. The work on this property is being done by contract and nine hundred feet of cross-cutting and drifting has been done during the past year.

The short gulch below the Banner vein has been noted for the production of big nuggets of native gold. The vein is persistent through this and adjacent properties. It will doubtless penetrate the three formations, as was experienced in its famous neighbor, and its extensive development by drifting from the new tunnel promises some very interesting results.

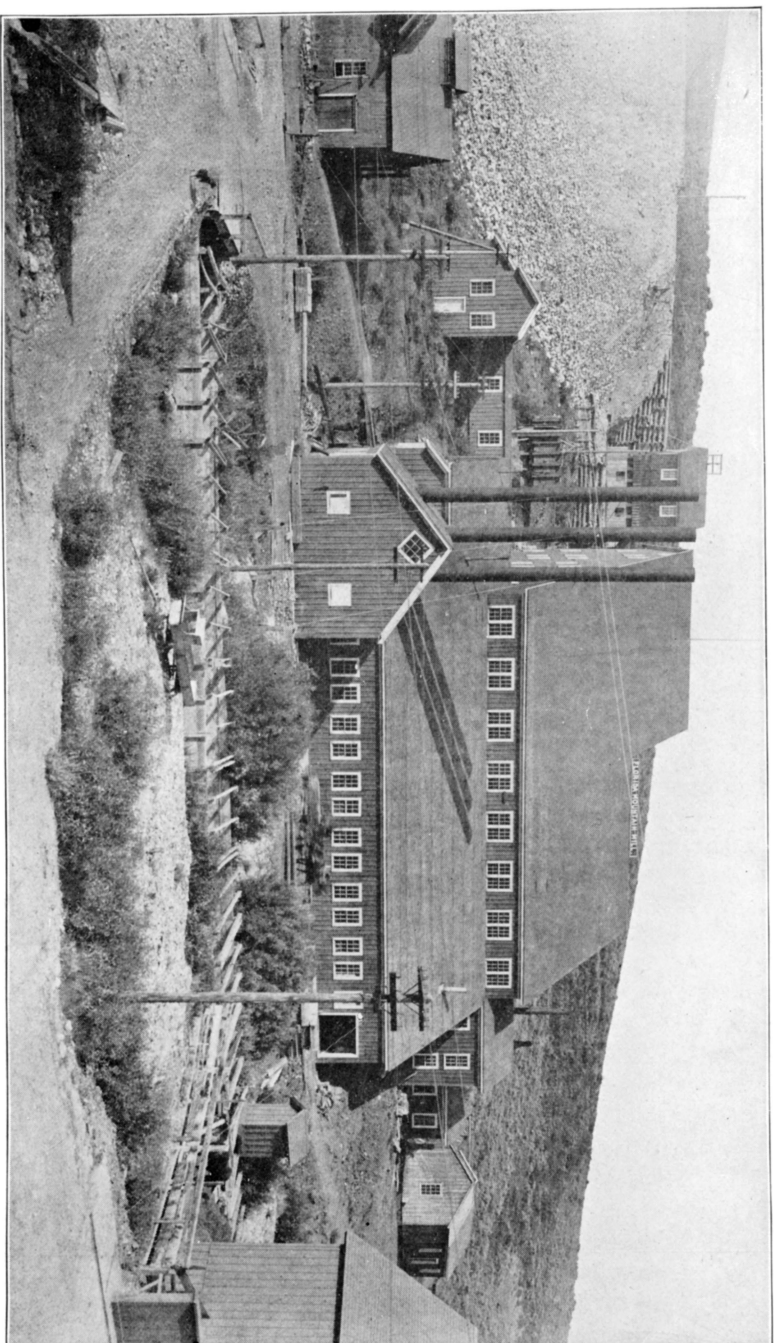
Mr. Peter Steele is president of this company, Hon. John Lamb, vice president and Mr. F. S. Heer is secretary, all of Silver City, Idaho.

War Eagle Mountain Mines.—On War Eagle Mountain, the property of the Pioneer Mines Company was successfully operated during the year and made a considerable production of gold. This property carries a small vein of good milling ore and is very conservatively handled. The electric motive power at the hoist and mill, with which it is equipped, is supplied by the Trade Dollar Company.

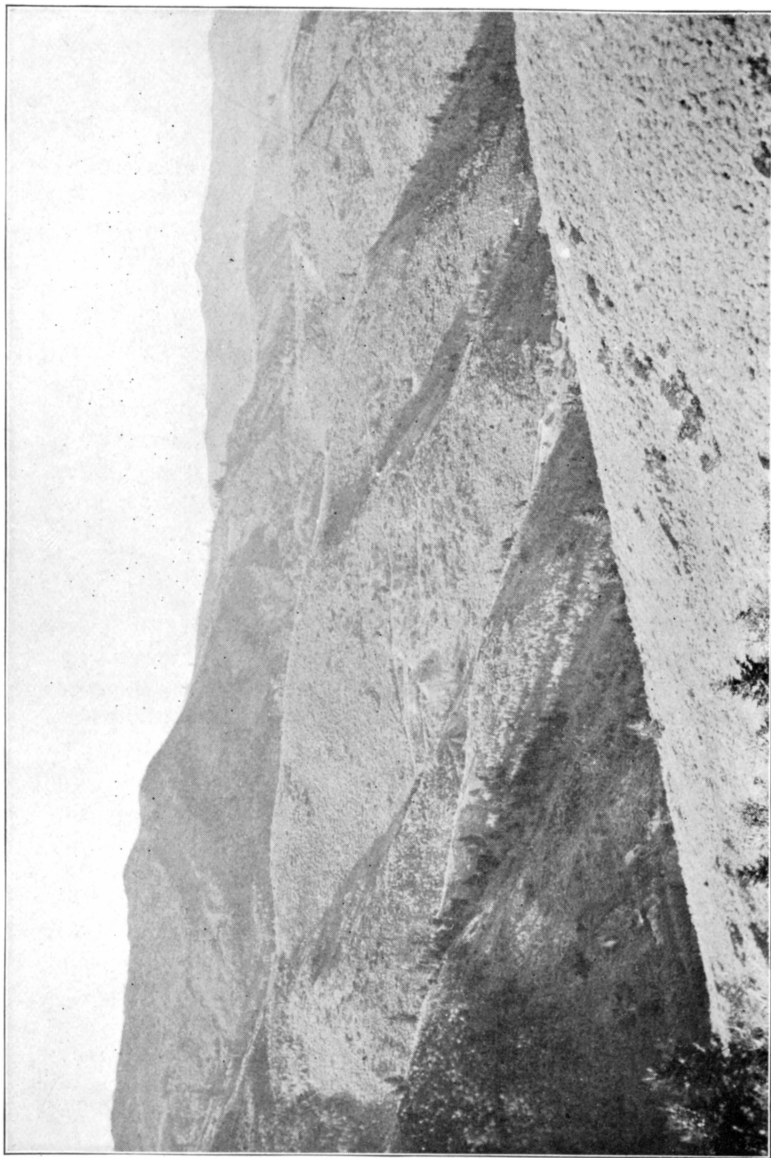
The Golden Chariot vein, just above the Pioneer mines property, has a precious bullion record of several millions of dollars. It has been idle for a number of years and full of water. A long tunnel has been undertaken for the purpose of draining this property and facilitating its further development. This work, however, was temporarily suspended during the year but the enterprise will doubtless be taken up again in the near future as the property is of good promise.

Adjoining the Golden Chariot to the west, another narrow parallel fissure or spur vein known as the Commoner was operated during the year by Salt Lake capital and a short shoot of bonanza ore developed that produced some remarkably rich native gold specimen ore.

At the time of the writer's visit to this property, earlier in the year, several hundred pounds of this rich rock had



TRADE DOLLAR CONSOLIDATED 20-STAMP MILL, DEWEY, OUYHEE COUNTY.



WILLIAMS CREEK BASIN, SHOWING BAY STATE DUMPS, SOUTH MOUNTAIN MINES. LICHER RIDGES
BASALT FOREGROUND, BENCHES LIMESTONE, SCHIST AND GNEISS. OWYHEE COUNTY.

been sorted out that would carry values at the rate of something like one thousand dollars per ton in native gold.

West of the Commoner, the Stormy Hill mine has considerable development and ore in sight, and is recently reported to have been sold to some New York capitalists.

The veins of the War Eagle Mountain are usually narrow, but have been noted for the production of very rich gold and silver milling ore and have a total output estimated at over twenty millions of dollars. These veins are persistent in length and depth and occur in eruptive granite with porphyry dikes, and in their southern extension pass under a surface flow of rhyolite that is probably of subsequent date to their mineralization, as was experienced at Tonopah, Nevada, and may cap over other important shoots of bonanza mineral.

The Never Sweat and Burro mines near where this rhyolite flow commences contain shoots of very rich mineral in some shallow surface development, and present very attractive chances for the investment of capital, which is also true of several other properties now idle on the slopes of the War Eagle Mountain.

The Home Stake Group.—This property, situated on Reynolds Creek, a short distance northwest of Silver City, is being developed by a crew of ten men. It carries a strong vein in granite containing good free milling values and has a total of about eight hundred feet of development of which four hundred feet was run during the year. The owners are planning the installation of an air compressor and machine drills to be run by electric power from the Swan Falls plant, as the property is showing evidence of developing into a paying mine. Mr. George Schlaack is in charge of this undertaking.

The Sunnyside Mine.—This property, situated on Succor Creek, a few miles north of the DeLamar mine, has attracted a good deal of attention during the year. It comprises one hundred twenty acres of lode claims traversed by a pronounced fissure that strikes a little east of north and dips to the southeast. The formation is granite and the ore shoots are of considerable size and length. The development so far is limited and does not exceed one hundred five feet all told, but the ore bodies are of such size and length as to indicate the presence of a valuable mine. A five stamp mill has been built on the property, which treated four hundred tons of ore during the summer, containing an average value of twenty dollars gold per ton; of this

seventy-five per cent was saved by simple plate amalgamation. A concentrator will be added to the mill in the spring and the plant increased all around as conditions warrant.

Most of the ore so far has been mined from open cuts and shallow shafts.

In addition to the mill a small gasoline pumping plant and a horse whim is employed in the work.

The vein is eight to twelve feet wide and gives every evidence of proving a big winner. Mr. G. A. Burgh and J. C. Poyns are the owners of the property and seven men are employed.

Rooster Comb Mine.—This property, situated near the Sunnyside, is owned by Mr. E. V. Orford of DeLamar and has been developed to considerable extent disclosing the occurrence of promising ore bodies containing good values. A carload of this ore was hauled to the DeLamar mill and tested by the cyanide treatment, to which it yielded a very good extraction and produced a result of about eighteen dollars per ton in gold. The showing made on this property justifies further extensive development, as the fissure is well defined, in a favorable formation, and a profitable mine is likely to result from its further investigation.

Castle Creek District.—In this interesting district, twenty-five miles southeast of Silver City, considerable prospecting work was done during the year, and on one of its properties some sensational values in gold were found which seemed likely to precipitate a boom at one time during the summer.

Conflicting results from the same assayers to whom the ores were submitted from the most promising showing retarded any permanent operation and it is believed that the ore carries some refractory element which is not understood, but causes conflicting assays on the same ore samples. Such things have occurred in other districts that subsequently became important producers, and it is sincerely to be hoped that the problem will be favorably solved in this case.

This district contains some very handsome prospects of lead, copper and silver bearing ores, all of which are associated with important gold values. It is a promising field for the prospector and investor and is well worthy of further investigation.

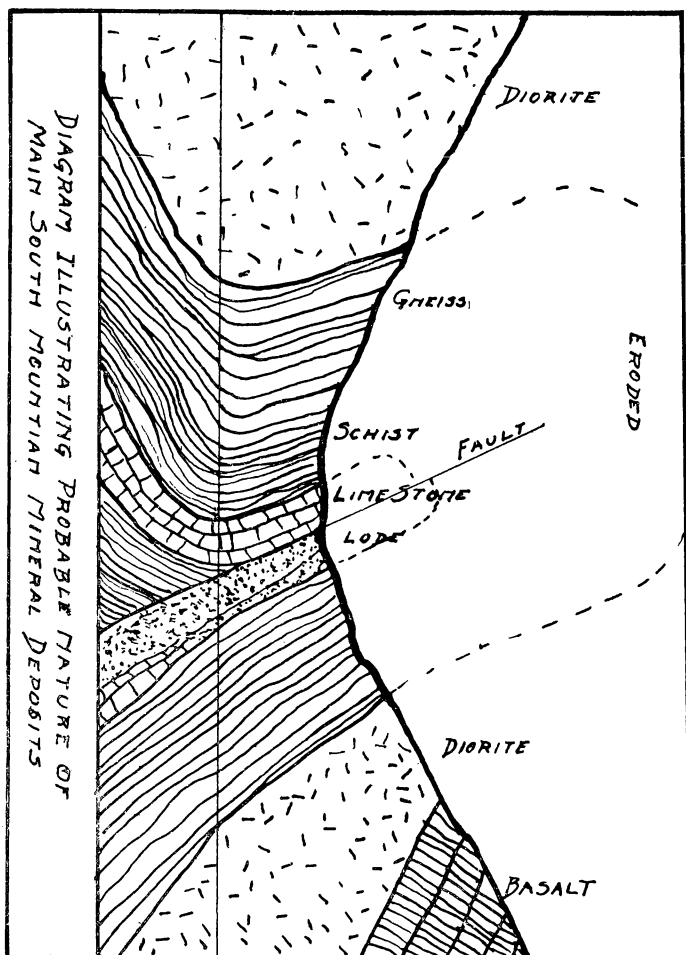
The South Mountain Mines.—One of the most important mining transactions of the year in this county was the tak-

ing over of the old South Mountain Mines by Mr. Wayne Darlington, former State Engineer, for a wealthy eastern syndicate. This property is situated twenty-five miles southwest of Silver City and consists of fifteen patented and seven unpatented lode claims and mill sites embracing all the properties that gave this camp its fame in early days, which were gathered together by Mr. George A. Sonnemann of Spokane, Washington.

