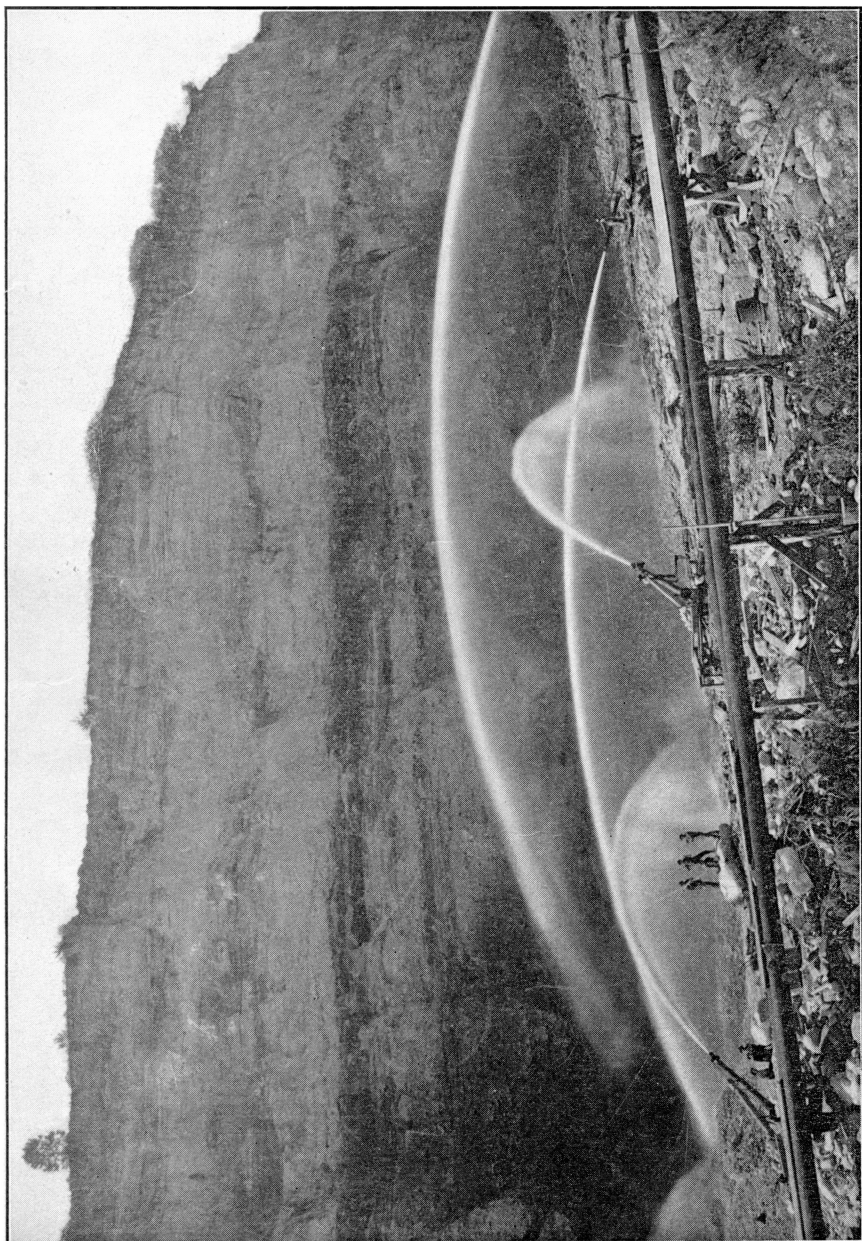


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20181105 Christopher Tate, Idaho Geological Survey

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



WOODBURN HYDRAULIC PLACER, IDAHO CITY

Geological Bureau Mines and Geology
IDAHO

REPORT

—OF THE—

Mining Districts

Of Idaho.



For the Year 1904.

By **ROBERT N. BELL**, Inspector of Mines

Office of State Inspector of Mines, State of Idaho.

Boise, Idaho, Jan. 1st, 1905.

To His Excellency, John T. Morrison, Governor of Idaho:

Dear Sir—I have the honor to transmit herewith my official report as State Inspector of Mines for the year ending December 31, 1904.

Very respectfully,

ROBERT N. BELL.

Report of State Inspector of Mines.

IDAHO RETROSPECTIVE.

The record of the metal mining industry of Idaho has been one of steady increase of production from the first discoveries to the present time.

The flush years of placer gold production subsequent to the first discoveries in 1860 at Pierce City, in the northern part of the State, were followed in the seventies by the sensational discoveries of extensive bodies of silver-gold milling ores of the camps in the central and southern part of the State, including Custer, Atlanta, Rocky Bar and Silver City Districts.

When the railroads first touched the present area of the State in the early eighties, the useful baser metals in which its mountains abound became available, with the result that today Idaho leads every other political division of territory in the whole world in the matter of lead production, with very bright prospects of maintaining that position indefinitely.

The copper resources of Idaho are rich, extensive and widely distributed; this branch of our mining industry, however, has been seriously retarded by lack of transportation facilities, yet it is gratifying to be able to report that Idaho contributed principally from two mines, at opposite ends of the State, over 5,400,000 pounds of the valuable red metal during 1904, and, given a little better railway facilities, a copper producing industry may rapidly be built up that will give Idaho high rank among the copper-producing States.

The formations occupying the entire mountain sections of Idaho, which cover fully three-fourths of its total area of eighty-four thousand eight hundred square miles, are

more or less gold-bearing throughout, and particularly so in the Owyhee range and the great stretches of granite formations that extend from the northern border of the Snake River plains to the British line, which bounds the north end of the State.

The fertility of these formations, as an original source of the precious metal—gold—is amply evidenced by the enormous yield of float or placer gold they have produced, an amount conservatively estimated at two hundred and fifty millions of dollars in value. In many of our noted old placer districts important disclosures and discoveries have recently been made that strongly indicate that “the mills of the gods” ground off but a very thin skim of the original reserve of gold-bearing rock. Take the Owyhee County districts for instance; the vein gold has exceeded the placer production twenty to one, and other placer districts in the State are likely to furnish parallel results, if given the same extensive underground development that the Owyhee camps have enjoyed.

In Boise Basin, Elk City and Leesburg Basins, some enormous zones of altered gold-bearing granite have been discovered that have been tested to some extent in quite a practical way, and found to carry what are considered paying values, in width—varying from one hundred to four hundred feet, followed for long stretches in the direction of their strike, many other and richer gold ore discoveries have recently been brought to light throughout the State, and while the gold production has fallen off a little during 1904, due to the abnormally dry season and other causes, as compared to 1903, yet the future of this branch of our mining industry is extremely bright with the promise of growing importance, and the output from ore sources is likely in time to excel and discount the palmiest days of our placer production, with the ever present possibility in our extensive stretches of virgin territory of the meteoric discoveries that have led to such booming times in other extensive gold fields of the West.

Idaho's Chief Source of Metallic Wealth.

The chief source of metallic wealth in Idaho is our lead production. In this industry our State is making history very fast.

In the winter of 1883-4, shortly after the golden spike was driven that connected the Northern Pacific Railway, the writer was working in the west end of the Bozeman Tunnel, and with several other pilgrims was attracted by the sensational stories of rich gold discoveries in the Coeur d'Alenes, and in the early spring formed one of a party of three to try a whirl at the new diggings. We had proceeded as far as Helena on the way west where we met a Utah miner whom we had worked with, and who had been to the Coeur d'Alenes and was on his way back, thoroughly disgusted with the country. He said that all the gold claims were staked and very spotted anyway; that the only thing he saw was some big boulders and croppings of soft lead ore which the Indians had used for making bullets, but that they would never be any good for anything else, as the ore was low in silver, occurred in quartzite, and would not go down any way, and besides it was such a rough and rugged country that it would be impossible ever to get a railway through it, without which the lead ore would never be of any value.

The result of this unfortunate conference was that we took his advice and switched off to Butte, and finally to the silver-gold camps of the upper Salmon River, Idaho, and just missed being in at the birth of one of the richest mineral districts ever discovered.

Since that date, in spite of their remoteness, those old bullet boulders and low grade lead ore croppings have seen a remarkable evolution and have produced not less than 20,000,000 tons of crude and concentrating ore that have yielded shipping mineral concentrates and crude ore con-

taining lead and silver values closely approximating \$100,000,000 in gross value.

During the early years of their development some of these big lead mines had a hard struggle for recognition as a source of profit, and taking the district as a whole the ores are low grade, and have involved enormous outlay of capital in their development and equipment. This has been warranted, however, by the remarkable size, length and depth of the ore shoots; and while the profits per ton are small, the quantity of ore available justifies an enormous production and affords the basis of a reliable, profitable and rapidly expanding industry; and the way new ore bodies are being discovered, and old ones holding out, or reforming at great depth, it is likely that the district will be able to respond to any demand that may be made upon it for a long time into the future.

While it is a fact that several of the longitudinal plans of the big lead ore shoots in the Coeur d'Alenes show the same consistent regularity in their length and downward extension that has characterized the development of the amygdaloid and conglomerate copper beds of the Lake Superior region during the past fifty years, yet, some of the most profound fissures of the district have exhibited the same vagaries of mineralization that have been met with in most other noted lead mining fields, that emphasize the necessity of capital risk for successful mining exploitation.

To illustrate a case in point: The great Kellogg Tunnel of the Bunker Hill and Sullivan Mine, starting near the level of the Coeur d'Alene River, just below Wardner, was driven into the mountains over two miles, at an enormous outlay of time and money, for the purpose of draining the mine and facilitating its operation generally, but more particularly for the purpose of undercutting and getting a new 600-foot lift on the great Stemwinder ore channel that had been the chief center of mineralization and source of ore in the levels above for years.

This great bore, when completed to the fissure over three years ago, found it as open and clean cut as ever. A drift was extended easterly along the well defined foot wall of the lode, under and beyond the point at which the Stem-winder ore shoots should have come down, and hundreds of feet of cross-cutting was done under this territory, without finding enough ore to "swear by" and the outlook for opening up profitable new ore bodies at Kellogg level seemed anything but bright; the present management decided to push the main drift further on to the east, with the result that within a few hundred feet ahead of where the face had been stoped, an ore body was encountered and has since been extensively explored that probably exceeds in size and value any other soft lead ore body ever discovered in the mining history of the world. It is now known to be between 400 and 500 feet long, and 50 feet between walls at right angles to the dip. The ore is a simple mixture of clean, medium grain galena, practically free from blend and iron pyrites, occurring in a shattered quartzite gangue, and showing an occasional sprinkling of clean gray carbonite of iron.

This great shoot, where it is cut at the Kellogg Tunnel level, 2,000 feet below the apex of the lode, carries bodies of solid galena several feet in width and affords a big tonnage of clean shipping mineral. Its average value through the whole width of the lode at this level is 25 per cent lead and about 12 ounces of silver per ton. The bearing that this great discovery may have on the prospects for successful deep mining in this district will be manifest. It seems as if the mineralization had set ahead a step in the plane of the vein to the East, had taken a new start and was going down cleaner, richer and larger at this deep level than at any other point previously encountered in the extensive exploration of this great mine.

The ore reserves already in sight in this great ore body alone, blocked out by intermediate levels for 600 feet above

the Kellogg level are sufficient to maintain the present remarkable output the mine is making for five or six years. This, together with the extensive stretch of virgin territory along the lode to the east owned by the company, in which several large ore bodies have been worked through the upper levels, and the eminent probability of the continuation of this present bonanza shoot to a very considerable depth below the Kellogg Tunnel—which establishes a new drainage level to sink from—puts the Bunker Hill and Sullivan, while low in silver, easily in the lead as the largest individual soft lead ore producing mine in the world.

Other Idaho Lead Districts.

Important progress has been made during the past year in several other Idaho lead districts. The Wood River region, especially from the Minnie Moore Mine, has made a larger production of high-grade ore and several of the old properties have been taken up and are being actively developed, and in two or three important instances have reappeared in the shipping list after a lapse of 12 or 15 years.

Considerable development work has been done and is now in progress on the big concentrating lead-silver-zinc ore zones of South Mountain District in Owyhee County. The ores of this district, while zincy, carry remarkably fine values in silver and gold, and when the present deep development plans are worked out a large tonnage of very valuable mineral is likely to be available.

The most important new lead ore development of the year, however, is that of the Gilmore mine in the Texas District of Lemhi County, which amounts to a veritable bonanza. This remarkable discovery consists of an ore shoot 400 feet long. Starting at the apex, a few inches in

width, it rapidly expands and at 175 feet deep shows a body of clean, shipping mineral 30 feet wide, between vertical limestone walls. From a trifling amount of development on this ore body during the past summer there was produced and shipped without preliminary dressing the equivalent of one hundred twenty-ton cars of ore, that was settled for by the smelters on an average basis of 45 per cent lead and 22 ounces silver per ton. This ore body is being actively developed at the present time and is likely to become an important factor in the total output of the State for 1905. A more complete description of this mine will be found under Lemhi County.

Another district which promises sensational results in lead and silver production has been brought to the attention and passed into the control of some of the most thorough-paced mining and smelter men in the country. This new district is situated up in the rugged canyons of the Sawtooth Range, near the headwaters of the Middle Boise and South Payette Rivers. The leading feature of this new district is a closely parallel system of monster fissure and contact veins in walls of eruptive granite and dark-colored igneous rock.

A competent expert who has sampled them says there is more surface evidence of lead-silver ore on a single group of ten claims in this district than in all the surface showings of the Coeur d'Alene District combined.

The veins are 10 feet to 60 feet wide and crop out boldly above the surface in thousand foot ore shoots, threaded and spotted with galena; and a long array of samples from them show an average result of 9 per cent lead and about 2 ounces silver with each unit of lead. The property is to be extensively developed in the near future, and if such values should show the same staying qualities to the deep as the Coeur d'Alene ores have done, the center of mining activity in Idaho is likely to move a little nearer the State capital within a few years.

The gross value of the metal output of Idaho mines during 1904, figuring silver at coinage value, lead and copper at the average New York quotations for the year, reaches the grand total of \$22,838,299.35, as compared with \$21,056,076.37, during 1903, showing an increase of \$1,782,222.98. This increase would have been exceeded by several million dollars but for the abnormally dry and unexpected weather conditions prevailing during the second half of the year, which cut down the output of several of the big Coeur d'Alene producers, who use water power to operate their mills, very seriously. Their motive power is now being supplanted by electricity from Spokane Falls, and if present metal prices prevail during 1905 the output of lead and silver from the Coeur d'Alene mines, and other ore sources in the State, should show a much larger increase than it has this year.

Aside from the temporary check above referred to, the mining industry of the State has enjoyed a very prosperous year. There have been no strikes or lockouts to mar the general amity of feeling that exists between employer and employed; labor is plentiful at good wages; living conditions are generally healthy and the more populous camps are rapidly settling up with a steady, reliable class of men, many of them men of families who find the school facilities in the vicinity of the big mines among the best in the West.

The wages paid in Idaho mines, and hours of labor are as follows: In the Coeur d'Alene mines the hours of labor are 10 hours day shift and 9 hours night shift, and \$3.50 a shift is the minimum pay for "all" underground men except in the big-low-grade stopes of the Wardner mines, where a good many shovelers are employed who receive \$3.00 a shift. Timbermen in this district are paid \$4.00 per day, and it is the usual custom to run eight-hour shifts and pay \$4.00 for any extra hazardous work like wet shaft sinking. It is the general custom for the men to go in and out

of the mines on the company time, which is quite an item in their favor, for the lineal and vertical development of the Coeur d'Alene mines is unequalled by few metal mines in the world. The going rate of board is \$1.00 a day.

In the Owyhee County mines there are two local unions, one at Silver City and one at DeLamar, eight-hour shifts are the rule, and the wages paid hand tool miners, or single Jackers, which constitute the bulk of the crews employed, is three dollars a shift; car men and muckers the same. A few machine men are employed in the Trade Dollar and are paid \$3.50 a day; timbermen, \$3.50; men go in and out on their own time and are expected to put in the full eight hours at the face; the going rate of board is \$1.00 a day.

At most other mining camps in Idaho miners are paid \$3.50 a day; two big shaft jobs, one at Idaho City and one at Iron Springs, work eight-hour shifts and pay \$4.00, which is the usual custom over the State in extra hazardous work.

A good deal of capital is being attracted to Idaho for mining development at the present time, and unless some disturbing element intervenes, the industry is destined to continue to forge ahead to a point of production not excelled by any other mining State in the west.

A SUGGESTION.

Of all the industrial enterprises suggested for the exploitation of Idaho's natural resources and raw material, it seems to me that this State offers one of the finest fields in the United States for the establishment of an extensive smelting and finished lead product manufacturing enterprise.

The proposition might not work out on close investigation, but it would seem that the various high-priced fin

ished products of lead would stand transportation to eastern distributing points, as well as Idaho sugar does.

We have the ore in unlimited quantity and every desirable variety; and located at some point in southeastern Idaho, say Pocatello, the enterprise would be near inexhaustible fields of rich fuel and fluxing material. The mine owners would be saved the cost of the haul between Pocatello and Denver, and the transportation companies would more than make up the loss of that traffic by handling the finished products beyond Denver.

Such an enterprise ought to work a distinct advantage to the Idaho lead producer and build up an industry that would employ as many more men as it takes to mine the ore at the present time. It presents a traffic possibility that would give the Harriman lines an absolute monopoly of the handling and distribution of the biggest end of the lead business of the United States, and while some fatal natural weakness may develop on a close study of the different economic phases of the scheme, it is certainly worth investigation, although it may require a merger genius to work it out if at all possible.

ACCIDENTS.

During the second half of the year 1904 the number of men employed in Idaho mines were materially reduced, due to lack of water for power, resulting from the extraordinary and unexpected dry season, and the total number employed in mine work during the year did not exceed 6,000.

The total number of fatal accidents reported during the year was ten, or 1.66 per 1,000 employed—a most gratifying decrease as compared with the record of 1903, and compares very favorably with the lowest record of any of the mining States.

The causes of the fatal accidents reported during the year were:

Explosion of blasting compounds.....	5
Fall of ground.....	3
Falling down shaft or chute.....	1
Tapping old works (dry fill).....	1

Total19

The number of fatalities during 1903 was 20, with the same causes prevailing. The non-fatal accidents reported during 1904 amounted to 30 in number, and fully 15 were due to the burning or premature explosion of nitro-blasting compounds. Several very close calls from suffocation by smoke or powder gas occurred during the year that might have easily doubled the present casualty list, and these, as well as other sources of danger to human life in our mines where any additional measure of protection may be provided without hampering the development of the industry, are worthy subjects for legislative enactment; and for the purpose of strengthening the present law governing the operation of metalliferous mines in this State, I submit and recommend the following measures for adoption, which are copied from the statutes of other prominent mining States where they have been found effective:

Recommendations.

That Paragraph 2, Section 6, Inspector of Mines act of our statutes be amended or replaced with the following specific requirements:

First. That explosives must be stored in a magazine provided for that purpose alone; said magazine to be placed far enough from any working shaft, tunnel or incline to insure the same remaining intact in the event the entire stock of explosives in said magazine be exploded;

that all explosives in excess of the amount required for a shift's work must be kept in said magazine; that no extra stock of powder or other explosive be stored in underground workings where men are employed; that each mine shall provide and employ a suitable device for thawing or warming powder and keep the same clean and in proper condition for use; that oils or other combustible substances shall not be kept stored in the same magazine with explosives.

Second. That the Inspector of Mines shall have the authority to regulate and limit the amount of nitro powder stored, or kept in general supply stores in mining camps or mining towns, where there is no municipal law governing the storage of same.

Third. That oils and other inflammable materials shall be stored or kept in a building for that purpose alone, and at a safe distance from the main buildings, and at a safe distance from the powder magazine, and their removal from said building for use shall be in such quantities as are necessary to meet the requirements of a day only.

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

Fifth. That all old timbers removed shall as soon as practicable be taken from the mine and shall not be piled up and permitted to decay underground.

Sixth. That all mines operated through a vertical shaft shall, after a depth of 300 feet has been attained, be equipped with a suitable cage adjusted and protected as hereinafter described. That no person addicted to the use

of intoxicating liquors or under eighteen years of age shall be employed as hoisting engineer.

Seventh. That all hoisting machinery, using steam, electricity, air or hydraulic motive power, for the purpose of hoisting from or lowering into metalliferous or coal mines employes and material, shall be equipped with an indicator geared positively to the drum shaft, and so adjusted with dial or slide as to move a target or indicator and thereby at all times show the exact location of the cage, bucket or skip, said indicator to be so placed near to and in clear view of the engineer and to be free of gong, bells or other automatic attachments.

Eighth. That all mines employing steam and other hoisting power, and equipped with cage or skip, shall, when hoisting material from two or more levels, employ a man to be known as a "cager," whose duties shall be to load and unload said cage or skip at said levels and to give all signals to the engineer.

Ninth. That the Inspector of Mines shall have the power to establish a uniform code of signals, embracing that most generally in use in metalliferous mines, and the Inspector shall have the power to enforce the adoption of such code of signals in all mines using hoisting machinery. The code of signals used shall be securely posted, in clear and legible form, in the engine room, at the collar of the shaft and at each level or station.

Tenth. That all mines having but one exit, and the same covered with a building containing the mechanical plant, furnace room and blacksmith shop, shall have fire protection. Where steam is used, hose of sufficient length to reach the farthest point of the plant shall be attached to feed pump or injector, and the same kept ready for immediate use. In mines where water is not available, chemical fire extinguishers or hand grenades shall be kept in convenient places for immediate use.