These mines are interesting from the fact that they bear a marked similarity in geological structure, size, history and mineralogical composition to the famous Broken Hill silver-lead-zinc deposits of New South Wales, which have a dividend record of over sixty millions of dollars. South Mountain is an isolated uplift or offset from the Owyhee range and is entirely surrounded by a broken lava plateau. It rises to an extreme elevation of eight thousand feet and is probably ten miles long by five miles broad. It presents an anticlinal arch of eruptive grano-diorite, a medium grained gray rock that looks like granite but carries an excess of horn blende over mica. This uplift was evidently broken by a fault along its axis which has been eroded into a deep gulch, now forming the bed of William Creek, which practically traverses the center of the uplift in a northwesterly direction. Parallel to the bed of William Creek and climbing over the highest crest of the mountain near its source, there is a belt or zone of white marbled limestone, showing a blocky structure with black lines of silica and impurities, and presenting the appearance of a much altered original sediment. Its general strike is northwest and southeast, turning sharply to the east where it crosses under the highest crest of the mountain near the head of the creek. It is from one hundred to three hundred feet wide and makes a distinct white line readily traceable for ten miles. It has a dip to the southwest of about sixty degrees and is flanked on the foot side by one thousand feet of schist, succeeded by a like width of gneiss, which in turn is succeeded by a wide belt of grano-diorite, and the same series on the hanging side partly capped with basalt. The schisted formations are doubtless an altered phase of the more massive grano-diorite and in that respect differs from the Broken Hill schists, which are altered sediments. It is evident from the position of the limestone that it represents a sharply

buckled fold or saddle reef deposit, broken by a fault, and that other sedimentaries may be found in depth.

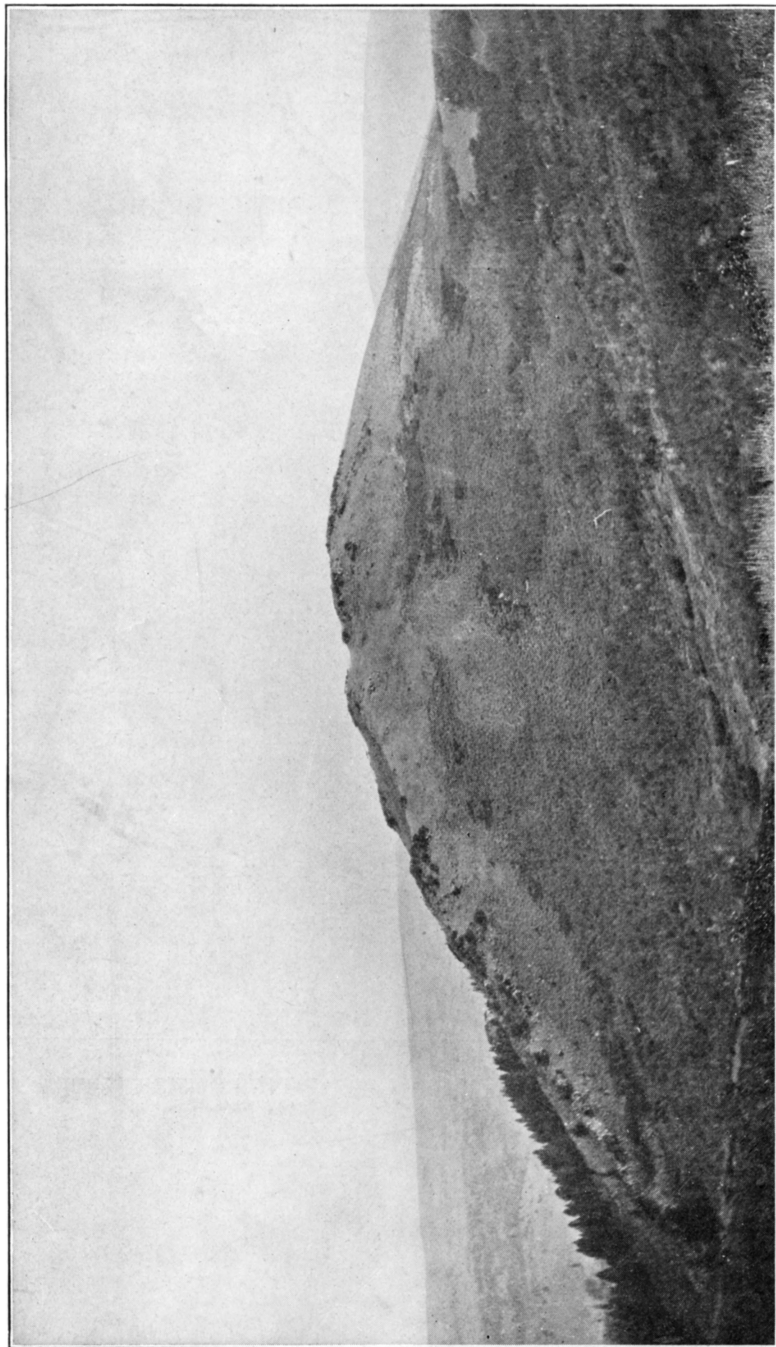
The Sonnemann property covers the choicest mineralized section of the limestone lode for two miles of its course, and consists of a combination of the best old claims



that formed the basis of a big mining excitement from Nevada in 1873, when the camp of South Mountain had a population for a short period of one thousand people, which was based on the discovery of some very high grade gold and silver bearing lead ore. A small thirty ton smelter was built at that day and two hundred fifty thousand dol-



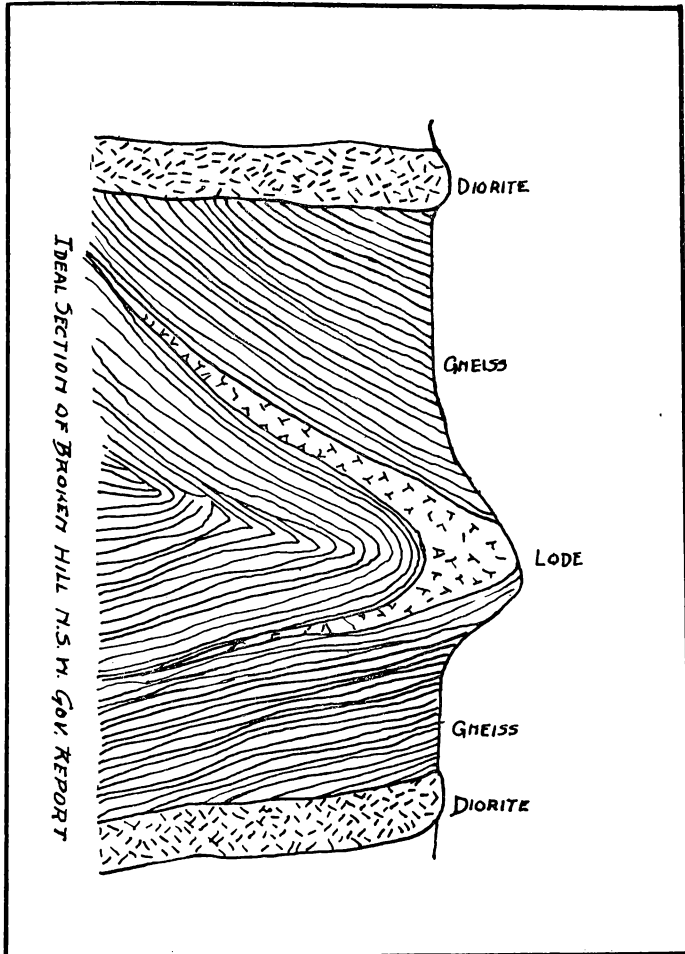
OLD LEAD CARBONATE STOPE, GOLCONDA CLAIM, SOUTH MOUNTAIN MINES.
WORKED THIRTY YEARS AGO. OWYHEE COUNTY.



ONE OF THE SUMMITS OF SOUTH MOUNTAIN COVERED BY THE PROPERTY OF THE STANDARD
MINING AND MILLING COMPANY, OWYHEE COUNTY.

lars worth of bullion run out, and a like amount of crude ore shipped to the railroad at Winnemucca, Nevada, which was their nearest railway shipping point, 230 miles distant.

The rich lead ore strike occurred associating with ex-



tensive brown gossan croppings, but wherever the lead carbonate ores found at the surface were followed down to water level, which proved very near the surface, they changed to a massive mixture of marcasite, pyrrhotite, galena, zinc blende and a sprinkling of copper sulphide,

which proved too tough a metallurgical problem for the early day operators, and the boom rapidly subsided, and the camp remained idle for years, until the principal old claims were gathered together by Mr. Sonnemann six years ago.

The most important mineral feature of the property, as it stands today, is a continuous body of rich, spongy brown gossen ore and rotten vuggy quartz, that is from ten feet to fifty feet wide, replacing the limestone near its hanging side for two thousand eight hundred feet in length. This great gossen has been opened by shallow shafts, cuts and tunnels at about one hundred foot intervals for its entire length, which in every opening shows kidneys, irregular patches and streaks of copper, lead and zinc carbonate ores. All the gossen carries appreciable values of gold and silver, and where associated with the other minerals, runs quite high in precious values. Accompanying this great outcrop of iron and manganese gossen and included in it are great masses of sandy garnet rock, together with sparry crystals of actinolite, siderite and calcite. This great mineral zone is cut at nearly right angles by half a dozen cross fissures that are invariably accompanied by small dikes of aplite-porphyry. One of these cross fissures, known as the Golconda vein, had an ore shoot one hundred fifty feet long and from one to eight feet wide of quite clean lead carbonate ore (and was the principal source of the bullion produced by the little smelter in early days). This changed to a massive base mineral at the depth of sixty feet. The remarkable variety of metamorphic minerals contained in this gossen also includes some barite and a rare form of iron ore called lievrite, which was noted by Waldmar Lindgren, in a United States Geological Report on this region. The main gossen showing strikes right in to the steepest part of the mountain and affords an excellent adit tunnel site, which will gain a face depth of eight hundred feet on the ore body in a distance of two thousand feet, and this condition is being taken advantage of by the present operators. The gossen has been opened at the lowest points of its course at several places below water level and shows an equivalent body of the massive sulphide mixture, formerly described, in which iron, zinc and lead sulphide are intimately blended. The iron sulphides predominate, but there are streaks of very clean lead and zinc sul-

phides in the mass, and where the galena is assayed separately it invariably carries from two to five ounces of silver to each unit of lead; while specimen values are found occasionally in the clean lead and clean zinc minerals that run as high as one thousand dollars per ton in gold. It is truly a very refractory and base mixture of minerals, but with present methods of concentration it can unquestionably be separated into marketable products of lead-zinc and probably copper concentrates carrying high precious values, and if the great surface gossens showing is underlaid throughout with proportionate bodies of the massive sulphide minerals that has already been disclosed, where a sufficient depth has been obtained, the proposition presents an enormous tonnage possibility and is well worthy of extensive development and investigation. The district is fifty miles from the nearest railway point, but the intervening country is an easy one for railway construction. This venture is now employing twenty men and Mr. Henry Kehoe is superintending the work.

The veins of South Mountain, like those of the Owyhee range, in which are situated the bonanza gold-silver milling ore deposits of DeLamar and Silver City, are probably of early tertiary age. The rich gold-silver veins of this range have been operated constantly for forty years. They have produced fully forty million dollars and have been noted for high grade milling ores and are still big producers.

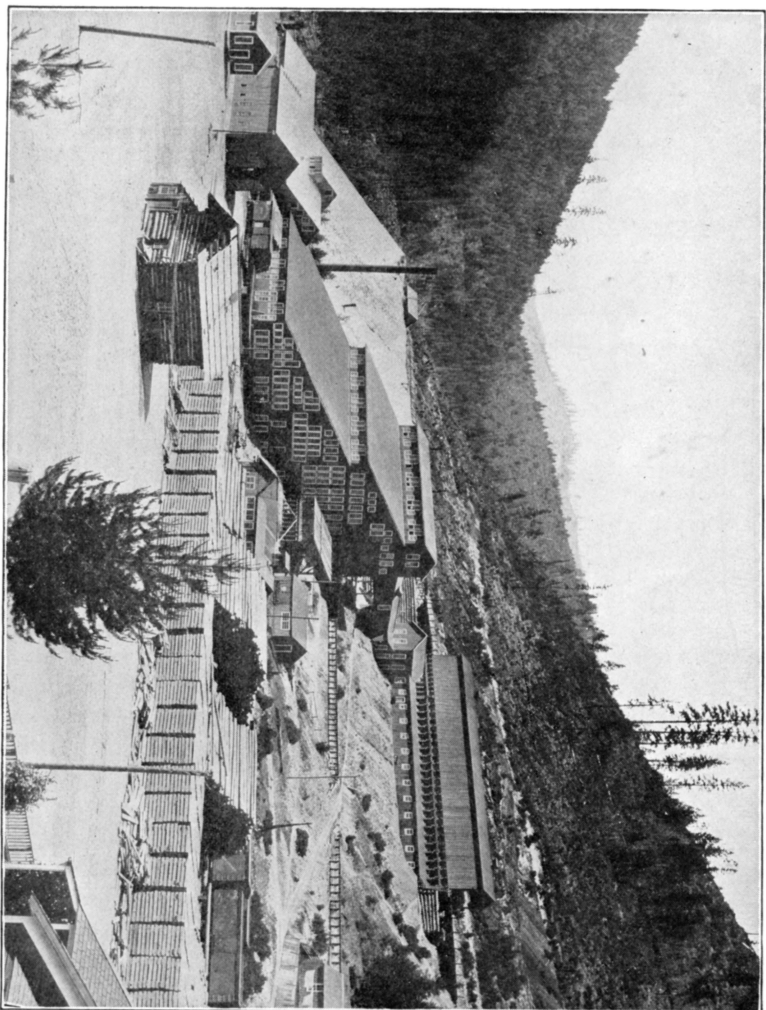
In connection with the South Mountain deposit and its variety of metamorphic crystals, the gangue of the DeLamar veins presents a very interesting problem. The complex system of veins in this old bonanza are contained in an altered rhyolite formation above basalt and their gangue consists almost exclusively of pseudomorph forms of barite, actinolite and calcite, replaced by pure silica and containing gold and silver milling values ranging from ten dollars to sixty dollars per ton. It would seem that the original minerals, of which crystal shells alone remain, may have been associated with similar lead and zinc values as are now found in the South Mountain deposit, and that if the great mother lode of this property was developed through the volcanic cap down into the underlying formations, which may prove to be sedimentary, that the original smelting metals that probably accompanied this sparry

gangue may be developed in an enriched and concentrated form.

The American Standard Mining and Milling Company.
—This company's property consists of a large group of claims commencing at the southeast end of the Sonnemann property and covers the strike of the South Mountain limestone lode to the southeast for over a mile, with several side claims embracing important cross fissures. The best development on this group is immediately adjoining the Texas claim of the Sonnemann property, on what is known as the Standard claim, where a body of soft iron and manganese gossen, twenty feet thick, carries some fine streaks of rich lead carbonate ore. One of these swells to as much as four feet. It has been opened with an incline shaft forty feet deep, from which a drift has been run on the best ore streak, sixty feet long. This ore carries average values of fifty-five per cent lead, fifty to ninety ounces silver, and several dollars in gold per ton, and a carload of mineral of this grade has been sorted out ready for shipment. An adit tunnel is being driven on the course of the vein which will tap this ore shoot fifty feet below the shaft. The great gossen ore body on this claim carries average values of about four dollars in gold and thirty per cent manganese across a width of twenty feet at one point, and is a very interesting association of such rich ore that may develop an important shoot of shipping mineral as depth is attained.

There are several handsome gossen showings along the strike of the main lode on this property to the southeast, in which direction the metal values seem to show a marked increase in copper, and selected samples are found in some of the company's shallow openings that run as much as twenty per cent copper, one hundred forty ounces silver and one ounce gold per ton. A cross vein has been opened on this group at a point one thousand feet southwest of the main lime zone that shows four feet of carbonate ore containing average values of eighteen per cent lead, ninety ounces silver and eight dollars gold. The extensive development of this group is likely to reveal several important bodies of high grade mineral.

The president of this company is Mr. Thomas F. Walsh of 506 McPhee Building, Denver, Colorado, and Mr. F. T. Clemmons is superintendent in charge at the mine. Four men are employed.



MORNING MILL, AT MULLAN, 1000 TONS DAILY CAPACITY, AND DUMP OF NO. 6 TWO-MILE
CROSS-CUT TUNNEL, SHOSHONE COUNTY.



TEN FOOT BREAST OF CLEAN CARBONATE ORE CARRYING 80 OUNCES OF SILVER AND 60 PER CENT LEAD.
HERCULES MINE, NO. 2 LEVEL, SHOSHONE COUNTY.

SHOSHONE COUNTY.

The famous Coeur d'Alene mining district, in Shoshone County, experienced during 1906 a year of unprecedented activity and progress amounting to a boom, especially in new mining development. While several circumstances conspired to retard the output of some of the established producers, the chief of which were a serious underground fire in the principal stopes of the Bunker Hill and Sullivan Bonanza, and the labor, car, fuel and electric power shortage which resulted in a comparatively slight variation in lead production from the previous year, the advanced price of all metals, however, increased the value of the output enormously and the district makes a larger gross yield of metal values this year than did all the State's output combined during 1905.

Bunker Hill and Sullivan Mine.—Many interesting points of progress bearing on the future improvement of the district are to be recorded. Notable among these was the successful development and opening of the famous March ore body in the Bunker Hill and Sullivan mine at a depth of four hundred feet below the Kellogg level and the wonderful profits derived from the middle horizons of this remarkable ore shoot, which still discloses enormous reserves of rich mineral and warrants the anticipation of a continuance of the handsome dividends derived from its operation during the past year, which amounted to the remarkable total of two million three hundred forty thousand dollars.

In addition to this marked feature of permanency, there has been developed in this great mine by several intermediate levels during the past eighteen months, an entirely independent ore channel that puts everything else entirely in the shade and exhibits a reserve of ore of such magnitude as to warrant the company in the erection of another milling unit of one thousand tons daily capacity, the same capacity as the one now employed, and plans for its installation are already well advanced. The plans for this new mill embrace all the new features in modern lead concen-

tration practice adapted for this class of ore, and will be strictly up to date.

The rapid advance in the price of lead and silver recently, has given the enormous pile of coarse jig tailings below the present mill, which amounts in volume to fully two million tons, a present value of about six dollars per ton, and has transformed them from worthless ballast material for which purpose they have been extensively used, into ore that contains a handsome margin of profit for rehandling, and a plant of a thousand tons a day capacity to treat these tailings has been constructed.

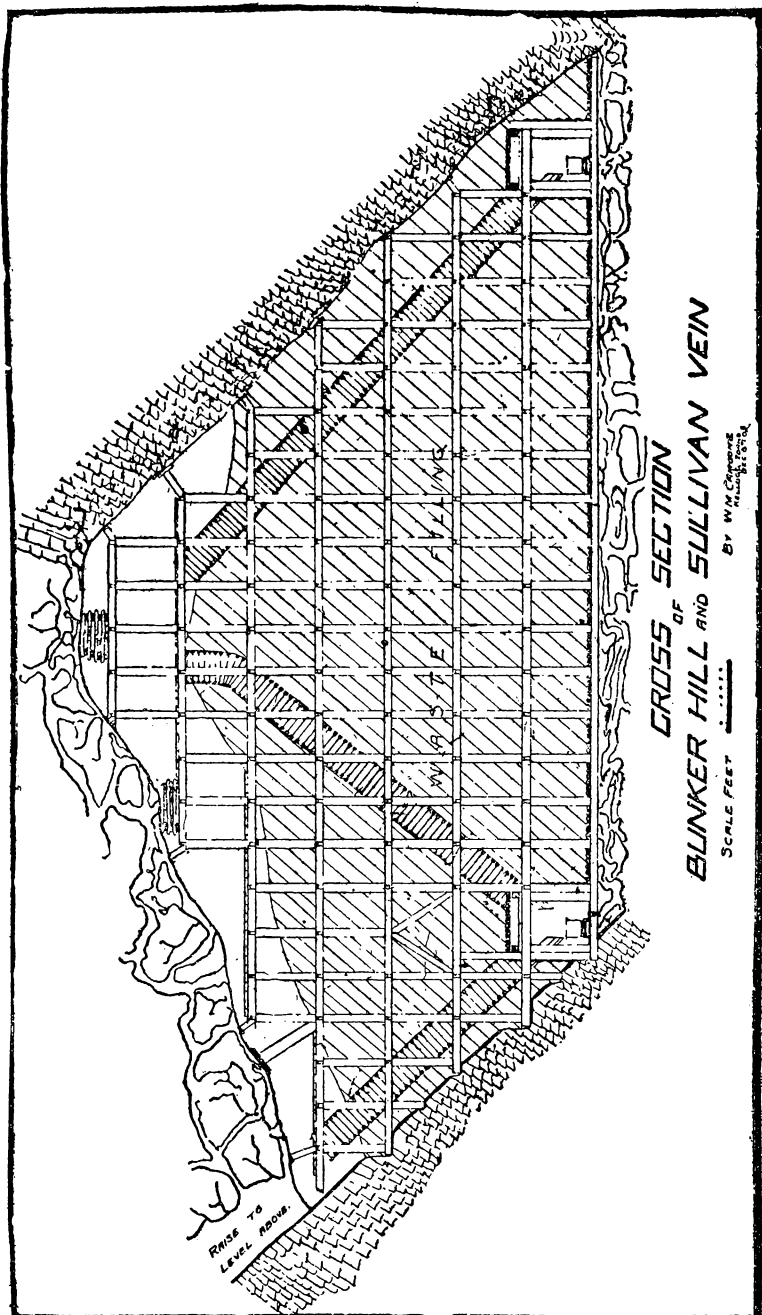
This new tailings mill will also treat the middlings and tailings from the present plant. It is based on a new flow sheet, planned after extensive and thorough tests and is confidently expected to give extraction results never yet attained by any concentrator in the district, and embodying the most advanced and successful principles of concentration, which were determined after an inspection of every large concentrator plant in the west and Mexico, and after very carefully and thoroughly testing all of the ores of this mine in a small plant erected for the purpose.

This company has also recently placed an order for an electric power reserve unit, consisting of a five hundred K. W. steam turbine driven A. C. generator. This will supplant and be a reserve to the Washington water power line and will insure a continual service in case of failure of the transmission line from Spokane Falls.

All of which will combine to make the Bunker Hill and Sullivan an example of mineral resources and equipment that will be hard to match, and puts it in a position to anticipate enormous profits and a continued operation of great magnitude indefinitely.

The accompanying flash light view from the Bunker Hill and Sullivan mine was taken in one of the richest breasts of mineral, at a point in the vein three thousand feet deep below the croppings, near the Kellogg level, in the famous March ore body, and over two thousand feet vertically under the surface, and two and a half miles in the mountain from the portal of the Kellogg tunnel. The cross section shows the general method of timbering and filling and the great width of the March ore body at the Kellogg level.

The big miner in the center of the flash light picture, who



looks like a college athlete in disguise, in fact is such; he is also general manager of this big enterprise, Mr. Stanley A. Easton, who took charge of the property about four years ago when it looked like an empty sack with nothing left but a few shakings. The long, expensive Kellogg tunnel had been run to the vein and hundreds of feet of drifting and cross-cutting done under the territory where the main ore body, worked in the levels above, was expected to come down, without finding any commercial ore, and it looked for a time as if the mine had been bottomed.

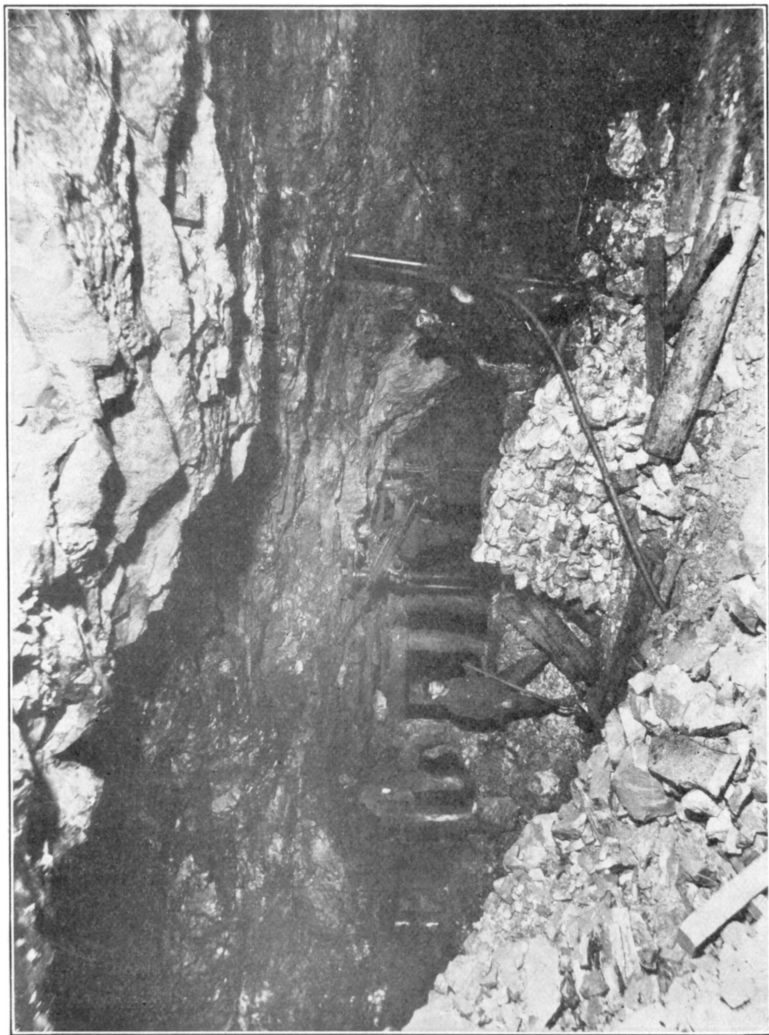
Since then, however, the vagaries of its mineral depositions have, in an important measure, been unravelled, and Mr. Easton has directed their development with such success that the mine contains today what is probably the largest and most profitable resource of lead-silver ore ever exposed in a single mine in the mining history of the world, and his greatest achievement of putting ore in sight was accomplished during 1906, and the revelations of rich ore recently made in the mine indicate that its most profitable history still remains to be written.

The Bunker Hill and Sullivan Company employs three hundred forty men underground and produces a thousand tons of concentrating and crude ore a day, which is all handled through the Kellogg tunnel with electric haulage to the mill and railway cars, a distance of two and a half miles, at a total cost of a trifle over five cents per ton, which includes the cost of handling the men and all material put into the mine. The mining costs are \$1.29 per ton and the milling costs average twenty cents per ton.