Eleventh. That all persons shall be prohibited from

riding upon any cage, skip or bucket loaded with tools, timber, powder or other material, except for the purpose of assisting in passing same through shaft or incline, and then only upon special signal.

Twelfth. All persons giving or causing to be given false signals, or riding upon any cage, skip or bucket upon signals that designate to the engineer that no employes are aboard, shall be deemed guilty of a misdemeanor under this act.

Thirteenth. That all shafts more than fifty (50) feet in depth equipped with hoisting machinery shall be divided into at least two (2) compartments, and one compartment to be partitioned off and set aside for a ladderway. The ladders shall be made sufficiently strong for the purpose demanded, and in vertical shafts landings shall be constructed not more than twenty (20) feet apart, said landings to be closely covered, except an opening large enough to permit the passage of a man; said ladders shall be inclined at the most convenient angle which the space allows, and shall be firmly fastened and kept in good repair. In all incline shafts over 45 degree pitch the landings shall be put in as above described, but a straight ladder on the incline shaft. Ladders in upraises and winzes shall be likewise provided and kept in repair, but where winzes connecting levels are used only for ventilation and exit, only one such winze on each level need be equipped.

Fourteenth. That hereafter shafts equipped with buildings and machinery with only the working shaft for exit, shall be divided into at least two (2) compartments, one of which shall be tightly partitioned off and used for a ladderway as hereinbefore provided for; said ladderway shall be securely bulkheaded at a point at least twenty-five feet below the collar of the shaft, and below this bulkhead, a drift shall be run to the surface, if location of drift is upon side hill, or wall without the building, and upraised to the surface, if upon a level. Said ladderway

and landings shall be kept at all times in good repair and afford easy mode of escape in event of fire.

Fifteenth. That hereafter all operating tunnels or adit levels, equipped with buildings containing timber shed, blacksmith shop or mechanical plant, at safe distance from mouth of same shall connect with the surface by a raise and be provided with safe and suitable ladders, and doors that can be closed from outside buildings by pull wire, and thus afford a means of exit indoors, in case of fire destroying buildings over the mouth of tunnel or adit level.

Sixteenth. That employes engaged in sinking shaft or incline shall at all times be provided with chain or other kind of ladder so arranged as to insure means of exit.

Seventeenth. That all shaft collars hereafter constructed shall be so arranged and protected that persons or foreign objects can not fall into the shaft, and the cage shall be equipped with safety clutches and a steel hood, or bonnet, oval in shape, if solid, and if divided in the middle and hinged at the sides, the angles of the sides when closed shall not be less than forty-five degrees, nor the steel less than three-sixteenth ($\frac{3}{16}$) of an inch thick.

Eighteenth. That all stations or levels shall, when practicable, have a passageway around the working shaft, so that crossing over the working compartment can be avoided. At all shaft stations a guard rail or rails shall be provided and kept in place across the shaft, in front of the level, so arranged that it will prevent persons from walking, falling or pushing a truck, car or other conveyance into the shaft. All winzes and mill holes extending from one level to another shall be covered or surrounded with guard rails, to prevent persons from stepping or falling into the same.

Nineteenth. That where any shaft is sunk on a vein, ore shoot or body, a pillar of ground shall be left standing on each side of the shaft of sufficient dimensions to protect and secure the same, and in no case shall stoping be

permitted up to or within such close proximity to the shaft as to render the same insecure, until such time as the mine is to be abandoned and said pillar withdrawn.

Twentieth. That all abandoned mine shafts, pits or other excavations endangering the life of man or beast shall be securely covered or fenced.

Twenty-first. That any person or persons removing or destroying any covering or fencing placed around or over any shaft, pit or other excavation, as hereinbefore provided, shall be deemed guilty of a misdemeanor under this act, and upon conviction thereof in any court of competent jurisdiction shall be fined in a sum of not less than fifty dollars (\$50) or more than three hundred dollars (\$300), or imprisonment in the county jail for six (6) months, or by both fine and imprisonment.

Twenty-second. That any person or persons operating any metalliferous mine or mill and employing five or more men, shall report the same to the Inspector of Mines and state when work is commenced and when stopped, the method and manner of working the same, and mines working continuously shall report on or before December 1, of each year, together with the names of the owners and managers or lessee in charge of said work, together with the postoffice address, the name of the claim or claims operated, the name of the county and mining district, together with the number of men employed, directly or indirectly, the same being classified into miners, trammers, timbermen, ore sorters, mill men, teamsters, etc. The necessary blanks to carry out the provision of this section shall be furnished on application by the Inspector of Mines.

Twenty-third. That any owner, lessee, manager, superintendent or foreman in charge of any metalliferous mine who shall wilfully misrepresent or withhold facts or information from any inspector or other officer of this department regarding the mine, such as length of time timbers have been in place, or making any misrepresentation

tending to show safety when the reverse is true, shall be deemed guilty of a misdemeanor, and upon conviction thereof in any court of competent jurisdiction, shall be fined in any sum not less than one hundred dollars, nor more than three hundred dollars.

Twenty-fourth. That strangers or visitors shall not be allowed underground in any mine, unless accompanied by some owner, official or employe familiar with the workings, deputized to accompany same.

Twenty-fifth. Notice of the maximum number of men permitted to ride upon or in the cage, skip or bucket, at one time, shall be posted at the collar of the shaft and at each level. All men or employes riding upon or in an overloaded cage, skip or bucket, as provided in notice so posted, shall be guilty of a misdemeanor, and upon conviction in a competent court, shall be fined not less than five dollars nor more than fifty dollars for each and every offense.

Twenty-sixth. The Inspector of Mines, under this act, shall have power to make such examination and inquiry as is deemed necessary to ascertain whether the provisions of this act are complied with; to examine into and make inquiry respecting the condition of any mine, or part thereof, and all matters or things connected with or relating to the safety of the persons employed in or about the same; to examine into and make inquiry respecting the condition of the machinery or mechanical device, and if deemed necessary have same tested.

Twenty-seventh. That all new mining development work undertaken after the passage of this act shall be made to conform to the same; that all present operating mines shall be made to conform to said requirement within one year after its passage.

Twenty-eighth. Any person, owner, agent, manager or lessee operating a metalliferous mine in this State, who fails to comply with the provisions herein set forth, shall

be deemed guilty of a misdemeanor against this act, and, when not otherwise provided, shall be liable to the penalty prescribed in Section 13 of this act, or to a fine of not less than twenty-five dollars (\$25.00), nor more than three hundred dollars (\$300.00), for each and every provision not complied with, or both, at the discretion of the Court.

Powder Accidents.

The increasing number of accidents of a purely preventable nature from the careless, reckless or ignorant manner of handling nitro-glycerine blasting powder, is deplorable, and their prevention is largely in the hands of the men who handle this powerful agent.

More accidents are caused from thawing or softening powder than by all other causes combined. This is more especially true of small operators. Nitro powder freezes or congeals at 40 degrees F., in which condition it is not as dangerous or effective as when thawed or soft. It softens slowly at 50 degrees and should never be heated to a temperature exceeding 100 degrees F., and never, if avoidable, by direct dry heat, such as placing it in contact with a hot rock, stove, or metal surface, or before an open fire where the temperature is likely to be raised suddenly, unequally and too high, for powder will explode by heat as well as by a blow. The safest way to thaw powder where only a small quantity is being used is by warm water. There are several devices on the market that can be recommended, usually in the form of a water-jacketed vessel surrounding a chamber with adjustable drawers or shelves, for supplying which the water should always be heated before being placed in the vessel and need not be used any hotter than the hand can be comfortably borne in.

Where the manufactured article is not available a con-

venient and fairly safe thawer can be made, suitable for softening thirty or forty sticks or cartridges, by building a solid, square box of two or three-inch lumber with a close fitting lid. The box should be deep enough to take in an ordinary square 5-gallon coaloil can in the center, with room for a double deck of 4 or 6-inch wide shelves around the can, set on cleats and brackets fixed to the floor and walls of the box.

The lower shelf should be loose boards resting on cleats about 3 or 4 inches above the bottom of the can when in place; the second shelf should be adjusted about 5 inches higher, and bored with regular rows of holes the size of sticks or cartridges used, in which they may be set in an upright position. Such a box set in some out-of-the-way cross-cut, or if at the surface, as far away as possible from where anyone is working, and supplied with a coaloil can full of warm water heated on a stove or forge when boiler water is not available, will thaw and hold in good condition sufficient powder to supply an ordinary mine crew of 10 men. The water should never be heated by candle snuffs in the same receptacle containing powder. This is a very dangerous practice. Any thawing device of whatever kind should be kept regularly cleaned and free from glycerine saturation which renders wood, cloth, paper, earth or anything into or onto which it can drip dangerously susceptible to explosion.

A law might be profitably enforced requiring all powder handlers to pass an examination showing their knowledge of the elemental composition and effects, under varying conditions, of nitro-glycerine compounds and other explosives before being permitted to use them.

Under intelligent handling the nitro blasting powder used in rock blasting, and commonly called dynamite or giant powder, are as safe as black powder; they are composed of varying percentages of nitro-glycerine in an absorbant material.

They are ever-changing, unstable compounds that rapidly deteriorate in value. To appreciate this statement, hang your nose over a case of the stuff. Nitro-glycerine is made with concentrated nitric and sulphuric acid with animal fat. The older the powder gets the more dangerous it becomes in the fact that it is harder to explode, more likely to involve missed holes, and the consequent danger of repriming, and its imperfect combustion or burning produces a very poisonous carbon-monoxide gas that is colorless, odorless, and tasteless, and capable of supporting the flame of a candle. A very small percentage of this gas mixed with an already vitiated mine air is dangerous and should be carefully guarded against.

The following "don'ts" may be profitably heeded by powder users; some of them will appear superfluous to the lay reader, but from personal experience I know them to be justified.

Don't start to drill in a new face until you have thoroughly satisfied yourself that there are no missed holes, or unexploded pieces of powder left in the old butts or that could angle into the line you are going to point a hole on.

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

Don't be in too big a hurry to go back on a stinker, or burnt hole, or to reprime a missed hole; but it is safer to reprime it in an hour, say, than to work over it for a whole half shift. During the past summer missed holes at the Snowstorm mine in Shoshone County and at the Cracker Jack mine in Idaho County, with fuse apparently burnt out, and giving no sign of life, exploded after standing quiescent for four and a half hours, badly maiming two men in one instance, and one in the other, who were working over them. A round of sixteen machine holes in a three-compartment vertical shaft, 200 feet deep, at the

Thorn mine near Idaho City last summer was fired and only one report short noticed; when the round was finally cleared up it was found that the butts of ten of the holes contained from one to eight inches of unexploded powder. The powder used looked all right but subsequently proved to have been in stock a long time. Moral: Demand fresh powder, use strong caps and good fuse.