The Federal Mining and Smelting Company.—The four great mines of this company, embracing the Standard Mammoth at Mace, the Tiger Poorman at Burke, the Morning and You-Like mines at Mullan, and the Last Chance string at Wardner, under the personal management of Mr. W. Clayton Miller, were all operated successfully and continuously throughout the year, and their combined output during 1906 doubtless constitutes the largest tonnage of lead mineral ever raised to the surface in one year under the management of one man, in the history of lead mining. Mr. Miller has gathered together a very able corps of assistants who are all specialists in their respective departments. His shipments of finished products of



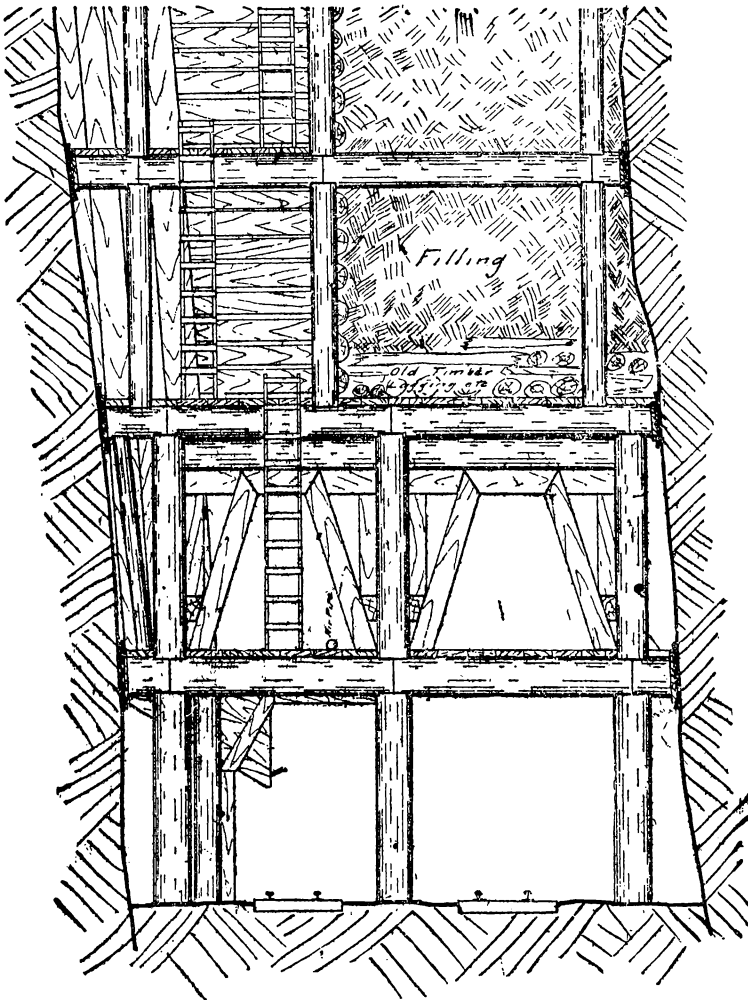
A BREAST OF CLEAN SHIPPING ORE, NEARLY ALL SOLID GALENA, IN THE FAMOUS MARCH
SHOOT OF THE BUNKER HILL AND SULLIVAN MINE AT KELLLOGG, THREE
THOUSAND FEET DEEP, SHOSHONE COUNTY.



HARD ORE SLOPE, LAST CHANCE MINE, F. M. & S. CO., WARDNER. ALL HIGH GRADE CONCENTRATING MINERAL, PILE OF FIRST CLASS IN CENTER. SHOSHONE COUNTY.

high grade concentrates and crude ore aggregated one hundred thirty-eight thousand tons during 1906.

One of the most important events in the development of this company's mineral empire in the Coeur d'Alenes was



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

the successful intersection of the Morning vein at Mullan, by a cross-cut tunnel two miles long, at a depth of two thousand feet, and the connection between this tunnel and the No. 5 level in the mine, nine hundred feet vertically above, with a shaft, from which several intermediate levels have been run and enormous reserves of rich ore disclosed that has fully warranted the great price paid for this property by the Federal Company during 1905. This long mill tunnel, known as No. 6, is being equipped for electric haulage and all the ore of this property will come out through this new avenue instead of coming down over the surface railway as before.

In the thousand ton concentrator connected with this property, some important additional machinery has been added and put into commission during the year, the principal feature of which is a regrinding plant for handling tailings, consisting of two six foot Huntington mills with sizing and settling devices embracing the Callow system of traveling screens, and conical tanks which size the ore to advantage, and the settling tanks thicken it much better than the old system was able to do. The material is then treated on Wilfley tables and vanners on different floors, the thickened pulp taking hold, apparently, on the surface of the machines much better than before, and the new equipment is saving three hundred tons of high grade mineral a month, in addition to what was saved before, and will probably be extended to handle the full product of the mill. The company intend to install the same system at all their other mills in the district.

At the Mace mines of this company, the great ore shoot has been proven in the lower levels for a length of eighteen hundred feet. The most interesting feature of the year's development in these deep levels has been a gradual increase in the silver tenor of the ore, which now practically gives one ounce of silver to each unit of lead, which, with its thousand tons per day production, means a marked increase in profits.

This mine is developed by cross-cut tunnels to a depth of twelve hundred fifty feet at the level of Canyon Creek, and from that level through a vertical shaft situated at the face of a three thousand foot tunnel, twelve hundred fifty feet deeper, with levels each two hundred feet. The ore

ranges from five to twenty feet wide. It has been more carefully mined during the past year and has produced more first class than in any previous year of its successful history, and in spite of its great depth, it is apparently just maturing its more important horizons and may be depended upon to continue production to much greater depth.

To this end the main working shaft has been successfully lined up and sinking recommenced from the bottom level. A new lift has already been put down two hundred feet and when sufficiently opened with the necessary station and drifts, sinking will again be resumed.

The Burke, or Tiger Poorman mine of this company, has continued in successful operation throughout the year, supplying the concentrator with which it is equipped with four hundred tons of ore a day. This is one of the oldest properties in the district and is developed through a vertical shaft, sunk from the surface in the bottom of Canyon Creek, two thousand feet deep. At the two thousand foot level, the main ore shoot contracted in length, and when this level was opened and the ore shoot entered in the drift, it was thought for a time that a Coeur d'Alene mine had been bottomed, as the first hundred feet of the shoot was rather lean; but conditions proved when the level was run out through the length of the ore body that it had simply contracted in length but contained about as much mineral in the shorter space traversed as in the full length of the shoot in the levels above, and showed such pronounced vitality that the company have felt warranted in following it to still greater depth.

The management has recently installed a large station pump at the two thousand foot level and from the healthy condition of the core of this main ore shoot at the two thousand foot level, there is every prospect that it may again expand to its normal proportions and continue on down into the earth to an indefinite depth.

At the Wardner mines of this company, the Nos. 3, 4 and 5 levels in the shaft from the Sweeny tunnel are being developed and looking well, in place disclosing some handsome bodies of high grade ore. Above the Sweeny level, a large amount of low grade ore has been developed, and new stopes opened in ground that had formerly been passed

by. A new double drum hoist has been installed at this mine, which is illustrated in an accompanying cut, and the property continues in good physical condition with a long life of successful production guaranteed ahead.

All the mines of this company are worked to the limit of their equipment and kept up in splendid, up to date shape, with new mechanical appliances added wherever they can be advantageously employed. The management is doing a lot of new development work in the district, and not overlooking any opportunity to pick up additional territory where the prospect of finding new ore bodies seems sufficiently promising and terms favorable, and their several ventures in this line are likely to bring important results at no distant day.

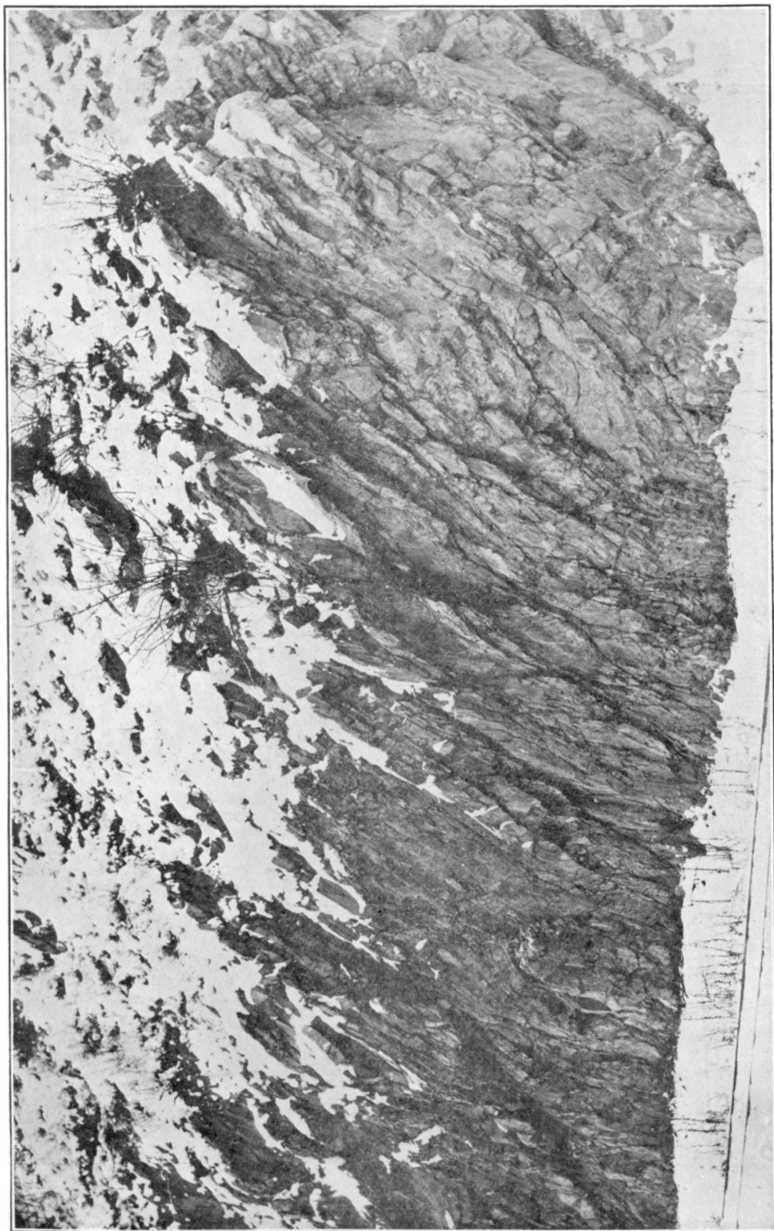
The Hecla Mining Company.—The property of this company, situated at Burke, enjoyed a very prosperous year and paid its fortunate stockholders an amount in dividends equalling nearly twice the total par value of its shares, from the year's ore production, and meets the future with more extensive ore reserves and better prospects of profit than at the close of any previous year's operation.

This mine is developed through adit and cross-cut tunnels to the level of Canyon Creek. The upper horizons of the mine were not very profitable—in fact, it was developed to several hundred feet below the apex of the vein before any important bodies of pay ore were found, and only made a profitable showing of mineral at the creek level.

From this horizon down, the development is through a vertical shaft nine hundred feet deep, sunk from the surface, from which three levels have been driven, each succeeding level showing much richer and stronger ore reserves than the previous one, and the nine hundred foot level, which has already been driven into the ore shoot a thousand feet, is the richest horizon in the mine and makes a display of available ore that could furnish a tonnage, without crowding, equal to twice the milling capacity of the property, as the block of ground between the three hundred and six hundred foot levels is not half exhausted, and the immense block between the six hundred and nine hundred foot levels remains untouched except for the drift being driven through it and a raise to connect it with the level above.



NINE FOOT BREAST OF GALENA AND HIGH GRADE CONCENTRATING ORE, HECLA MINE, NO. 9 LEVEL, SHOWING INCLUDED DIABASE DIKE, SHOSHONE COUNTY.



"WALLACE SLATE," WY. CUT, O. R. & N. DEPOT AT WALLACE, SHOSHONE COUNTY.

New equipment has been added during the past year to the mine; plant and mill, which includes a complete picking and conveying belt at the mine, with the idea of rejecting more waste and making more clean shipping ore and a better grade of concentrating ore, which will be equivalent to a substantial increase in production. At the mill, additional crushing machinery has been added for finer grinding and the substitution of Callow traveling belt screens for hydraulic classification.

The company are planning the installation of a new electric hoist capable of sinking two thousand five hundred feet and as soon as it is installed sinking below the nine hundred foot level will be resumed.

The Hecla is the only contact lead ore deposit in the Coeur d'Alenes accompanied with an igneous dike. This is aptly illustrated in the accompanying under ground flash light view of the face of the drift on the nine hundred foot level, where a small dike of dark diabase rock is shown in the center of the ore body, which is a constant accompaniment, and forms one of the strongest features and indicators of the permanency and continuity of the ore body to a great depth.

The share capital of this company is one million shares of a par value of twenty-five cents each, with a present selling value of \$3.75 per share, at which price the stock is very scarce, as it earns a handsome interest rate in dividends paid monthly, and at that figure, with the magnificent future prospects of earning capacity showing in the mine, appears to present as safe an investment as could be selected in any real estate or industrial enterprise.

Mr. J. R. Smith is president of this company, and Mr. James F. McCarthy, general manager, both of Wallace, Idaho.

Hercules Mine.—This famous bonanza of high grade lead silver ore, situated above Burke, continues under the management of Mr. Harry L. Day, and has discounted all its previous records during 1906. It ranks third in earning capacity among the Coeur d'Alene companies now, and pays more profit per man employed than any other mine in the district.

This property was equipped with an up to date concentrating plant of three hundred tons daily capacity, which

was completed at the close of 1905, and has been kept in continuous operation throughout the past year, increasing the previous production fully fifty per cent. Its previous output had been entirely from crude ore shipments and the new mill makes available some immense reserves of high grade concentrating mineral that had been passed by and stored in the previous operation of the mine. As a good deal of this ore was already broken and ready to be conveyed to the mill, its treatment has greatly relieved the extraction of ore in the mine, which is simply being played with, and could treble its present output on a week's notice if desired. This conservative method of handling the ore resources, however, is amply justified by present market conditions, as a study of the lead resources of the world must readily indicate a rapid increase in lead values as time advances.

The Hercules is developed to a depth of thirteen hundred feet by three cross-cut tunnels. A fourth tunnel now being run will be a mile in length when completed and will increase this depth to nearly two thousand feet when it intersects the vein. The principal ore body now being worked is three hundred feet long and twenty-five feet wide, with definite evidence in the No. 3 level of an important expansion in length.

The accompanying illustration shows a breast of ore embracing ten feet in width, that was taken by the writer on the sixteenth floor above the No. 2 level, two years ago. Photography is one of the many requirements of a mine inspector that I am not very proficient in, and the picture was not limited with any object of known proportions as it should have been. It represents ten feet of the width of the bonanza ore body of this mine that was all clean, brown stained lead carbonate, containing sixty per cent lead and eighty ounces of silver per ton. The white clusters at the upper left hand side of the picture represents a magnificent array of perfect crystals of cerussite, for which the mine is noted. The face of ore, at the time the picture was taken was decorated with patches of delicate natural filigree work and wires of native silver, and sparkled like a jewelry shop.

While galena has developed strongly below the No. 2 level, a great width of the rich, secondary lead carbonate ore, sprinkled with native silver, continues on down in this

bononza shoot of ore more than half way through to the No. 3 level, seven hundred feet below.

The Hercules fissure is one of the most pronounced in the district and carries many of the characteristics of the Bunker Hill and Sullivan lode. It has a very pronounced foot wall, a very large and clean ore body and a shattered hanging wall country more or less mineralized for a width of one hundred feet, and when the new No. 4 tunnel is completed and drifts extended out on the vein, it is likely to prove equal in ore resources and value to anything in the district.

The new mill of this property has recently been connected with an aerial tram to storage bins at Burke, over which the ore can be conveyed and loaded directly on the cars, eliminating the expensive wagon haul by which the product of the mine so far has been delivered to the railway.

The Frisco Mine.—A notable event during the year in the Canyon Creek section was the re-opening of the Frisco mine at Gem. This property has been a famous producer in the past but has been idle for several years and full of water. It is developed at a depth of twelve hundred feet to the creek level by adit and cross-cut tunnels, and from the creek level by a vertical shaft fourteen hundred feet deep, sunk from a big station at the face of a twelve hundred foot tunnel, with levels every two hundred feet. After the water was taken out of the property, the lower levels were found intact, with the exception of some very minor caves that were readily cleaned up. The Frisco was shut down several years ago on account of the zincy condition of the ore shoot. The rapid rise in zinc values, however, as well as of lead, since that time, makes its resources of great value again. The shaft has been sunk an additional two hundred feet during the year and a new level is now being opened at sixteen hundred feet deep below the mill tunnel.

A concentrating mill of four hundred tons daily capacity, placed at the mouth of this tunnel, has been overhauled and additional machinery added for the purpose of separating and saving the zinc, and the mine should become a very profitable producer of both lead and zinc minerals during 1907, for it has a handsome ore shoot. In the fourteen hundred foot level, this ore shoot is nine hundred feet long and from three to nine feet wide. It is a remarkably

interesting deposit with a structural variance from anything else in the district. The western half of this shoot is largely a massive amorphous zinc blend, with stringers of lead, and the eastern half is largely clean galena with stringers of zinc, exhibiting an interesting banded appearance. The ore, in addition, carries a sprinkling of pyrites, siderite and calcite, but is generally very clean mineral with a comparatively small proportion of gangue. A good deal of the zinc can be hand picked and with the modern appliances now being placed in the mill, very clean products of both lead and zinc can be made, and there seems no question but that the old mine will again take its place as one of the prominent dividend payers in the district during the coming year.

The Success Mine.—This property, situated on Nine Mile creek, was equipped during the year with a splendid new mining and milling plant, which has gotten into successful operation along in the fall and is now reported to be in the dividend class of Coeur d'Alene producers. Its extensive ore resources run high in zinc, and the Success will have the credit of producing the bulk of the zinc output in this district during 1906. Its milling results are said by mill experts from zinc districts to be as nearly perfect as has been obtained anywhere on this class of ore, and a great deal of credit is due the management in tackling the metallurgical problem involved and carrying his property through to such a pronounced "Success," in fact as well as in name.

The Tamarack and Chesapeake Mine.—This is another of the Nine-Mile properties that entered the shipping list during the past year and made the interesting output of twenty-two cars of high grade ore, practically all from development work at a horizon several hundred feet deep in the vein where an ore shoot four hundred feet long and of great width has been disclosed, carrying a strong pay streak of crude shipping ore and a large body of rich concentrating mineral.

The Tamarack and Chesapeake only a short while ago was one of the low price stock offerings of the Coeur d'Alenes, many of its shares having changed hands during the past two years at less than ten cents per share. They are now scarce at \$1.40 per share and advancing. The mine has passed under the management of Mr. Harry L. Day of

the Hercules and is being put in shape for important production. It is locally considered to be one of the most important lead ore developments in the district during recent years, and believed to have the definite promise of becoming a big dividend paying proposition.

The Callahan Mine.—The Callahan is another new lead ore development of importance and great promise, situated about a mile and a half northwest of the Hercules, that shipped eleven cars of sixty per cent crude lead ore carrying fifteen ounces of silver per ton, during the year, which was mined from an ore shoot of nearly clean shipping mineral two and a half to four feet wide. The length of this shoot has not yet been run out completely, as the rich ore strike was only made during the summer, but it gives definite evidence at the surface of being four or five hundred feet in length. It is developed in the Pritchard slate formation and broadens the ore bearing possibilities of the district in area materially, and at the same time widens the view previously held by some people that the profitable lead ore deposits in this district are confined to the quartzite formation of the Burke variety.

This important ore development at the Callahan tends to strengthen the importance of the lead ore bodies being developed in similar formations on the north fork of the Coeur d'Alene River in the Murray district, where the Monarch, Black Horse and Bear Top mines all have developed large bodies of high grade lead ore in the same scillaceous slate series.

The Bear Top is equipped with a small concentrator and made an important production of shipping mineral during the year. Its management is now pushing some deep development that is likely to warrant a much larger mill, and with railway transportation into this part of the Coeur d'Alenes, which seems very likely of accomplishment at an early date, it will doubtless contribute a very important output of lead production in the future.

Other Nine-Mile properties that have been conspicuous in the mining history of the past year and made some production, were the Rex mine and the Pittsburg mine. The latter developed an important showing of high grade ore during the closing months of the year, which is now being developed. It included a handsome streak of steel galena and at late accounts has proven of considerable extent.

There are a number of other promising properties being actively developed in the Nine Mile drainage and it is not unlikely that this tributary of the South Fork will become a very important unit in the total mineral output of the Coeur d'Alenes in the near future.

Gold Hunter Mine.—The operation of this important lead silver deposit, situated a mile above Mullan, was seriously interrupted by the fuel famine which afflicted the district during the fall months. It, however, ran its concentrating mill for several months and made quite an important output. The Hunter carries a very interesting deposit that is also in a class by itself. Its ores have always run a little higher proportions of silver to the lead values than most other lead producers in the Coeur d'Alenes. It carries a pronounced fissure several feet wide that is ore bearing for several hundred feet in length, and widens into an immense mineralized zone for several hundred feet in width and has been mined in places, fully fifty feet wide. This great ore bearing zone is by no means all pay, but it carries some fine pay streaks of good concentrating material. Its present development is comparatively shallow, but if its great mineralized zone increases in value in the same ratio as has been experienced in several of the other important lead ore deposits of the district, and there is good evidence to indicate that it may, its future as a big producer of lead silver mineral will be assured, for the extent of its ore bearing formation is very large. A new drain tunnel is now being run from the mill level, which it is expected will intersect the ore body early next season and at a depth of several hundred feet below the present workings. Should an appreciable increase in value be encountered at this horizon, deeper developments will be immediately undertaken and miners familiar with the Hunter's resources are very sanguine of its future success.

The Senator Stewart.—This property, situated about three miles southwest of Wardner station, on the great Wardner lode, made famous by the Bunker Hill and Sullivan, Last Chance, Empire State and other great mines, has advanced rapidly in popular favor and in the value of its shares during the past year, through the development of extensive bodies of fine lead silver mineral, a great dump of which is in evidence at the lower tunnel entrance. These bodies are recently reported to be assuming great size and

commercial importance. This property forms the link between the Wardner mines and those of Government Gulch. It embraces a section of the great lode which shows the evidence of just as intense fissuring, brecciation and coloring at the surface as other productive sections along its course, and is very favorably situated.

Other Mines.—Aside from these more important properties that have developed rich ore during the past year and have entered the shipping list, or have a definite prospect of doing so in the near future, there are fully one hundred other mining and development companies carrying on an active search for lead silver ore bodies in the Coeur d'Alene district with crews varying from two to thirty men. The work on a number of these properties has been carried to considerable extent in some instances, and new finds of importance are likely to be recorded as a result of their efforts, right along; for the known lead bearing district is very extensive and embraces an area of fully fifteen by thirty miles, without any clearly defined limits. To make a single paragraph reference to these numerous enterprises and other mining ventures in the Coeur d'Alene district that are now in progress, would swamp the printing resources of the office. It must be manifest, however, from the foregoing review of the principal producers, the output they are making and the dividends they are paying, which will probably total over \$6,500,000 for 1906, and especially when the depth at which the ore is being mined is considered, that many of the new lead mining development enterprises in the Coeur d'Alenes must have, to say the least, an excellent chance of success.

The great dividend paying mines so far developed, with the exception of those that are opened on the same lode, possess a marked individuality of their own in physical structure. They are scattered over an area of fifteen miles long and five miles broad, on six distinct and separate "mother lodes" of such healthy proportion that other progeny can safely be anticipated from them, and while it is a fact that in one or two instances ore bodies in this district have terminated abruptly in their downward course by faulting or through other causes, the discovery of a definite body or shoot of mineral in most of the mines has meant its staying qualities or repetition to great depth, affording examples of the deepest developed lead ore bodies

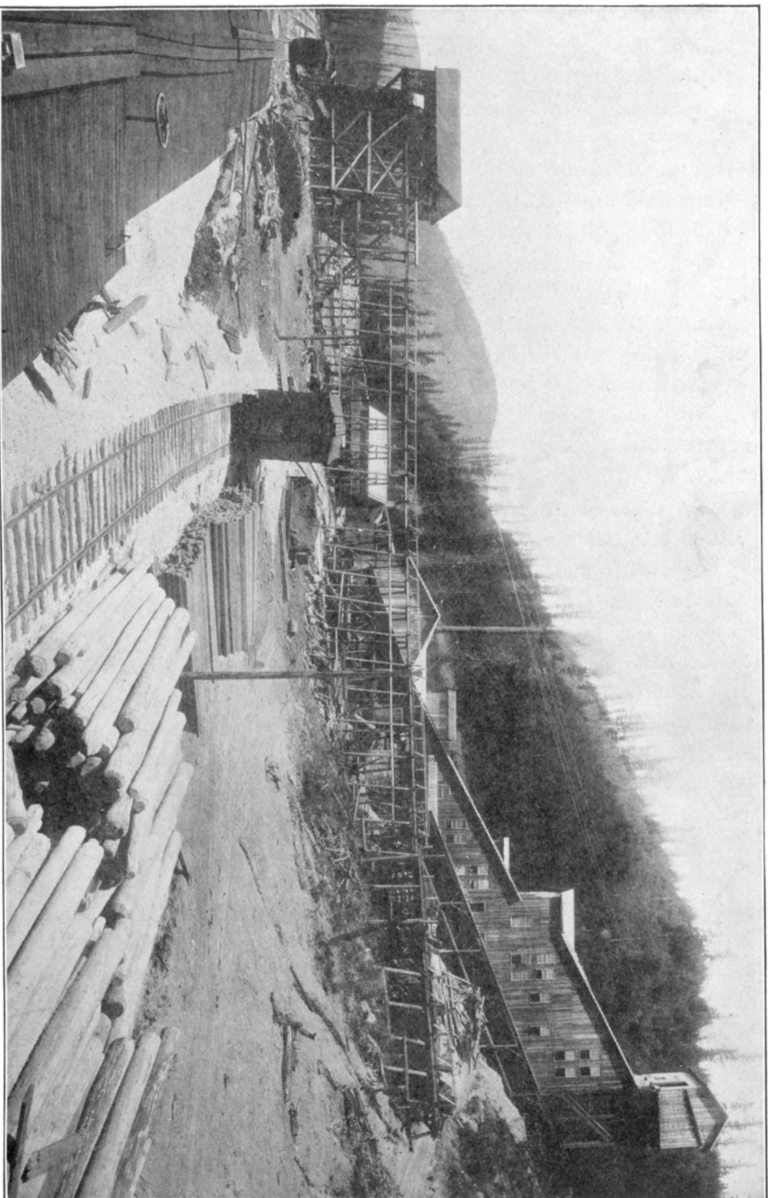
ever mined anywhere in the world. With few exceptions, the great ore shoots in this field have made very insignificant surface outcrops of mineral, and reasoning from previous experience, the number of favorable surface evidences of mineral now being developed, along the dozens of other big fissures, must result in the discovery of other important shoots that will occasionally drop into the producing stage and maintain the reputation of the district for lead production indefinitely.

The high values found in the deeper levels of the old mines, leave the depth to which profitable ore channels may be followed, an interesting and open question. It has been demonstrated that the great ore bodies of Leadville were formed at a depth of something like ten thousand feet under the surface, and subsequently exposed or brought nearer the surface by faulting and erosion. With this example of the deep mineralization of lead deposits, and the great start some of the Coeur d'Alene mines have made for permanency, it is not improbable that the profitable ores of this field will go down as far as modern mining methods can follow them. The fact of their slim surface manifestations leads to the assumption that the ore bodies have suffered hardly any deterioration from natural erosion since they were formed, and that their crests are original and practically undisturbed in most instances, all of which greatly enhances the speculative chances of new enterprises that are now in progress and have ore on the many pronounced fissures of the district.

COPPER.

The marked increase in the production of copper from the Coeur d'Alenes during the past year, which was principally due to the continued operation of the Snow Storm mine three miles above Mullan, added to the great activity and profits made in the lead-silver properties, precipitated a boom during the year in mining stock speculation as well as mining development, that is well justified and well gotten under way in the Mullan copper belt, as well as in the adjacent lead producing area of the district.

The Snow Storm Mine.—The Snow Storm copper mine carries an ore chute of equal magnitude and profit-producing capacity with some of the big lead ore deposits of this field. It is directly on the strike of the great Canyon Creek lead-bearing fissures and ore shoots and only four



SNOWSTORM MINE TRAMWAY TERMINAL AND LEACHING PLANT AT LARSON SIDING, 3 MILES ABOVE
MULLAN, SHOSHONE COUNTY.



THIN BEDDED ORE BEARING BURKE QUARTZITE, THE MOST PRODUCTIVE FORMATION IN THE CŒUR D'ALENES,
SHOWING DEPOSITAL LINES AND DIAGONAL CLEAVAGE. RAILWAY CUT BETWEEN
MACE AND BURKE, SHOSHONE COUNTY.

miles in an air line to the southeast of them. This property has a very interesting history. The occurrence of promising copper prospects have been known in the Mullan section for years, but very little faith was developed in them until the successful mining and marketing of the Snow Storm ores were demonstrated by leases.