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

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

Don't be a hayseed and carry powder about your person to soften it, or attempt to thaw a stick in the flame of a candle, or crimp a cap with your teeth, or "break" a stick in two; cut it, no matter how dull your knife is.

Don't keep powder and caps in the same box.

Don't jab a pick into a muck pile like driving a spike on the railway. You are liable to hit a stray piece of powder that will explode and blow your eyes out. Such an accident has happened within a year. Use your pick to work the stuff down with more of a raking motion. It is safer, and just as effective.

Don't take a naked light into any storage place for powder or sub-magazines; leave it at the entrance, as far back as will serve the purpose.

Don't take these admonitions too much to heart, but bear them constantly in mind. With all the risks of a mining occupation, including the handling of powder, they are no greater than those of trainmen, require no more mechanical skill, and with reasonably careful handling and intelligent precautions the present chief source of accidents in Idaho mines ought to be reduced very materially.

IDAHO BY COUNTIES.

A statement in detail of the mineral resources of Idaho is out of the question in a necessarily limited report of this kind. There are 250 organized mining companies owning property in Idaho, of which 14 are dividend payers, and returned approximately \$3,000,000 in net profits to their stockholders during 1904. Of the latter class, eight are located in Shoshone County, two in Owyhee County, one in Blaine County, one in Idaho County and two in Lemhi County. There are a number of other fine properties already developed and equipped to, or near a producing stage, and several hundred company, private and individual enterprises struggling to find something, or develop and put in profitable minable shape something already found, and from these several new dividend payers are likely to be added to the list during 1905.

To make a detailed description of all live, meritorious mining properties in Idaho would involve a mass of matter that would bankrupt the State to pay the printing bill, and in the foregoing pages reference is confined to typical properties the districts contain, and the lack of geological detail will be supplanted by a paper covering the subject in a general way that was written for the Portland session of the American Mining Congress.

Ada County.

The mineral resources of Ada County, while of no mean importance, are too close in to attract much attention apparently. The mountain slopes immediately north and east of Boise City contain some very promising prospects, and values of \$300 per ton and over in gold and silver are found in selected samples of beautiful, ruby silver ore from big, strong fissure veins in granite, that traverse the slopes of Curlew Gulch that warrant more development and hold out the promise of disclosing good pay streaks of profitable ore.

At the Hornet District, ten miles above Boise, the Ironsides mine is being developed at the present time, and a shipment of high-grade ore is being prepared for market.

This mine has two thousand-two hundred feet of underground development, on a clean-cut, well-defined fissure vein in granite, that is 10 feet wide and traceable along its strike for a long distance. It has exposed at the present time, a large reserve of good milling ore of \$7.00 or \$8.00 value per ton, and some pay streaks of much better grade, from which a number of car-load shipments sent to the Salt Lake Valley Smelters during the development of the mine have returned results of \$40 to \$50 per ton in gold.

Some important tracts of promising dredge placers were reported to the writer from the Boise River, some distance below the city, but I have not been able to find time to investigate their merits.

The chief mineral output of Ada County continues to be from its building stone and brick quarries whose finished products during the past year yielded a revenue of considerably over \$50,000 in gross value and found a ready market among the extensive building enterprises of Boise. A splendid standing advertisement of the high-class building stone resource adjacent to the city is exhibited in the blocks of beautiful blue granite that grace the approaches to the new Federal building.

Boise City.—Boise City, the county seat of Ada County, and capital city of the State of Idaho, has seen a marked, steady, and substantial growth during the past year, and the remark is often made as to what warrants its substantial line of building enterprises that continue to spring up. The secret of this spirit of enterprise is not far to find, however, for a little investigation will show that while Boise has no mining or other immediate industrial pay rolls to support it, it is the Mecca of the pay checks and settlements of an infinite variety of small and large enterprises scattered over an enormous tributary territory, which in a measure embraces the whole State. Its mild, incomparable climate and magnificent school system and desirability as a home town draws people to it. It is one of the most important mining supply distributing points in the State.

It has new railways, lumbering, irrigation, building, and

mining enterprises immediately tributary to it, that are already organized, and, in some instances, already under way, that should call for the disbursement of a million dollars a year for the next six years, the bulk of which will naturally gravitate to Boise.

The business of the Idaho Vitrified Brick and Pipe Company, whose plant is located in the north suburbs of the city, has expanded materially during the year and their output of common, pressed, vitrified and fire brick varieties has been enormous, and of a quality that brooks no competition from any other known source. The demand for their products is rapidly increasing, so much so that new machinery has had to be added and is now in process of construction to facilitate the manufacture of special lines demanded by the trade, and it is safe to predict that this important enterprise will continue to expand and eventually develop into one of the largest sources of fancy building material in the west.

Boise is situated in one of the most fertile valleys in the west, at an altitude of only 2,800 feet above sea level, and near the mouth of the canyon from which the Boise River emerges—the gateway to one of the most extensive and promising undeveloped mining regions in the west, embraced within the upper drainage of the Boise River. This drainage basin has a record of bullion production in the form of placer or float gold, exceeding \$100,000,000 in value, which recent discoveries intimate may only be an earnest of what remains to be developed.

As previously intimated, the territory near the upper rim of the Boise drainage contains definite evidences of a new silver-lead district that is not equalled in surface mineral display by the famous Shoshone County districts; while its gold ore resources in its dozen or so of different districts have barely been scratched as yet.

The most urgent cultivation this promising field needs is a wagon road up the main and middle Boise River canyons to Atlanta, which would give an all of the year around route to the very heart and center of the field which is at present cut off for seven months in the year by high, snowy divides.

The Atlanta mines have a million tons of pay gold ore blocked out and in sight that would give employment to hundreds of men if such an avenue of access were afforded

them for machinery and supplies, which, with the other important districts that would be rendered accessible, including Warrior and the new lead-silver district referred to, together with the enormous stretches of virgin mountain slopes that surround them, a mining industry may be stimulated that would prove of vast importance not only to Boise, but as a home market for the agriculturists of the whole valley.

The present State Legislature will probably be asked for a sufficient appropriation to build, or assist in building, this road to Atlanta, with a view of ultimately connecting it with the State wagon road system in Custer County, only a few miles beyond. And in view of the success of the new Thunder Mountain road, if the finances of the State are not overtaxed with other more imperative demands, the support of this enterprise is amply justified, as it would reclaim and open to the investor a mineral field that it without a peer in the State, and in which mining enterprises of the highest importance are likely to be built up.

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Bannock County.

Considerable activity has been manifested during the past year among the many interesting prospects in the mountains lying immediately adjacent to the south and east of Pocatello, the county seat of Bannock County. In some instances very extensive plans of mining development are in progress and two properties of this district made ore shipments during the year.

One of the most extensive operations of the district is that of the Fort Hall Mining and Milling Company, who own a big group of claims at a point one and a half miles west of Portneuf siding and six miles south of Pocatello.

This property is being developed by a cross-cut tunnel and is equipped with a power drill. The tunnel is being run to undercut, at considerable depth, a system of copper-gold bearing fissure veins that show good ore at the surface outcrop. This tunnel is now in 1,800 feet, and it was anticipated that the main vein would be cut some

time ago, but it is evident that it has reversed its dip at this level. Such an energetic example of extensive prospecting development work in a new district is worthy of all success. The company are working a force of twelve men. It is calculated that the main fissure will be cut at a depth of 800 feet and high hopes are entertained for the successful outcome of the venture.

Another promising enterprise whose affairs are in the hands of good, practical business mining men is that of the Inman Mining Company, whose properties are situated near Inkom station, and consist of the "Black Chief" group of six claims, on which a tunnel for development has been run 350 feet. Also the "Creed" group, consisting of 17 claims, whose development, as yet, consists only of prospect holes, and the "Reservation" group of seven claims, which has a development tunnel 290 feet long and is equipped with a commodious camp house. All these claims are situated close to the Short Line main track and carry a number of encouraging indications of pay ore, but nothing of shipping value has been uncovered in any of them as yet.

The most recent and promising acquisition of this company is the "Monte Cristo" group of claims, situated about five and a half miles back in the mountains from Inkom, on Rabbit Creek, with which place it has been connected during the summer with a well graded wagon road, at a cost of \$2,000.

This group is being actively developed by a force of 20 men. It covers a wide contact vein of brecciated, siliceous gague, well saturated with copper carbonate ore, and also carrying some small streaks of high-grade ore that are rich in both copper and gold. The walls are quartzite and limestone, and in places, 15 to 30 feet apart and can be readily followed along the strike for hundreds of feet. This vein is very liable to develop into a valuable, concentrating and shipping proposition.

The property is being developed by a deep cross-cut tunnel which is already in 350 feet and intended to cut the contact at or near water level, when ores of secondary enrichment and high shipping values are anticipated. The commodious new camp equipment recently completed on the property consists of four dwellings for families, an assay office, bunk house for 32 men, large kitchen and din-

ing room, and a barn large enough to accommodate 12 horses, etc. The development work is being rapidly pushed under the personal direction of a well-known Utah mining engineer and gives every promise of resulting in a profitable mine by next season.

The "Moonlight Mine," situated 12 miles northeast of Pocatello, has the distinction of marketing the first shipment of ore from the Pocatello district. This mine shipped two 20-ton cars of ore during the summer that are reported to have averaged 25 per cent copper and 14 ounces silver per ton.

The "Moonlight" has several hundred feet of shallow surface cross-cut tunnels, and a limited amount of drifting on a well defined fissure vein in walls of schist and conglomerate. The shipments, of course, were carefully sorted ore, but a large amount of low grade stuff was mined at the same time that will run four or five per cent copper and is now piled up on the dump.

The ore in this vein occurs as a dissemination of sulphides in the matrix of the conglomerate above the smooth schist foot wall, and also in big kidneys of beautiful, pure bornite ore that sometimes weigh as much as 100 pounds. These seem to be associated with adjacent cracks or fractures in the smooth schist foot wall. The deposit is very interesting and of considerable promise. The company have let a contract for a cross-cut tunnel to be 700 feet long, which is well under way and when completed is expected to tap the vein at a vertical depth of 300 feet.

There are fully a dozen other small mining development enterprises in the Pocatello District, some of which have shown up some remarkably interesting gold values, and it will not be surprising if a profitable district is developed here in time.

Should the mines of the Pocatello District prove all right their extensive development would be facilitated by the cheap electro-motive power obtainable from the American Falls Power, Light and Water Company, whose headquarters and central offices are located at Pocatello. This splendid enterprise, under the management of Hon. J. H. Brady, has been brought to a high degree of efficiency. Its property at American Falls embraces the entire falls and land adjacent on both sides of the river and has been greatly improved during the year, and the company is now

able to furnish 2,400 horse power, and have 20,000 horse power in reserve, which, when fully developed, will make this one of the largest power plants on the Pacific slope, and will work wonders for the material development of southeastern Idaho.