The Snow Storm ore chute made a very insignificant short chimney outcrop of green stained country rock at the surface, and had nothing much to recommend it but one well defined fissure wall. In fact, the ore chute was very short to a depth of 200 feet, at which it was tapped by a short cross-cut tunnel. A second cross-cut tunnel tapped the vein at 500 feet deep, at which considerable depth the ore continued completely altered—green carbonate of copper saturating a quartzose gangue, and the ore body had expanded from less than 200 feet in length at the No. 1 tunnel level to 500 feet in length, at No. 2 tunnel level, by a width of from five to forty feet. The foot wall is very pronounced and the deposit evidently a fault fissure of the same type as the Hercules and the Wardner lode.

This fissure cuts the thin bedded quartzite at a quartering angle and the ore gradually fades out in the hanging wall country with no clearly defined limits, but has been successfully mined as much as 40 feet wide and produced shipping ore for that width, containing 100 pounds of copper and six or seven ounces silver per ton. The dip of the vein is about 60 degrees and with the slope of the mountain, and it has been tapped with another cross-cut tunnel 1700 feet long at a depth of 1200 feet, from which extensive levels have been run and a raise put through to the No. 2 tunnel level, with four intermediate drifts.

In the first intermediate level below the No. 2 tunnel level, the ore chute is over 600 feet long and maintains its great width. It has been mined during the year with square sets for a width of twenty-five feet and the ore has been shipped to the smelters principally from this horizon and width during the past six months without sorting, at the rate of over 200 tons a day, and yielded a profit over shipping and smelting charges of about \$10.00 per ton. It is a very simple mixture of nearly pure silica and copper carbonate and is in good demand by the copper smelters of Montana for converter linings, to which purpose it is es-

pecially adapted and in consequence is handled at a very low treatment charge.

This mine commenced shipping in 1904 under a lease to J. H. Heward & Co., which was financed by the Greenough Bros. of Mullan, who have since sold the lease to the Snow Storm Mining Company, and acquired control and management of the whole enterprise. The Snow Storm Mining Company is now capitalized at fifteen hundred thousand shares of a par value of \$1.00 a share. Mr. T. L. Greenough of Mullan is president and Mr. W. D. Greenough is general manager.

During 1903, the stock of this company was changing hands at around 5 cents per share, but has since seen a meteoric rise and has made a score of people rich. It sold during the past year as high as \$4.50 per share, and now has a market value of around \$3.00, at which price it seems a fine speculative investment with such an ore showing and such eminent prospects of new and rich ore development at further depth in the fissure.

Since the leasing operations commenced in this mine in 1904, the copper contents of the ore it has shipped has amounted to about fourteen million pounds, together with something like eight hundred thousand ounces of silver, and has resulted in several hundred thousand dollars net profit. The mine now has a million tons of developed payable ore in sight, and while all of this great reserve is not of the ten dollar net grade, a good deal of it is, and some of it much higher grade.

At the first intermediate level below the No. 2 tunnel, the green carbonate ore rapidly changes to a clean dissemination of fine grained bornite and chalcocite with stringers of pure mineral. An interesting feature of the development at the No. 3 tunnel level is a transition at and for a short distance above that level of the sulphide minerals back to a carbonate ore again. This condition is accounted for by a pronounced water course that flowed an enormous volume when the vein was encountered at this horizon, and seems to have locally altered and partly dissolved the values. When the vein was tapped at this level the cross-cut was carried through 100 feet of disseminated copper carbonate ore, containing about 20 pounds of copper per ton, together with streaks of much better

ore, and it is evident that this is only a temporary interruption of the sulphide condition found higher in the vein, as other recent narrow water courses, but dry, have been found in working the main carbonate ore body above the No. 2 tunnel, which seem to have washed out the mineral completely for a width of a foot or two on either side of the crack.

Where the vein was encountered at the No. 3 tunnel, the foot wall was as well pronounced and clearly defined as at any point in the mine, in fact, more so, and carried pieces of massive black and yellow sulphide mineral that ran as high as 50 ounces in silver and 30 per cent copper, and there is hardly any question but that the new No. 4 cross-cut now in progress, which will intersect the vein 500 feet still deeper, will encounter extensive ore reserves and probably of much higher value in the form of secondary enriched sulphides, than has yet been found in the mine; for it is manifest that the water course intercepted by the No. 3 tunnel was not the permanent water level of the country, but must have been in motion to have locally oxidized and alter the ore in the vein, which is clean sulphide mineral for 500 feet above the level.

A sample of the sulphide ore now being developed in the intermediate levels between Nos. 2 and 3 tunnels, which carries average values of ten per cent copper for ten feet in width in one of the drifts, has been subjected to a microscopic examination. A thin section of this ore, highly magnified, was illustrated in the "Mining and Scientific Press" last fall, which shows these rich sulphide minerals occupying the interstices between the sand grains, replacing the cementing silica and not the original grain, a significant condition that is likely to mean still more important sulphide enrichment at greater depth in the vein when the permanent water horizon is encountered or approached.

The present management have greatly improved the equipment of the property since the Heward & Company lease was purchased. These improvements include a new Riblet aerial tramway to connect the lower tunnel with the railroad at Larson's siding, with a carrying capacity of twelve hundred tons per day; a twenty drill air compressor and two hoisting engines with single deck cages for use in the big raise connecting the two main tunnels, and seven

thousand feet of main air pipe; also a fine water power including a four mile flume, together with other appliances which will greatly facilitate the operation and development of the mine and the extraction of ore. The property is equipped with a two hundred ton leaching plant that has been operated successfully.

Plans are being considered for the erection of a smelter to treat the Snow Storm ore on the ground, and their successful accomplishment would greatly enhance the profits of the operation, as a desirable mixture of smelting material can unquestionably be supplied from this locality. The Reindeer mine on the opposite side of the North Fork Canyon, about the same elevation as the Snow Storm, has a remarkably well defined and large fissure vein well developed, carrying great bodies of clean iron carbonate and oxide ore near the surface associated with copper sulphide at depth that would make a very desirable flux, and a little further south, the Monitor mine and others along the Stevens Peak and Park Copper belt, are likely in the near future to afford a big tonnage of very desirable high grade copper sulphide ore, and the consideration of a smelter for this point is timely.

The rapid advance in the Snow Storm stock from a few cents a share three years ago, has made a good many people rich, especially the controlling owners of the stock, who took the longest chances at the start. Manager W. D. Greenough has been criticized for his optimism in regard to its future, but he has played the game wide open. There are no doors or locks on the Snow Storm mine. It has been a show place for intending or interested investors in its shares and he has demonstrated to the public that he is not putting up a story about the property which he does not want to take any chances of having refuted, by his liberality in affording every facility for its inspection. His personal profits from the enterprise have not been salted in real estate investments in other States, but have been liberally put back into the ground in the promotion and development of other mining enterprises in the Mullan section, which include some of its most promising mineral showings. The country along the strike of the Snow Storm vein is covered for several miles with the groups of mining claims of other incorporated stock companies, most of which are being actively developed at the present time and their efforts are very likely to reveal copper ore bodies

of equal magnitude with the Snow Storm, if original surface indications are any guide.

The Monitor Mine.—This interesting copper deposit, situated near the Idaho-Montana line, a few miles east of Mullan, was handled by some energetic Wallace operators during the past year, and made a splendid development, particularly during the closing months of the year, of high grade copper sulphide mineral, of which about six hundred tons were shipped from the mine during 1906 that contained a gross value of sixty-five dollars per ton in copper, gold and silver.

This property carries a large fissure vein that strikes northeast and southwest and stands nearly vertical. It is developed with a shaft now down three hundred forty feet, which is being continued at the five hundred foot level. There have been four short levels opened, exposing two handsome ore bodies that carry from ten to sixteen per cent copper and five or ten dollars per ton in gold and silver, through a width of from ten to fourteen feet in places. Recent reports from the mine say that it has over a half million dollars of developed ore now in sight and has a definite prospect of making a permanent and very important resource of shipping mineral.

Extending west from the Monitor, across the high mountain spurs that put out from the divide between the St. Joe and the South Fork of the Coeur d'Alene River, a string of claims has been located almost continuously for fifteen miles in the direction of the Bunker Hill and Sullivan lode and by some experts supposed to be on the same line of fissuring. Several of these carry remarkably handsome surface showings of copper bearing iron gossen and spatic iron ore. In fact, this belt of territory contains the most conspicuous surface showings of mineral found anywhere in the whole Coeur d'Alene district. These are accompanied at several points by a large parallel dike of igneous rock resembling diabase, to my notion a very important and significant association of the mineral veins.

The Park Copper Mine.—This property carries an ore deposit which is a type of a number of others of similar size and probable importance along this belt. Its principal feature is a continuous body of brown iron oxide and siderite iron mixed, that is from three to fifty feet wide and apparently continuous for fully two thousand feet in

length, striking into a steep mountain spur and affording a magnificent adit tunnel site. It stands nearly vertical and has been developed by an upper tunnel four hundred feet long with cross-cuts every fifty feet, exposing a body of clean gossen mineral for that length that averages forty feet wide. In some of these cross-cuts the brown spongy oxide ore is spotted with kidneys of clean thirty per cent chalcopyrite mineral and copper carbonate. These sulphide pebbles are doubtless remnant cores of a massive body of the same kind of mineral of which the spongy iron shell remains. That this gossen, in its original condition, represented a clean copper sulphide ore, is manifest by the structure of its pores. Iron pyrites usually result in more or less cubic shaped cells of irregular sizes. A massive copper sulphide without any crystalline grain apparent to the eyes, results in a fine sponge like structure of small and flattened cells like the gossen here encountered, and it is not unlikely that when the sulphide horizon of this great vein is reached, the great body of brown gossen ore shown will be replaced by equivalent bodies of massive yellow copper sulphide ore, and probably an important zone of bornite or glance enrichment representing the leaching of the iron cap here presented. Should this conclusion be demonstrated by the development now in progress on the Park mine, which is shortly expected to tap the vein at a depth of four hundred feet, it will have the effect of enhancing the value of every similar showing along the Park and Stevens Peak copper belt, and I consider that the cheap stock offerings of this important section of the Coeur d'Alenes affords some of the finest chances for speculative investment at the present time to be found anywhere in the west.

The Stanley Mine.—This property, situated up George Gulch, a mile above Burke, between two of the most famous lead silver producing fissures of the Coeur d'Alenes, developed an important shoot of clean antimony sulphide ore that is practically free from lead or any other minerals detrimental to its use in the production of metallic antimony. It carries an ore shoot from a foot to five feet wide of white quartz richly impregnated and associated with massive clean stibnite mineral which also carries important values in gold, including native gold specimens. Three car loads of this ore were shipped during the closing

months of the year, that averaged all through fifty-five per cent of metallic antimony, and the last car also contained an average value of twenty dollars per ton of gold, in addition.

It was difficult to market this ore when it was first encountered, but since it has become known that the district contained clean antimony mineral, a number of bidders have developed and the ore seems to be in excellent demand at high prices.

A second shoot has been discovered on this vein a thousand feet east of the first one, that is a foot to eighteen inches wide of the same rich ore and has been drifted on 100 feet already, and the property seems likely to develop very considerable commercial importance as a producer of this useful mineral.

Clean Minerals.—The Coeur d'Alene district is best known to the world as a lead-silver district, and, in fact, as such it is without a peer. The bulk of its lead-silver ore production is noted for its purity and freedom from objectionable mixtures of other sulphide minerals. It is true that it has certain sections that carry a mixture of zinc and lead, but it is a remarkable condition to find such clean minerals of the different varieties so promiscuously mixed in their geographical distribution throughout the district, and that the district is important as a probable extensive resource of other valuable ores besides lead and silver, is now established. Its copper veins are generally free from lead and it has some magnificent deposits of zinc ore that carry a very small percentage of lead. Over on the north side in the Murray section, the Pilot gold mine developed a pay streak of gold bearing tellurium ore that produced a ton shipment of selected mineral containing a value of four thousand dollars in gold, during the past summer, and the list is likely to be further extended from that interesting section during 1907 by important shipments of tungsten mineral.

Such close association of pure, high grade minerals in the same general system of fissuring and formations, can only be explained by long continued, repeated and deep seated sources of mineralization, and indicates that the main vents of the district have had on tap a varied source of high grade mineral solutions and that they are likely to continue to afford some interesting surprises in ore development.

The mining population of the Coeur d'Alenes has increased about 50 per cent within the past year. The hotels in the district are crowded all the time, and business of every kind is very prosperous. The boom in stock values suffered a temporary setback at the close of the year, but with such magnificent dividends and such strength at depth as is displayed by all of the large properties, and with continued high metal prices, its more popular shares are likely again to become very active and prices advance materially in the near future.