This property possesses an unique advantage in the fact that it is never bothered with anchor ice in the winter season, no matter how cold it gets, which is accounted for by the fact that the river is fed by immense volumes of spring water along its course for several miles above the falls, which is supposed to be the outlet drainage of the Lost Rivers. This company is now furnishing light and power to both Pocatello and Blackfoot and its business is growing very rapidly and promises to develop into one of the most profitable enterprises in the State.

Bingham County.

Mining in Bingham County has not progressed very satisfactorily during the year. The glowing account sent in late last fall from the Carriboo District of copper-gold ore disclosures has proven premature, and later results have not come up to the anticipations of the promoters. Carriboo contains some gold-bearing bedded and fissure veins of very considerable merit that warrant extensive development and under conservative and intelligent equipment and management should, in some of the properties, result in the establishment of profitable mining and milling enterprises.

Bingham County produced gold bullion to the value of \$4,360 during the year of 1904. A good proportion of this amount was doubtless derived from small sluicing operations along the fine gold bars that border the Snake River in the vicinity of Blackfoot, the county seat, and the balance from the operation of two suction dredges in the same vicinity. These particular dredging enterprises have not proven much of a success so far, and their failure to pay has been due more to lack of knowledge and experience in their design and subsequent operation than to the

value of the ground, as there are some splendid stretches of good gravel along the river for several miles below Blackfoot that ought to pay if handled intelligently and in sufficient quantity.

A move is on foot to consolidate the interests of the Blackfoot Construction Company and the Snake River Valley Gold Dredging Company, who own the present boats, and put in electric power from American Falls, which can be supplied from the power company's terminals now at Blackfoot, which would effect a great saving in operating expenses.

For the benefit of the many inquirers interested in Snake River fine gold, I have reproduced under Cassia County and Lincoln County a descriptive article on the only dividend paying dredging operation I have met with on any scale along the Snake River, and some theories of the origin of the elusive colors.

Boise County.

Boise County, of which Idaho City is the county seat, has been the theater of some very important ore discoveries and developments during the past year. This is the banner placer county of the State, its output of placer gold to date being almost equal to all the other counties combined, and the present output from its surface diggings is still a very important item. The principal producers of placer gold now operating in this famous old district are the Woodburn hydraulic property, which runs for a short period each year while the high water lasts from the melting snows.

The Boston and Idaho Dredging Company, near Idaho City, has been very successfully operated for a number of years for a period of about eight months each year. This property is equipped with a chain-bucket-elevator dredge which handles the gravel to excellent advantage and makes a close saving. This company's property is very extensive and could furnish profitable material for several times the digging capacity of its present equipment for a term of years.

The Janney Dredge, near Centerville, another boat of the same type but supplied by electric motive power, was successfully operated through the past season and is reported to have made considerable profit and a record for low cost of operation. The Gratz Dredge, one and one-half miles below Centerville, is being improved and will probably be put in commission next season, and a new bucket elevator dredge of 2,000 yards daily capacity, it is anticipated, will replace the present steam shovel plant of the Moline Company of Placerville. If these extra plants get to a producing stage by next season they will increase the placer gold output materially. These mechanical placer digging plants are the present chief source of placer gold, yet there are still numerous smaller operations that collectively produce quite an important amount of gold.

Probably the most important mineral discoveries of the year are those of the monster silver-lead bearing fissures previously referred to, away up in the Sawtooth Range, between the headwaters of the Boise and Payette Rivers, whose magnitude will warrant extensive development, in spite of their rugged surroundings, and may eventually result in making Boise County the banner metal producing county in the State.

Among the gold ore veins of this county some very important advancements have been made during the year, especially in the basin country and at Pearl.

At the property of the Golden Rod Mining Company, near Placerville, an eighty-ton Chilian mill has been installed and put in operation with a cyanide annex that is said to handle the ores of this mine in a very satisfactory manner. Several new ore bodies have been disclosed in the mine, and while not high-grade on the average, the deeper they are followed the values seem to strengthen materially; the property has been equipped with a number of substantial buildings, is being actively operated at the present with a large force of men, and when the present mine development plans are worked out a little further the property gives every promise of becoming a reliable and profitable gold producer.

At Quartzburg the old Iowa mine is undergoing development under bond and lease to an eastern company, and the Sunday Mine, in the same vicinity, is also being developed

and put in shape to form the basis of a new incorporation. These two properties are closely adjacent to the famous Gold Hill and Pioneer claims, which were operated steadily for 25 years with an old fashioned mill equipment and produced gold bullion estimated at a total of \$3,000,000 in gross value and are still only developed to a vertical depth of 400 feet, and retaining the evidence that another \$3,000,000 might be extracted from the next 400 feet in depth.

The Ingalls mine, five miles northeast of Pioneerville, is one of the big mineral show places of the Basin. It has been developed by a cross-cut tunnel exposing a lode of ore 90 feet wide with only one wall exposed. The discovery of this great body of mineral was unexpected. It was encountered while cross-cutting for another purpose and came as an agreeable surprise. It carries gold-lead and copper values averaging \$6 to \$20 per ton and promises to make a concentrating proposition of great magnitude.

This property has several other extensive ore showings in strong streaks and good values. It is equipped with a Chilian mill of 50 tons a day capacity, but the ore has proven too base for successful amalgamation. Development work is being continued on the property with a small force.

In the near vicinity of the Ingalls Mine the Bruiser and Pheasant Mine, owned by the War Eagle Company, is developed on a five-foot vein of pyritic ore that gives average values, in places, of \$25 per ton in gold, 40 per cent free milling, the balance of the values going into the iron concentration that gives fair results to cyanide treatment, and the French claims, between the War Eagle and the Ingalls, have some fine surface showings of ore, together with considerable development and some high-grade ore on the dump. Select streaks in this mine give bonanza assay results and the property promises an extensive development to make a handsome paying mine.

The Fuller and Miesner group, another property, near the Ingalls, to the northeast, is opened on a 26-foot lode that carries average values of \$6.00 to \$8.00 across its full width in a mineral mixture very similar to the big zone cut in the Ingalls property; and several other claims in the same vicinity carry definite surface evidences of big bodies of copper, lead, and gold ores. This interesting

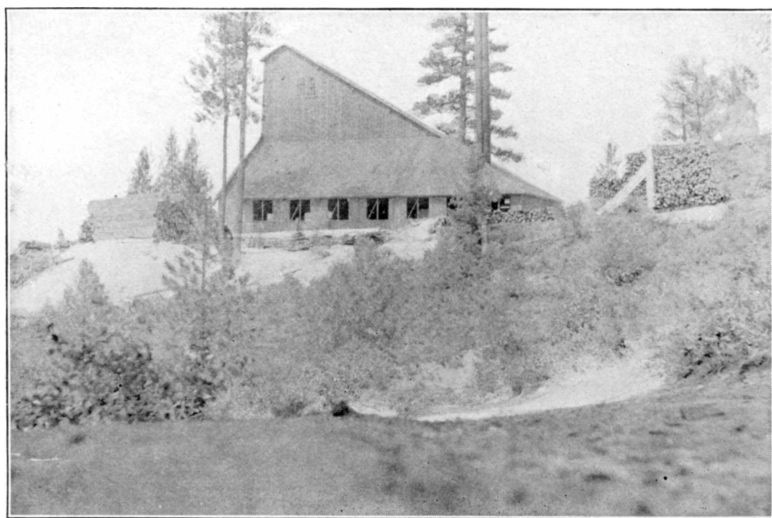
district looks like the substantial basis of an extensive concentrating and pyritic smelting enterprise, for while the ores are generally quite base, they occur in immense bodies, and for their size carry more than ordinary average gold values. Pioneerville is the nearest postoffice.

The Mammoth mine, at Summit Flat, 12 miles east of Pioneer, has been working a force of 20 to 30 men during the past year. This is one of the most meritorious gold veins of the county and warrants extensive exploration at depth. It has been developed with a 300-foot incline shaft; about 500 feet of drifting and other development work has been done during the past year. The property is equipped with a small mill, which was operated during the summer and is reported to have made a saving of \$20 per ton in free gold. The vein is a fissure in granite, two to eight feet wide and well defined.

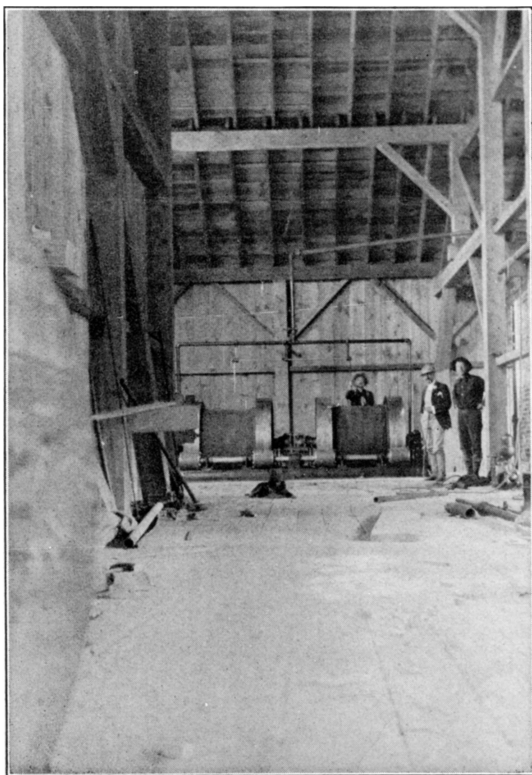
The Green and Thompson mine, near Banner, is one of the new developments of the year that carries some large veins of good grade milling gold ore that show quite promising evidence of a big supply. An Elspass mill was hauled into this property late last fall, which it is the intention to put in commission early next season.

Near Idaho City, within a mile or so of town, there has been discovered during the year what is likely to prove one of the most important and extensive gold ore deposits in the State, and one that has a very important bearing on the future, and staying qualities at depth of the whole vein system of the basin. This discovery is on the South African group of claims, and consists of a great zone of altered and mineralized granite 150 to 300 feet wide that is thought to carry paying values all through, and also contains a sub-zone, or core, of more scilicified and iron impregnated material 20 to 40 feet wide that look like \$10.00 to \$20.00 per ton in the pan wherever you pick it out, of coarse and fine, rough and ragged, high grade gold.

This remarkably interesting discovery was made at the lowest exposed point of granite bedrock surface in the whole basin country, whose topography, while manifestly one of deep erosion, with all the enormous yield of placer gold it produced, evidently by no means exhausted the original source, and the inference may further be drawn from this showing, that the numerous fine vein croppings



SHAFT HOUSE, THORNE MINE NEAR IDAHO CITY.



INSIDE VIEW OF SHAFT HOUSE.
THORNE MINE, IDAHO CITY.

in the nearby mountains of Elk Creek and Gambrinus District will carry their values at least as deep as the original values now exposed in place on the South Africa, which means 1,000 to 1,500 feet deep, and probably twice that depth. This discovery, occurring as it does right at the upper edge of the great fill of secondary formation of sandstone and shale that covers the great orographic sink now forming the false bedrock of Elk and Moore Creeks from this point down for several miles, indicated that the sedimentaires may be underlaid with an equally rich layer of original bedrock pay gravel that may be drifted out and prove as rich in placer gold as the top bedrock surface of shale and sandstone was. The South Africa is being actively developed and plans are maturing for the erection of a big mill next season.