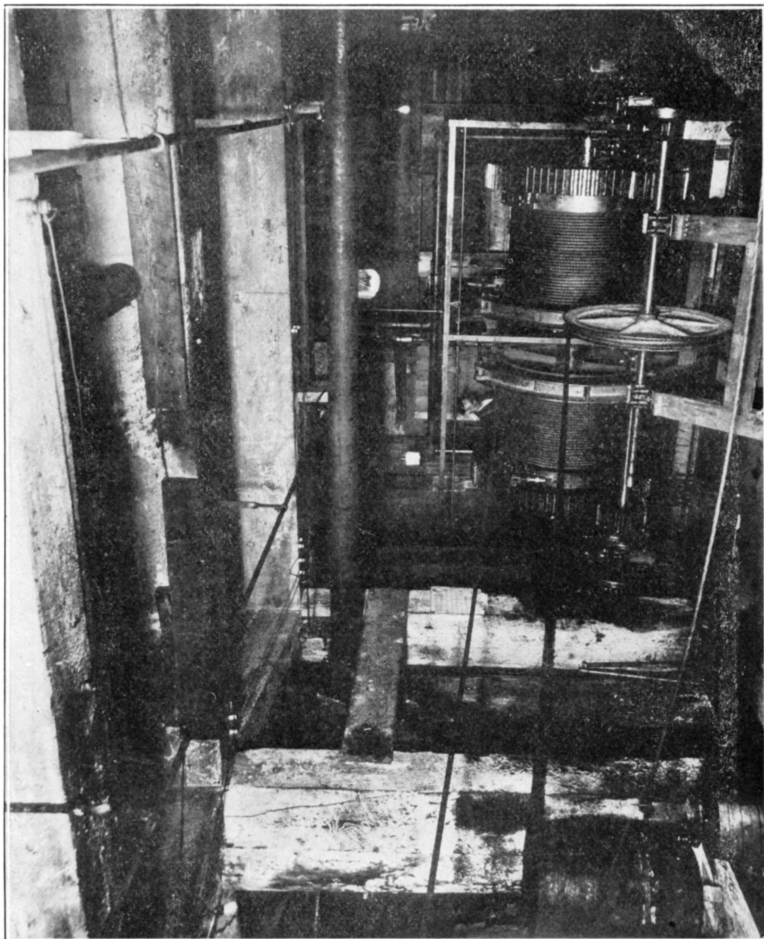
In this connection, the continued upward course of lead metal prices, unless some unforeseen industrial calamity occurs, which might cause a temporary setback, can safely be banked on. According to the best authority on the subject, "The Mineral Industry," the United States during 1905 produced three hundred twenty thousand tons of lead and consumed nearly 40,000 tons in addition to its domestic production, of imported lead, and the stock on hand at the close of the year amounted to the insignificant sum of 4,000 tons. Of the total domestic output Idaho produced 107,000 tons, Missouri, 102,500 tons, Colorado, 57,856 tons, Utah, 44,500 tons, all other States combined 8,400 tons, from which it will be seen that the important lead resources of the United States are circumscribed to a very limited territory.

Copper is more widely distributed and makes an important output from a dozen different States of the Union, but there are practically only four States producing lead in any quantity, and the natural growth of the country will unquestionably create a demand that will more than equal any prospective increased supply, as lead mines, like other enterprises, take years of time for their proper development to put their resources in marketable form, and my prediction of a year or so ago of a 10 cent lead market at no very distant date is showing symptoms of vindication already, all of which means more profits and enhanced values for the principal metal resources of the Coeur d'Alenes.

The big mines of this district are being worked to the full extent of their milling capacity, and while they could easily double their output in some instances, from developed ore, the facilities for putting the mineral in marketable form will require time.



**BREAST OF HIGH GRADE GALENA ORE AFTER BLASTING. 1600 FOOT LEVEL,
MORNING MINE, F. M. & S. CO., MULLAN, SHOSHONE COUNTY.**



UNDERGROUND HOIST STATION, F. M. & S. CO., WARDNER MINES
SHOSHONE COUNTY.

The milling practice of this district during the past years has not been such as the operators care to brag about, for their concentration losses have constantly ranged from 15 per cent to 20 per cent and over of the gross lead-silver contents of the ore mined. This loss was formerly in a measure justified by the size of the ore bodies and the low price of the metals. The rapid increase in metal values of late, however, have opened their eyes to this reckless waste of rich mineral, and great improvements are being made all along the line by the introduction of new devices for a closer and better saving of the slimes and finer material that have previously been allowed to float away, and for retreating coarse tailings, and it seems only a question of a little time, if money and milling talent can bring about the result, when the district will afford some of the finest examples of high extraction to be found anywhere, as plans are maturing to that end with several of the big companies.

Of all the great volume of lead ore produced by the Coeur d'Alenes, not a single pound of it is smelted and reduced to bullion in the State. That such a condition exists is due to the fact that the bulk of the output is controlled by the smelter trust, which works a hardship on the profit-making reputation of the district and is rather a reflection on its native talent. There is in the Coeur d'Alenes some of the ablest mine managers in the United States, who can show operating costs sheets that will compare favorably for economy with the best in the country. These men have graduated to their present positions of eminent ability from the farm and stope as well as from the best technical institutions, and it will be surprising if some Moses does not develop to lead the industry out of the control of one institution in respect to the final treatment of its ores.

Smelting is simply a fire concentration, and with such easy ores as the Coeur d'Alenes afford, requires less technical ability for a close saving of mineral values than does water concentration. With a 10 per cent discount for loss in smelting on a fire assay basis and the heavy treatment charge now paid, together with the shipping charge on 50 per cent of dead loss on each ton of mineral shipped, an independent smelter in or near the Coeur

d'Alenes would make so much money that it would be ashamed to take it from the miners, on present discount margins, and could afford to reduce the present charges for freight and treatment 50 per cent; and the time is ripe for the introduction of an independent plant which would doubtless build up, if properly financed and made trust proof, a smelting industry to go with the mining industry that would give the district important added prestige and profit, for there are enough independent producers in the district and new ore bodies being developed, to supply a very respectable plant already, with the likelihood that its capacity would need enlarging annually.

During the past year new companies have been formed to exploit the mineral resources of this field, by the dozen, and stock speculation has been quite rampant. Recent Coeur d'Alene mining companies usually incorporate with a million share capital, and from that up, at a par value of \$1.00 a share. This does not necessarily mean that the shares are worth a dollar each or ever will be; they are simply worth what they will bring and prices are generally held down to a rational level considering the chances of success they afford. They may be based on anything from a 10-foot hole on a more or less well placed claim to a large group of claims with a thousand feet of development, or more. In the very nature of things, a great many of these enterprises will fail to make mines, and care must be exercised in their selection, but their high capitalization has been demonstrated in several conspicuous instances to be justified, for when an ore body is struck of any size in this field it is generally permanent and very productive, and is likely to pay big dividends on the par value of the shares for an indefinite period. Many of these new ventures are backed strongly by local people, a majority of the miners, operators and business men of the Coeur d'Alenes themselves being heavily interested in the different new enterprises, and there is an unwritten but nevertheless well-pro-nounced law against wild-catting.

There are seven local newspapers published in the district, four of which are in Wallace, the principal business center of the Coeur d'Alenes. These are generally edited in the interest of clean mining methods, and while their mining news, which naturally occupies a conspicuous

place in their columns, is attractively headed and put in a readable form, they nevertheless endeavor to protect the outsider and the reputation of the camp, and have no scruples in frowning down any attempts at crooked methods of raising capital for mining development, and the district affords many splendid chances for speculative investment, especially in its cheaper share list, where intelligent selection is exercised.

Wallace has a number of responsible mining stock brokerage firms, which afford a reliable means of transactions in Coeur d'Alene shares, at very moderate commissions. They are right on the ground, so to speak, and have the best general facilities for advising their clients of the trend of local mining affairs in which they may be interested. I understand they are shortly to form a local stock brokers' association and make daily quotations, which is a good move, for such an association, governed by strict business principles, can do a great deal to encourage the development of the varied mineral resources of this rich district.

Investments in the shares of mining development enterprises, however, must always be looked upon as purely speculative. It is a business for the strong and adventurous investor; for the man who can spare money he invests without the possible loss of it hurting him, for, as a well-known writer has said:

"Nature is very erratic in the disposition of her minerals. She appears to enjoy the baffling of human intelligence and a like formation and mineral indication in every respect is not always attended by like conditions and results. In one place under certain geological conditions, you will have the deposition of paying minerals, and in another place, with the same formation, you will have none, and it is this uncertainty about Nature's moods that gives the precious minerals their value and spurs the ambition and cupidity of man to fathom and unlock her secrets."

To any one wishing to pursue a more detailed study of the mineral resources, geology and history of this district, I would respectfully refer to "Contributions to Economic Geology for 1904," issued by the United States Geological Survey, Washington, D. C., which contains a splendid preliminary report entitled *The Geology and Ore Deposits of the Coeur d'Alenes*, by Frederick Leslie Ransom, and I un-

derstand that this is to be supplanted by a more detailed and elaborately illustrated report on the same subject, soon to be issued.

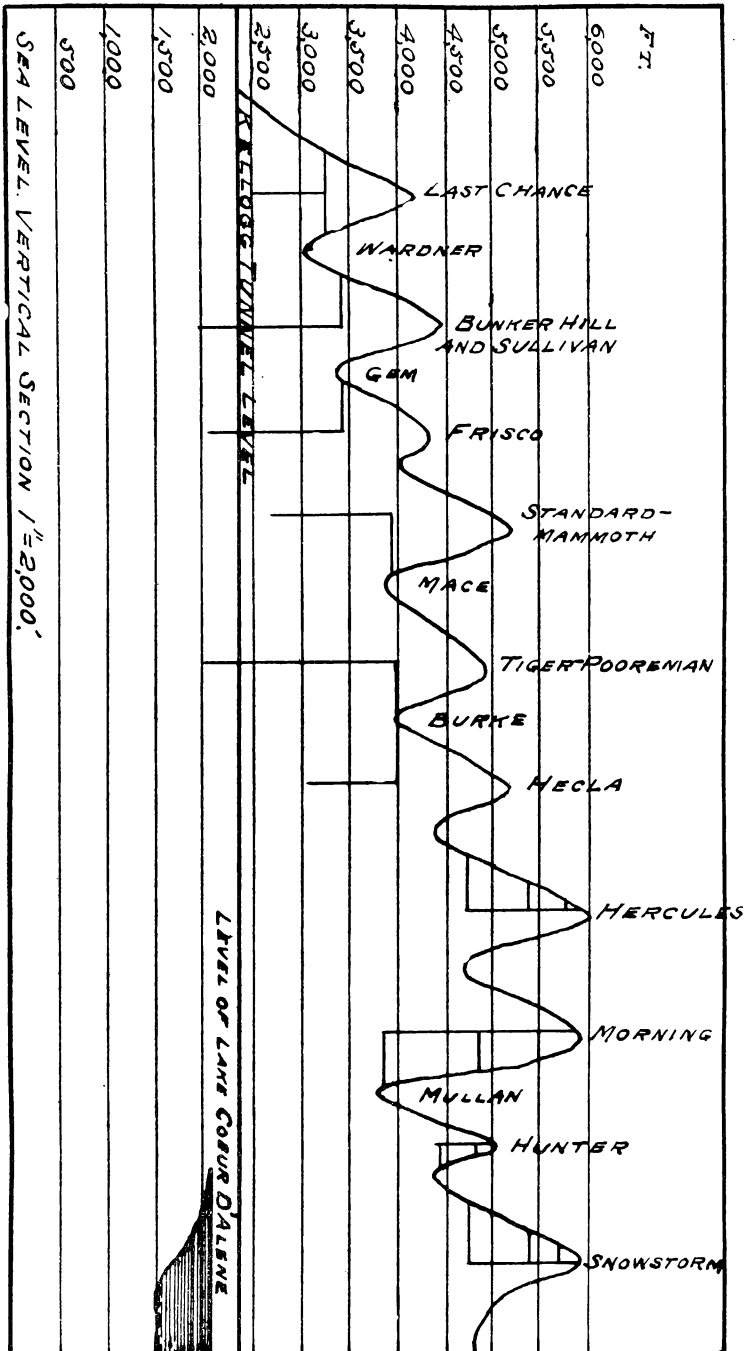
The statistics of output accompanying this report are based on gross metal contents of mineral shipped, and as some of the settlements are not received for two or three months after the ore is sent out of the district, they are necessarily in the nature of estimates for the closing months of the year.

These figures are purely for advertising purposes, to exhibit the resources of the State. The producers, of course, do not receive the value shown in these estimates for their products, but the bulk of the metal contents continues to provide profits and employment in handling and treatment, until put into final marketable shape, and it is a patent fact that not ten per cent of the gross amount goes into the air or slag as loss in smelting, for it is well known that in good practice four or five per cent is a big margin for such losses on this class of ore, and with the American Scotch-earth, bag-house plants of the east handling clean lead ore, ninety-eight per cent extraction is not an uncommon result. I consequently consider that I am justified in giving the district credit for creating the values ultimately obtained for the finished product, and base the gross value in these estimates on New York quotations for the metals, which is the principal settling price stopped at in estimates of this kind.

People want to know at the close of the year what the year has done, and I believe that a timely close guess is better than an accurate obituary written a long time after the close of the year.

Of the total metal output of the State during 1906, the Coeur d'Alenes produced 98 per cent of the lead, 87 per cent of the silver, 55 per cent of the copper, 95 per cent of the zinc and 5 1-2 per cent of the gold, and all of the antimony, and makes a magnificent display, not only in value, but in variety of precious and useful metals.

The most important occurrence of the past year from the standpoint of the laboring man in the Coeur d'Alenes, was the voluntary accession of the mine operators to an eight hour day with same rate of wages previously paid for ten hours. This has had a very salutary effect and created a better feeling throughout.



The following is a list of wages paid in the Coeur d'Alenes in all the mines, for an eight hour day, except the Wardner mines, where shovellers receive \$3.00 per day of eight hours:

Miners, \$3.50; trammers, \$3.50; top cagers, \$3.50; bottom cagers, \$4.00; nippers, \$3.50; timbermen, \$4.00; engineers, \$4.00; pumpmen, \$4.00; shift bosses, \$5.00; assayers, \$125.00 per month; electricians, \$4.00; blacksmiths, \$4.00 to \$4.50.

This list is from the Hecla mine and varies but little at the other mines throughout the district, with the exception mentioned.

WASHINGTON COUNTY.

The extensive mineral resources of this county were not very aggressively developed during 1906, although a few important enterprises were afoot that are likely to result in important ore developments in the future.

Seven Devils.—In the well known Seven Devils copper district, one of the most important happenings of the year was the settlement of a long pending title suit by a supreme court decision affecting the title to some of the most noted claims of this district which it is to be hoped will encourage their transfer into more enterprising hands.

This district, like most of the other Washington County mining districts, is situated at some distance from railway transportation, which has proved a great drawback to the successful disposition of its important ore resources. The distance is not great to any of Washington County's mining camps, and the routes quite feasible for railway construction, but so far conditions have not warranted any being undertaken, excepting the extension of the Pacific and Idaho Northern, which was pushed ahead towards the

magnificent timber belt and mining country in the direction of Meadows, for a distance of sixteen miles, during the past year, and the new extension completely equipped and put into operation. An additional fourteen miles to be added to this railroad during the coming year should result in it becoming one of the most important lumber roads in the State.

The eminent probability of the early construction of an Oregon Short Line extension through the Snake River Canyon to Lewiston will bring the whole western slope of the Seven Devils range within easy reach of railroad transportation, and will doubtless result in the opening up of a number of important mines, as that slope of the range is richly mineralized throughout the entire length of the canyon from the Huntington bridge down to the mouth of the Salmon River.

Queen and Calumet Mines.—The most active mining operation of the year in the vicinity of Landore, which is the postoffice center of the Seven Devils copper district, was the operation, under lease, to S. Peacock and B. Peacock of the Queen, Calumet and Alaska lode claims. This property carries rich lenses and kidneys of high grade bornite and copper carbonate ores in a gangue of garnet rock with more or less limestone and calcite. There are no defined walls. The altered metamorphic minerals blend into a general country of gray diorite. The property was operated through tunnels and shafts, and a total of seven hundred fifty feet of new work was accomplished during the year. For a greater part of the season, forty-six men were employed and six hundred ten tons of shipping ore extracted containing a gross value of sixty dollars per ton and upwards, all of which was shipped to outside smelters.

The wages paid in this district are three and 50-100 dollars a day for miners, three dollars for trammers, four dollars for timbermen, and four dollars for blacksmiths; nine hours constitute a shift. Shaft sinking on this property costs nine dollars per foot and drifting seven dollars per foot. Dr. S. Peacock was manager in charge of the work.

Other Shipments.—In addition to the production of this property, there were two thousand five hundred forty-five tons of ore hauled to the railroad and shipped to the Ore-

gon Smelting and Refining Company at Sumpter, Oregon, which contained one hundred forty-eight ounces gold, seven thousand two hundred eighty-three ounces silver and five hundred eighty-seven thousand eight hundred sixty pounds copper. This ore was from the stock piles of the Ladd Metal Company and was mined from the old Peacock property several years ago.

Black Lake and Iron Springs.—At this gold district, on the eastern slope of the Seven Devils range, development work only was in progress during the year, and none of the mines produced any bullion.

The Idaho Gold Coin Company at Black Lake is driving a deep drain and development tunnel to tap its ore bodies at considerable depth. This tunnel is now in a distance of twelve hundred feet and it is anticipated that the ore body will be encountered by spring. The company has experienced hard luck in this undertaking by the burning of its compressor plant, which seriously retarded the work, and other difficulties which, however, are overcome, and the successful reopening of the mine, which has been an important gold producer in its upper levels, may be confidently looked for the coming season.

At the property of the Iron Springs Consolidated Company, four miles northeast of the Gold Coin, a force of fifteen men were employed during the year doing assessment and development work on the numerous claim holdings in that section.

In addition to these a number of prospects were worked and some rich ore discoveries were reported from this section during the year at several points.

Heath District.—This district is situated on the westerly slopes of Cuddy Mountain and eighteen miles from the Pacific and Idaho Northern Railway at Cambridge, with which it is connected by good road on easy grade.

The most important transaction of the year at this district was the reopening of the well known "Railroad" copper silver mine by Dr. S. Peacock. This is a very interesting deposit of large size containing good concentrating values in gold and silver bearing copper sulphide ore. It consists of a vein, or zone, of limestone and garnet rock in walls of blue porphyry; it stands nearly vertical and is one hundred feet wide, containing average values of three and a half per cent copper, with bodies of massive clean sul-



SCENE NEAR SAPPHIRE MINE, ROCK FLAT, WASHINGTON COUNTY.



**BASALT CLAY DIKE FROM WHICH SAPPHIRES ARE DERIVED, ROCK FLAT
PLACER MINE NEAR MEADOWS, WASHINGTON COUNTY.**

phide mineral that runs fifteen to twenty per cent copper, and at the outcrop some handsome deposits of green and blue carbonate were found that sample up to forty per cent copper. There are several hundred feet of development on the property, which is being continued from a short cross-cut tunnel. The work now being carried on is in the shape of drifts and cross-cuts and is all in ore. Some wide streaks of mineral in this deposit contain white bismuth sulphide, associated with the copper and iron sulphide that run very high in silver, selected specimens showing as much as a thousand ounces per ton.

Dr. Peacock has greatly improved the property already since he took charge along in the summer. He has put in five hundred feet of new trackage, three camp houses, equipped for seventy-five men, and three miles of new road, together with ore bunkers, and has two hundred tons of ore of shipping grade on hand which will be hauled to the railroad as soon as the roads are in shape for sleighing.

With the construction of the new railroad down the Snake River, this mine will be only nine miles from railway transportation, with a down hill pull that will greatly facilitate the operation of this and other properties of this district.

This deposit is of great size and promise, and in such energetic hands is likely to shortly develop a very important producer. The natural conditions surrounding it in the way of chances for gravity handling, timber, water for milling purposes, and deep adit tunnel work, are exceptionally fine.

The district contains a number of other very promising deposits of both copper and lead silver ore, and the successful operation of the Railroad mine will doubtless induce other investments in its promising resources.

Geologically, the Heath district and the Cuddy Mountain uplift are very favorable for the occurrence of valuable smelting ore deposits. The prevailing formation that flanks the mountain to the east and north is a Columbia lava flow which at one time covered the entire district but has been broken though or eroded at the higher elevation, and on the western slopes exposing a great boss or lacolite of monzanite granite, with bordering belts and zones of limestone and schist, also numerous dikes and bodies of

porphyry and diorite, together with an extensive development of garnet and epidote accompanied with manganese and iron gossens.

Northeast of the Railroad mine, nine miles distant, the Galena Mountain mine was also operated in a limited way during the past summer by Dr. Peacock, and a carload of rich lead silver ore produced and shipped which yielded fifty-four per cent lead and six and one-half ounces silver per ton. This property carries a number of small veins of nearly clean galena, two to six inches wide, in a porphyritic quartz formation associated with a good deal of manganese stain and presents a very interesting condition that may warrant further development.

Sapphires.—Washington County came to the front the past year with an important discovery of precious stones, consisting of a deposit of genuine sapphires. The sapphire is the next hardest substance in nature to the diamond. It is clear crystalized corundum. Ordinary opaque corundum crystals are used for abrasive material and have very little commercial value in this region at the present time, but the clear crystals make beautiful and lasting gems and American sapphires have the peculiar and valuable property of reflecting their sparkling colors and tints under artificial light as well as by daylight, a property not so fully possessed by the foreign oriental gems. Sapphires occur in all colors, while blue is the true sapphire color. The substance of a true ruby is practically the same as the blue sapphire, the only difference being in the slight mixture of other natural coloring matter, and the prefix "oriental" is added to the genuine corundum crystal of any other color than blue which makes it an oriental ruby, amethyst, emerald, etc.

The sapphire deposits of Washington County occur at the Rock Flat gold placer mine near Meadows postoffice on a high plateau divide that separates the waters of the Little Salmon and the North Payette Rivers in a beautiful, heavily timbered district near Payette Lake.

Basalt Clay Dike.—The general formation of the district is gneiss and the corundum crystals which include some of excellent gem quality seem to be derived from a wide dike of basaltic clay formation with a peculiar spheroidal structure. The gem stones are found associated

with a great array of pyrope garnets in the cleanup boxes of an old placer pit. The dike was uncovered in the bed-rock while washing the gravel for its gold contents. Some beautiful gems have been found. They occur in a variety of colors, the oriental amethyst shades predominating. Most of them have an opalescent silky sheen and are not of high value, but would cut into excellent cat's eyes and star sapphires. Some bronze crystals would also make handsom tiger eye sets. Some small stones, however, of fine quality have been found, which, when cut, are as large as one-half to one karat and have a beautiful clear cornflower blue color. Others make brilliant pink stones as large as a karat and a half in weight after cutting. The crystals also include some of poor red quality, but nothing as yet approaching a true ruby color; however, these tints are so varied and the crystals so plentiful that valuable gems of large size are likely to be found with the further development of the deposit, including rubies.

This development is now in progress, a drain tunnel is being run to tap the deposit at a depth of eighty feet. This has been extended in six hundred feet through the rim of the plateau, and it is probable that a connection will be made above the face of this tunnel to the overlying gravel bed and dike formation, which is only eighty feet above the face of the tunnel. This will greatly facilitate the further operation of the mine, and it is not unlikely will give Washington County a prominence as a producer of valuable gem stones.

Basaltic dike formations of the same nature as the one above described are of common occurrence in connection with the placer deposits found in the eruptive granites of central Idaho, and other sapphire discoveries are likely to be made in the working of these placers, and it will be well for the miners to keep a sharp lookout at cleanup time for clear colored crystals of other color than red, which are likely to prove sapphires and of considerable value, for the opaque corundum crystals are known to exist at a number of other points, notably in the different placer deposits around Resort in Idaho County, in the Gold Fork and other tributary streams of the North Payette River in Boise County, and in the placers of Stanley Basin in Custer County, and at Pierce City in Nez Perce County.

The corundum concentrates at the Rock Flat mine are associated with other heavy minerals in appreciable amounts. These include monazite, zircon, chromite, illmanite, magnetite, and traces of platinum. These rare minerals, some of which have important commercial value, are said to be a common association of the oriental ruby and sapphire deposits of Ceylon and Burmah and may prove significant in this instance.

The foregoing review of "Idaho by Counties" is semi-official only. I endeavor to get information on subjects treated as recent as possible, and to this end send out blank reports about December 1st, which, however, are often neglected or sent in too late to do any good and while a good deal of the matter is from personal knowledge. Idaho is a broad field for one man to cover and I have to rely on other than personal sources of information to some extent.

The statistics of output are also partly estimates for the closing month of the year. As most of the big producers are from one to two months getting settlements from ore shipments after the mineral is shipped out of the State, as none of our great output of smelting minerals is reduced to bullion in the State. From the best information obtainable at the time of going to press with this report it is evident that the dividends and net profits made by Idaho mines during 1906 will approximate \$7,000,000, the bulk of which is from the Coeur d'Alenes, the Bunker Hill and Sullivan mine heading the list with \$2,340,000, while the combined profits of the Federal Mining and Smelting Company's four mines will exceed \$2,500,000.

ADA COUNTY.

Gold, fine oz., 50.80	\$ 1,050 00
Silver, fine oz., 25.04	16 64
Total value	\$ 1,066 64

BINGHAM COUNTY.

Gold, fine oz., 72.76	\$ 1,504 00
Silver, fine oz., 10.40	6 91
Total value	\$ 1,510 91

BLAINE COUNTY.

Gold, fine oz., 884.62	\$ 18,285 00
Silver, fine oz., 217,217.09	144,340 76
Lead, lbs., 223,639.4	126,579 90
Zinc, lbs., 77,000	4,766 30
Total value	\$ 293,971 96

BOISE COUNTY.

Gold, fine oz., 13,112.72	\$ 271,040 00
Silver, fine oz., 7,465.23	4,960 65
Total value	\$ 276,000 65

CUSTER COUNTY.

Gold, fine oz., 5,950.65	\$ 123,000 00
Silver, fine oz., 175,223.54	116,436 04
Lead, lbs., 240,000	13,584 00
Copper, lbs., 4,000,000	774,000 00
Total value	\$ 1,027,020 04

ELMORE COUNTY.

Gold, fine oz., 7,987.42	\$ 165,100 00
Silver, fine oz., 4,328.05	6,513 24
Total	\$ 171,613 24

FREMONT COUNTY.

Gold, fine oz., 14.90	\$ 308 00
Silver, fine oz., 800	531 60
Copper, lbs., 64,000	12,384 00
Total value	\$ 13,223 60

IDAHO COUNTY.

Gold, fine oz., 8,950.17	\$ 185,000 00
Silver, fine oz., 3,251.42	2,160 57
Total value	\$ 187,160 57

KOOTENAI COUNTY.

Gold, fine oz., 96.76	\$ 2,000 00
Silver, fine oz., 31,525.00	20,948 36
Total value	\$ 22,948 36

LEMHI COUNTY.

Gold, fine oz., 5,178.52	\$ 107,040 00
Silver, fine oz., 50,027.01	33,242 95
Lead, lbs., 1,800,000	101,880 00
Copper, lbs., 40,000	7,740 00
Total value	\$ 249,902 95

LINCOLN COUNTY.

Gold, fine oz., 120.95	\$ 2,500 00
Silver, fine oz., 58.17	38 65
Total value	\$ 2,538 65

NEZ PERCE COUNTY.

Gold, fine oz., 8,906.14	\$ 80,740 00
Silver, fine oz., 850.08	564 88

Total value\$ 81,304 88

ONEIDA COUNTY.

Gold, fine oz., 196.81	\$ 4,068 00
Silver, fine oz., 16.16	10 74

Total value\$ 4,078 74

OWYHEE COUNTY.

Gold, fine oz., 8,644.51	\$ 178,682 00
Silver, fine oz., 732,450.31	486,713 23

Total value\$ 665,395 23

SHOSHONE COUNTY.

Gold, fine oz., 3,244.32	\$ 67,060 00
Silver, fine oz., 7,903,487.00	5,251,867 11
Lead, lbs., 251,650.209	14,243,401 83
Copper, lbs., 6,856,324	1,236,698 69
Zinc, lbs., 1,400,000	86,660 00
Antimony, lbs., 90,000	20,700 00

Total value\$20,906,387 63

WASHINGTON COUNTY.

Gold, fine oz., 350.27	\$ 7,240 00
Silver, fine oz., 7,941.04	5,276 82
Lead, lbs., 39,480	2,234 57
Copper, lbs., 680,241	131,626 63

Total value\$ 146,378 02

TOTALS FOR THE STATE OF IDAHO.

Lead, lbs., 255,966,083.00	\$14,487,680 30
Silver, oz., 9,136,860.73	6,071,443 96
Copper, lbs., 11,640,565.00	2,252,449 32
Gold, oz., 58,762.32	1,214,617 15
Zinc, lbs., 1,477,000.00	91,426 30
Antimony, lbs., 90,000	20,700 00

Total value\$24,138,317 03

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. Figuring silver at its coinage value of \$1.29 per ounce, the grand total would be \$29,853,423.41, a total increase in value over 1905 of \$4,044,719.07; over 1904 of \$7,-015,125.06; and over 1903 of \$8,797,348.04.