At the Thorn mine, five miles north of the South Africa, in the Gambrinus District, and more than a thousand feet higher elevation, there is in progress one of the best plans of gold mining development in the south end of the State, in the shape of a vertical three-compartment shaft, situated in the center of a strong system of fissure veins that vary from two to six feet wide and carry average values of from \$5 to \$50 per ton in gold.

The equipment consists of a commodious shaft house of modern design, inclosing a Lidgerwood double drum hoist, two eighty-horse power boilers, machine shop, engine and compressor room, a fifty-foot gallus frame, automatic dumping device and ore bin, a very compact plant, all lighted by electricity.

The shaft is very substantially timbered and equipped with cage bucket and manway. It is already down 225 feet. At the 200-foot level a big station has been made and cross-cuts started to intersect the main veins of the system, five in number, which lay to the north and south of the shaft.

One of these veins has already been encountered in the north cross-cut and proven to be as clear cut, large, rich and well-defined as in some shallow works near the surface where it was opened in early days with a hand windlass and produced ore to the value of \$100,000.

This work is all being done in a very substantial manner, characteristic of the methods of its owners, who are an English company. From a large amount of surface pros-

pecting on the main veins of this system it is anticipated that a succession of ore shoots will be opened up by drifting along the course of the different veins that will collectively furnish a supply of ore of about ten or twelve dollar grade that will justify the erection of a good-sized mill, and the way the property is responding so far, it seems very likely that this anticipation will be realized. At different points in the shallow workings of this group of fissures bodies of ore carrying bonanza values have been encountered that have produced several small fortunes, and their repetition with extensive drifting at depth may reasonably be anticipated.

A few miles north of the Thorn Mine the Boulder group of claims was worked at an early day down to water level, where a large body of ore is still showing that assays from \$30 to \$40 a ton in gold, about 40 per cent free milling, and above this, 2,000 feet higher up the mountain, the Mollie McCarthy Mine is developed with an adit tunnel run on the vein for 500 feet, attaining a face depth of 300 feet. The ore in this vein is mostly a hard quartz, in which the gold is free to a much higher per cent than in the Boulder.

Three miles above the Mollie McCarthy Mine, near the famous old Elk Horn, the Elk Meat vein is showing up some remarkable ore. This vein is small but very rich. It has been developed by shallow cuts and tunnels along its course for 200 feet, and a mill run of several tons taken out last summer yielded \$80 a ton in free gold on the plates. The ore doubtless carries some base values, for assay results on the ore as high as \$1,200 a ton are common and a test on a small quantity of concentrates from this ore gave results of \$40,000 per ton in gold. The owner of the mine is now engaged in running a tunnel to tap his vein 75 feet deep.

Pearl District.—My Boise County story (and the printer's bill) is growing apace, and only a very few of its meritorious mineral resources have been touched, and many will have to be slighted for lack of space, as the most active ore district of the county still remains to be mentioned, which alone warrants a chapter of review; and this is the Pearl District, near the border of the county, west of Idaho City.

The Pearl District, including the slopes of Rock Creek

down to the Payette River has seen one of the most active years of its history in the way of new ore development and mine equipment.

The territory outlined above is a mineral kingdom of itself, in the number and lineal extent of its gold bearing fissures. A granite district, reticulated with dike rocks and pronounced ore courses, in some places carrying very extensive shoots of pay mineral, clearly defined and uninterrupted for long distances, in others, pinched, faulted and disturbed in a manner characteristic of all deeply dissected and mineralized formation, conditions that accompany and are essential to the genesis of profitable ore deposits and districts.

The Pearl District compares in all essential particulars of ore composition and economic geology with the little kingdom of Gilpin County, Colorado, which for 49 years has proven one of the most permanent and prosperous gold mining districts in the Centennial State, with its present annual production on the increase.

It is not unlikely that the Pearl District, when properly strung out, will develop a similar career of permanent production and profit as its famous compatriot. Pearl, while one of the most accessible mining districts of the State, situated in the foothills, less than three hours' drive from Boise City, has been seriously hampered by transportation costs to market of its rather base gold bearing concentrates and crude ore which have to be shipped to the Salt Lake Valley smelters at present.

Some very encouraging results are being obtained by cyanide treatment in good-sized, practical tests at the Lincoln mine, and it is to be sincerely hoped that the problem of profitably recovering the values at home may be worked out, for its solution would result in a veritable boom to mining property values in this extensive district.

The ores of this district consist of granular, altered granitic gangue and quartz impregnated with iron sulphides and a pronounced sprinkling of lead and zinc sulphides; the gold values in the milling ore range from \$5.00 to \$15.00 per ton, about 25 to 30 per cent free milling, and usually carry pay streaks and bunches of clean, shipping mineral that range from \$50.00 to \$300.00 per ton. A carload lot of selected ore from one of the prominent mines was shipped during the year that sampled \$400.00 per ton

and contained considerable silver. One of the best developed ore shoots of the district, developed to a depth of 330 feet in the Lincoln mine, is continuous for eleven hundred feet by an average width of four feet.

The gold production of the district during the year has been decreased, instead of increased, as was anticipated in my last report. This decreased output was due, largely, to the suspension of operation by the old, reliable Checkmate Company, which had been the mainstay of the camp for several years, but had the misfortune to lose its mill by fire, during the year.

While in operation, the use of the water pumped from the Checkmate shaft was enjoyed by the companies operating below, and with this supply shut off their operation has been seriously retarded, a condition that will have to be met with deeper sinking, or by running the ore down to the valley over electric railway, which ought to be done for less than 50 cents a ton if supplied in sufficient quantity.

It is to be sincerely hoped that arrangements will be made to resume the operation of the Checkmate property again at an early day, as this company owns one of the largest, most centrally and best located tracts of territory in the whole district. It has a bullion record of \$500,000, at 500 feet deep on one fissure and half a dozen other very promising fissures that warrant extensive exploration at depth.

The properties most energetically developed in this district during the past year, and that hold out definite promise of becoming profit producing enterprises at no distant date, are the Lincoln, Checkmate, Black Pearl, Whitman, J. I. C., Friday, Lucky Ridge, El Paso, I. X. L., Golden Age, Summit, Dorsey properties, United Mines, Osborne Mines, the South Lincoln and East Lincoln, The Phoenix, Printer Boy, Hy Henry, and Governor Properties, and a number of other promising prospects have been worked on.

The ore disclosures of the year have greatly enhanced the standing of Pearl as a gold bearing district, and while there are several little economic problems still to be met in the profitable transformation of its ores into money, the natural conditions at hand, lend themselves to this end, and if the good work of development is continued Pearl will doubtless rapidly develop an ore resource that will justify a number of profitable mining and milling enterprises and a large production of gold.

The expensive dam of the Highland Valley Power Company, across the Boise River, near the south end of Boise County, was washed out by the excessive high water of last spring, entailing a loss of \$150,000 to its owners and checking a successful placer mining enterprise that was in progress. The accident was partly due to faulty construction. The company have, pluckily, taken up the work of reconstruction and a much more solid dam is now well under way and will probably be completed next fall.

Another important placer mining and power enterprise of considerable magnitude is being developed in Boise County, on the south fork of the Payette River. This enterprise is known locally as the Oxbow Tunnel Company, and has been very energetically pushed. A large tunnel through a narrow neck of granite has recently been completed, through which the whole river can be diverted, laying bare a long stretch of the river bed, around a big bend in the shape of an oxbow. This section of river bed is said to contain good gold values, and it is thought, will form the basis of a profitable placer mining operation, in addition to which the fall afforded for the surplus water at the outlet of the tunnel will warrant the establishment of a large power plant, the power of which can doubtless find a ready and profitable market by electric transmission to the basin mining districts.

Blaine County. ✓

The record for the year among the mines of Wood River, in Blaine County, has been one of steady progress and several old properties have again entered the shipping list after a lapse of years of idleness. The silver-lead output of the county for 1904, according to figures compiled by Rockwell & Company, bankers, of Hailey, amounted to 6,200,579 pounds of lead and 408,387 ounces of silver, the bulk of which, of course, was from the Minnie Moore Bonanza.

This famous old property, which produced so lavishly in the early days, was abandoned and remained idle and full of water for 14 years, and was looked upon as an ex-

hausted, dug-out proposition, but within the past three years has been reopened and under intelligent modern management its workings, already 1,000 feet deep, have been carried down 200 feet deeper and brought into bonanza ore again at every level from the 900 to the new 1,200.

During the brief period since the lower level of the Minnie Moore were rescued from the oblivion they had been relegated to by the incompetent management of the early operators, they have produced high-grade silver-lead ore to the gross value of more than a million dollars, and during the year 1904 have yielded the fortunate owners dividends amounting to the handsome sum of \$250,000, which again forces the property into favorable recognition among mining men and strengthens the faith of investors in the numerous other noted old properties of the Wood River District.

The mines of Wood River carry the highest grade and cleanest silver-lead ore of any mines in the State. The Minnie Moore sent out 300 tons of first-class crude mineral during December, 1904, that averaged 70 per cent lead and 110 ounces silver per ton. The same grade of ore is found in many of the other old properties, and the important line of development now in progress among them is very likely to result in a marked increase of the metal output of this county during 1905.

In sharp contrast with the rich silver-lead ores of this district that are practically free from zinc and pyrites, and occurring in close proximity with them, is found one of the richest and most extensive bodies of zinc-silver ore in the country.

This property, which is known as the "War Dance," is situated on Deer Creek, four miles from the Short Line track, a short distance above Hailey, and has recently passed into the control of some prominent zinc operators and smelter men who have paid a substantial installment of the purchase price and ordered the first 75 ton unit of a large lead-zinc mill. This machinery was ordered December 10th shipped from Denver, also 120,000 feet of lumber to be used in housing it was ordered from the Bridal Veil Falls Company.

These people are under contract to have the mill in operation by May 1st, and propose to work 40 men on the enterprise all winter.

According to conservative estimates the War Dance has 150,000 tons of ore in sight above its deepest level, which is 500 feet, and a large portion of this ore is high grade in zinc, rosin Jack, 40 to 60 per cent ore, with a little lead, some high silver values and a little gold.

The upper levels of this mine have yielded in the past silver-lead ore to the value of \$325,000, a good deal of which averaged over 100 ounces silver per ton. The mine is situated high up on the mountain side and may be tapped to a depth of 2,000 feet by drainage tunnels of moderate length. The success of this enterprise seems assured, and it will likely add another variety and important amount to the next annual output of our metal mines.

Very considerable development is in progress among the lead-silver mines of the Wood River District, and favorable results are being encountered at many points.

The Idaho Consolidated Company are working on a new line of development at the Relief claim, immediately adjoining the Minnie Moore to the northwest, where they have encountered a fine vein of milling ore containing bunches and streaks of first-class, high grade stuff on the under side of the limestone beds that form the foot wall of the Minnie Moore vein. This discovery is likely to prove a new line or horizon for ore shoots along the entire string of claims which cover the Minnie Moore contact for three miles. So much importance is attached to the discovery that the Minnie Moore Company have commenced to cross-cut through these foot-wall lime beds from within their works opposite one of their big ore stopes.

The district in the vicinity of the Minnie Moore has recently been undergoing a close study by Prof. Walter P. Janney, who advances the theory that the ores of this district are the replacement of igneous dikes, which, if true, may have a very important bearing on permanency of the ore bodies and would intimate that they may be followed down to indefinite depths.

On the next claim adjoining the Relief, and covering the same contacts, the Alturas Mining Company are sinking a vertical, two-compartment shaft that will be 370 feet deep and tap the main Minnie Moore fissure 900 feet below the apex on its flat dip. The close proximity of this property to the old dividend payer gives it considerable prestige and justifies extensive development.

The Wolf Tone mine, situated near the Red Elephant, in the Mineral Hill District, is being negotiated for by an eastern syndicate and should form the basis of a successful mining enterprise, as it already has a shipping record of \$130,000 from shallow workings, at no place exceeding 130 feet deep. This property carries a well defined fissure, traceable at the surface for a long distance, and also several important lateral fissures whose intersection are very likely to make good ore bodies. This property is a good one and justifies extensive development, and the lay of the land permits of this being carried on by tunneling from the surface to great depth.

The Red Elephant, one of the largest producers of the early days, is working 50 men and has put considerable ore on the market during 1904, with a bright prospect of materially increasing its output.

The Dollarhide mine, 20 miles west of Ketchum, is being operated with a good force of men, and shipped several cars of ore during the year and is well thought of locally.

The Democrat mine is working 25 men on development and will probably become an important shipper again in the near future, as it is said to have considerable ore blocked out and should soon be in shape for profitable extraction. This vein is tapped at a depth of 1,000 feet by a tunnel 2,300 feet long, which was just recently completed.

The Boyl Mountain Mining and Development Company, west of Ketchum; the Oswego, in Mammoth Gulch; the Snowslide, Weber, Argosy, Blue Bird, and Idaho Wonder, in Muldoon District, have all developed good ore recently, and several of them are likely to become steady shippers of high grade silver-lead ore in the near future.

Along the Blaine County gold belt the Tip Top and Liberal mines have been engaged in blocking out and extending their ore reserves for future treatment. Both of these mines are quite extensively developed and have a great deal of good grade gold ore in sight. The Liberal is employing a force of 10 men, the Tip Top 20.

The Sampson Mining Company, recently incorporated, owns a valuable group of claims just west of the Liberal. The amount of development so far done on this property discloses three strong fissure veins in granite, all carrying good values with some pay streak ore that runs \$10.00 to \$100.00 per ton. The company has been incorporated for

500,000 shares, of which 250,000 shares have been set aside as treasury stock to provide funds for further developing and equipping the property. The company owns nine claims all in one group, with abundant water and timber privileges. The property is in the hands of practical men and is likely to prove a winner.

The Five Points mine in this same district has a large reserve of good gold ore in sight and is well developed and should form the basis of a successful mining enterprise, with a reasonable amount of capital.

The interest in the Wood River mines continues to grow. They are employing between 400 and 500 men this winter, from whose labors important strikes of rich mineral may be confidently anticipated.

Cassia County.

The mineral resources of Cassia County, while of no mean importance and extent, are of very limited development as yet. The great government and private irrigation enterprises calling for the investment of between four and five millions of dollars for dams and ditches alone, nearly a third of which has already been expended and whose final consummation and results promise no less than a duplication of Idaho's present total population—its peerless and unparalleled stretches of fertile soil and great volumes of Snake River water that are to make it blossom like the rose, are the whole absorbing topics of interest to Cassia County at the present.

Cassia County is a county of possible big things in mineral, however, as well as in agriculture. The great lava plateau country, lying south of Twin Falls and west of Goose Creek, is underlaid at a depth of from 600 to 1,000 feet for an area of several hundred thousand acres in extent with a series of two or three beds of lignite coal that have been prospected at twenty different places in the canyons of Goose Creek, where they have been found to be from two to fifteen feet thick and are lying nearly horizontal, or showing a gentle dip toward the valley conformable to the superincumbent layers of interbedded, brown

lava and lake-bed sediments, the whole series plainly exposed by the deep-cut box canyons of the Goose Creek tributaries.

The quality of this fuel, if fuel it can be called, is low, as far as developed, in fact little better than rich carbonaceous shale; the best results obtained from any of the development showing only 50 per cent combined carbon and 25 per cent each of water and ash; but almost all the development made so far is confined to the shallow outcrops at the foot of the great bluff of overlaying strata that tower above them, and it would seem most probable that if the development on these veins were carried in a few hundred feet under these high plateaus it is more than likely that the increased pressure and close contact of overlying volcanic flows will be found to have eliminated most of the moisture, leaving a combination of say 25 per cent ash and over 70 per cent of carbon, which would mean an useable grade of cheap fuel.

It is most likely, however, that among the enormous accumulation of carbonaceous matter the beds of this field represent, that there must be some important areas very much more free from ash than the results mentioned; and if such an area can be found, and it should happen also to have received the coking influence of the overlying lava flows, a very superior domestic fuel would be the result. The field is worthy of close investigation with that object in view, to say the least, as the discovery of even a fair grade of domestic fuel would be an important aid in the development of the great agricultural empire that lies immediately to the south of it.

At Conner Creek, a few miles south of Albion, the county seat of Cassia County, the Cumora-Melcher mines are opened on a very pronounced vertical fissure vein, cutting a series of quartzite schists and granite.

This property is equipped with a good-sized air compressor plant and machine drills, and is being developed by a cross-cut tunnel that has already been extended into the mountain 2,800 feet and it is expected will encounter the main fissure within the 3,000-foot line and at a depth of about 1,000 feet below the apex of the vein, which at the surface shows some fine shoots of quartz containing good values in gold, associated with concentratable sulphides of iron, copper and lead, and quite a display of float quartz below the vein, among which it is no trouble to

pick up pieces showing colors of native gold that are visible to the naked eye.

There are a number of fine prospects in this district that carry good values in gold, silver and lead, and given sufficient development several of them may prove to be profitable mines. These mountains contain fine building stone resources, including limestone, sandstone, tuff, marble and granite.

The gold production of Cassia County for 1904 amounted to 270 ounces and was probably all derived from small sluicing or rocking operations along the Snake River, which forms the northern border of Cassia County for 90 miles. This portion of the Snake River has been the scene of the only dividend-paying dredging enterprise the writer has met with for the recovery of its fine gold, while its banks for 300 miles of its course in this State are strewn with old relics and eyesore failures of the dredge and fine-gold-process man, whose cash sponsors and financial victims ever after retain a sore feeling towards Idaho mining without just cause.

For the benefit of prospective investors in this class of mining, and to show what kind of an investment is needed and has been successful, and what kind of a margin of profit may be anticipated under the most favorable conditions and skillful handling, I reprint the following story from the Engineering and Mining Journal, February 15th, 1902, covering the construction and operation of the Sweetser-Burroughs Dredge.

This boat represented an original investment of about \$1,200, and a whole lot of rare mechanical skill in its evolution. It produced a large amount of gold which was all minted at Boise, and paid two \$10,000 dividends. The ground on which it was operated for several years was exhausted in the spring of 1903; after that the boat was dismantled and sold.

An item of scientific interest in connection with this operation is the finding of an impalpable, fine, gray-white metal in the clean-up boxes that is doubtless platinum or one of the platinum group of rare metals. A vial sample of this rare metal was collected and is now in the possession of one of the principal owners of this boat, Hon. Louis Sweetser, who is at present representing Cassia County in the Idaho Legislature. The story of this dredging enterprise is as follows:

Dredging for Fine Gold in Idaho.

In spite of a general impression to the contrary, the successful recovery of fine gold from the Snake River placer beds on a commercial scale, up to 95 per cent of the gross contents of the gravel, has been an accomplished fact for years. The method employed is one of simple gravity concentration of the fine material on burlap tables, after it has been separated from the coarser gravel by passing through a screen-floored sluice box, the gold afterwards being collected from the small residue of concentrates by quicksilver, in a clean-up barrel, a small arrastra-tub or a rocker. The method is simple, efficient and adapted for operations on a large scale, and with careful attention will give high results.

The problem to be solved to make placer mining pay along the broad, flat bars of Snake River has not been the saving of the fine gold so much as the handling of a sufficient quantity of the low grade, gold bearing gravel to justify the investment of any large amount of capital. The application of the floating dredge to placer gold mining and its skillful handling and adaptation to the conditions here met with seem to have solved this difficult problem and to have opened up an extensive field for profitable gold mining investment.

It is very common to hear the numerous pick-and-shovel operators along the Snake River tell of having large tracts of gravel that will average from 30 cents to \$1 per cubic yard, and as a matter of fact, such high values do occur, but only as local skim diggings in especially favorable localities. Close investigation will prove that there are few gravel bars along this stream that carry an average value of 30 cents per cubic yard for a depth of over 10 feet; but it is probably not an exaggerated estimate to say that there are millions of cubic yards of gravel along the valley apparently well adapted to dredging that will contain 5 to 15 cents per cubic yard of savable gold, and at these values may be made a source of profit.

The Sweetser-Burroughs Mining Company was among the first to undertake dredging the Snake River on a large scale. Under the personal supervision of the president and general manager, Mr. George T. Burroughs, Jr., this com-

pany built the Sweetser-Burroughs dredge boat in 1894, at a point on Snake River 30 miles southwest of Minidoka, a station on the Oregon Short Line Railroad. Plans were made for this boat in the fall of 1893, lumber and machinery ordered during the winter and work commenced on the dredge as early in the spring as weather permitted.

This is a suction dredge and was started with a 6-inch nozzle or intake. The nozzle was changed in 1895 to one of 10 inches diameter, and has been in constant and successful operation during the open season ever since. Minor but important changes have been made in the plant right along, looking to the strengthening of the principal wearing parts, efficiency and economy of operation. The hull of this boat is 30 by 90 feet, and draws three feet of water, and the dredge has an actual average daily capacity of 2,500 cubic yards. The motive power is supplied by a 125 h. p. vertical compound condensing marine engine, supplied with steam from two return tubular boilers of 75 h. p. each. These boilers are set in brick with a sheet-iron casing, designed especially for dredge work. The pump is designed to handle any size of rock that will pass the nozzle of the suction. It is lined throughout with manganese steel and is very durable.

The gravel is discharged into a stationary sluice 12 feet long, set nearly horizontal in order to check the velocity of the stream of gravel before it passes to the adjoining two lengths of shaking sluice, each seventeen and a half feet long and set at a grade of one and a half inches per foot. These sluices are five feet wide and arranged to shake endways with a 3-inch stroke, being driven in opposite directions from the same shaft by eccentrics. The bottoms of these sluices are perforated steel plates, No. 10 gauge, one-eighth inch holes, spaced three-eighths of an inch centers. The coarse material from these screen sluices, or grizzlies, then passes to a rubber belt conveyor or stacker, which deposits it sufficiently astern to be away from interference with the operation of the boat.

The fine material, together with the gold, after passing through the shaking screens is discharged into a distributing box, which feeds it evenly to a set of 16 inclined burlap tables with an aggregate surface area of 1,000 square feet, set at right angles to the sluices. These dis-

charge over the side of the boat. This dredge has been so designed that its operation may be continuous and uninterrupted by the necessity of cleaning up, moving anchor lines or changing spuds, etc. The burlaps are taken up at intervals of six or eight hours and washed in a wooden tank, from which the accumulated gold and black sand concentrates are elevated automatically to the amalgamating room; quicksilver is here added, and the gold readily separated by a simple barrel process of amalgamation, after which the amalgam is retorted, melted and run into bars and shipped to the Government Assay Office at Boise, where it brings \$19.40 per oz.

The force required to operate this dredge consists of three men to a shift, who work eight hours, and the total force employed on the boat, including chief engineer, blacksmith and roustabouts, consists of thirteen men for the twenty-four hours. The fuel used has been Wyoming coal, but the company is now experimenting with sage brush, which is grubbed out by horse power and cut up with a "hog" or bark mill for convenience in handling and firing.

The cost of handling gravel at this plant, including all charges, is 4 1-2 cents per cubic yard. Working in the river bed, most of the gravel being raised from below the water surface, a good deal of the material handled runs from 10 to 20 cents per cubic yard and affords a handsome margin of profit.

An auxiliary steam tender, 15 by 60 feet and twenty horse power, keeps the dredge supplied with fuel and furnishes the motive power whenever it becomes necessary to move camp. A commodious twenty-two-roomed, double decked houseboat supplies the plant crew with convenient quarters. The lower deck consists of 12 rooms, including kitchen, dining room, office, store room and eight bedrooms for the crew. The elegantly furnished apartments of the upper deck, which are divided into ten rooms, are occupied by the manager and his family. Everything about the house boat is kept clean and orderly, the table well supplied, and the crew well cared for in every way. Snake River is 600 feet wide at this point.

The successful results accomplished with the Sweetser-Burroughs dredge were such as to induce the company

to build a second plant, and the dredge boat, Yale, was built in 1899. This boat, which is at work on the main river, twenty miles southeast of Minidoka, is of the chain elevator bucket type. The digging buckets are of five cubic feet capacity, and the boat has shown actual working capacity of 2,000 cubic yards a day over a period of twenty consecutive months, employing the same number of men as required at the suction dredge. The gold saving arrangement on this boat is about the same as at the Sweetser-Burroughs dredge. The hull of this boat is thirty by ninety feet, and draws three feet of water. The engine and boiler are of fifty-five and eighty horse power capacity, respectively, and the fuel used is Wyoming coal, which is laid down at a cost of \$6.00 per ton.

While the pay gravel at this plant is somewhat richer than that found at the lower boat, the digging conditions are much more severe. The Yale is now located on a low-shifting bar made in a short bend of the stream. This particular bar is 3,000 feet long by 350 feet broad, and the pay gravel extends six feet deep. The usual loose free gravel of small well-rounded pebbles prevails here as at other points along the Snake River, but this section of the stream is flanked for miles along its north shore by a high terrace of black basaltic lava. The broken slide boulders from this lava bed, probably through the action of shore ice, have been scattered along the center of the stream and are now found more or less thickly sprinkled throughout the gold-bearing gravel.

These boulders form a serious drawback to the digging capacity of this machine, and are responsible for a considerable loss of time in the operation of the boat, equal to about four hours in each twenty-four, besides inflicting an increased strain on the principal wearing parts with a consequent increase in cost of operating, bringing the total average cost of handling gravel at this plant up to 5 1-2 cents per cubic yard. The Yale dredge, like the Sweetser-Burroughs, enjoys the convenience of a commodious house boat consort, and its shoreward wants are attended to by a little gasoline launch of six horse power.

The success of these two dredging enterprises are not the result of any set plan, but comprehend a good deal of careful and original thought and management on the part

of Mr. George T. Burroughs, Jr., the president and general manager of the company, who is a mining and mechanical engineer, and has exceptional business tact and inventive ability. Both the plants under his charge carry a number of important mechanical improvements, necessitated by the varying conditions met with that are entirely original. Mr. Burroughs does not believe in overworking his men, and finds that it pays to keep them well housed and fed; he exacts and receives very efficient service in consequence. Those of the crew filling the positions of engineers and pilots work eight-hour shifts, while the roustabouts work ten hours. Each engineer is given a printed blank, upon which he is expected to keep an accurate log of the operations of the boat; this includes, among other things, a record of every stop the machinery makes, and for what cause; also a regular reading of a set of automatic self-registering devices attached to the mooring lines and to a vertical sliding rod or indicator at the bow, which is actuated by a traveling wheel at its lower end. These devices accurately measure the length, depth and width of each cut across the face of the bar, and put beyond question or guess the actual number of cubic yards of gravel handled during the operation of each shift.

Both the plants are lighted by electricity. They are also connected with each other, and with the railroad station at Minidoka by telephone. At the station a special forwarding agent and a good team keep them in close touch with the outside world. Every feature of the business has been systematized down to a fine point, and reflects great credit upon its founder.

The Sweetser-Burroughs Mining Company has set the pace, and under similar competent management the Snake River Valley would seem to offer a field of great possibilities for profitable gold dredging in the future, when the waterfalls and rapids now running to waste along this stream are taken up and transformed into electric energy.

Note—(The bucket dredge did not prove a profitable investment.)

Canyon County.

Aside from the fact that the important ore courses of the Pearl district have been traced out to the west, over the Boise county line into Canyon county, and have received considerable development, there is nothing to report in the shape of ore discoveries in other parts of Canyon county.

The very promising indications of lignite north of Emmet have received a little development during the year. In the same vicinity some very likely evidences of a resource of natural gas and mineral oil are manifested that seem to warrant the attention of capitalists, especially since the advocacy of the volcanic origin of petroleum by scientists.

Custer County.

The 1904 metal output of Custer county mines exceeded in value that of 1903 by \$349,757, or practically 100 per cent. This increase was due entirely to the active mining and smelting operations of the White Knob Copper Company, who employed between 300 and 400 men during eight months of the year, but this enterprise failed and passed into the hands of a receiver in September.

Recent information from the east indicates that the company has been reorganized and that an extensive plan of development work will shortly be undertaken at the mines, which is cheering news, for the property has immense bodies of mineral in sight of a grade, carrying about 50 pounds of copper bullion per ton, together with important values in gold and silver.

The great trouble with the White Knob enterprise is the fact that its expensive smelting plant and surface equipment were undertaken before the metallurgical feature and method of treating the ore was sufficiently worked out. The great bodies of carbonate and oxide ores have continued down 700 feet in that altered condition to the Albert Tunnel level, and experience has shown that the ore lacked sufficient sulphur for a successful matting

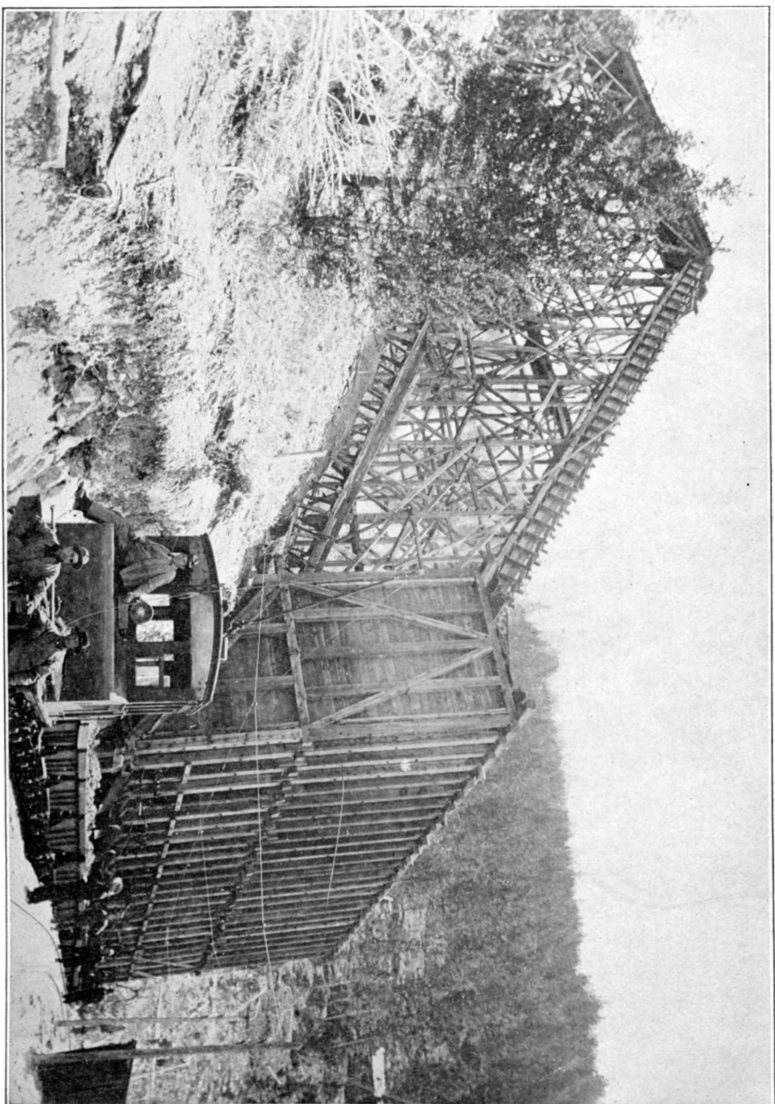
method of treatment with which it has been attempted to work it, and too much sulphur for making base bullion successfully.

Both the sulphur and copper tenor of the ore has shown a marked increase in two short winzes that have been sunk from the Albert Tunnel, and if the development is followed out in this direction and subsequently connected with the Van-Austin Tunnel that is designed to tap the ore bodies 900 feet below the Albert Tunnel, and is already in over 1,000 feet, the property is likely yet to blossom out in all the glory promised by its early advocates, for it has immense bodies of low-grade, oxidized and carbonate ores, and if they follow the normal rule of big copper ore bodies, a zone of secondary enrichment is yet due to make its appearance in the downward extension of the ore bodies that should bring the property into favorable prominence, and eventually justify the splendid plant with which it is equipped.

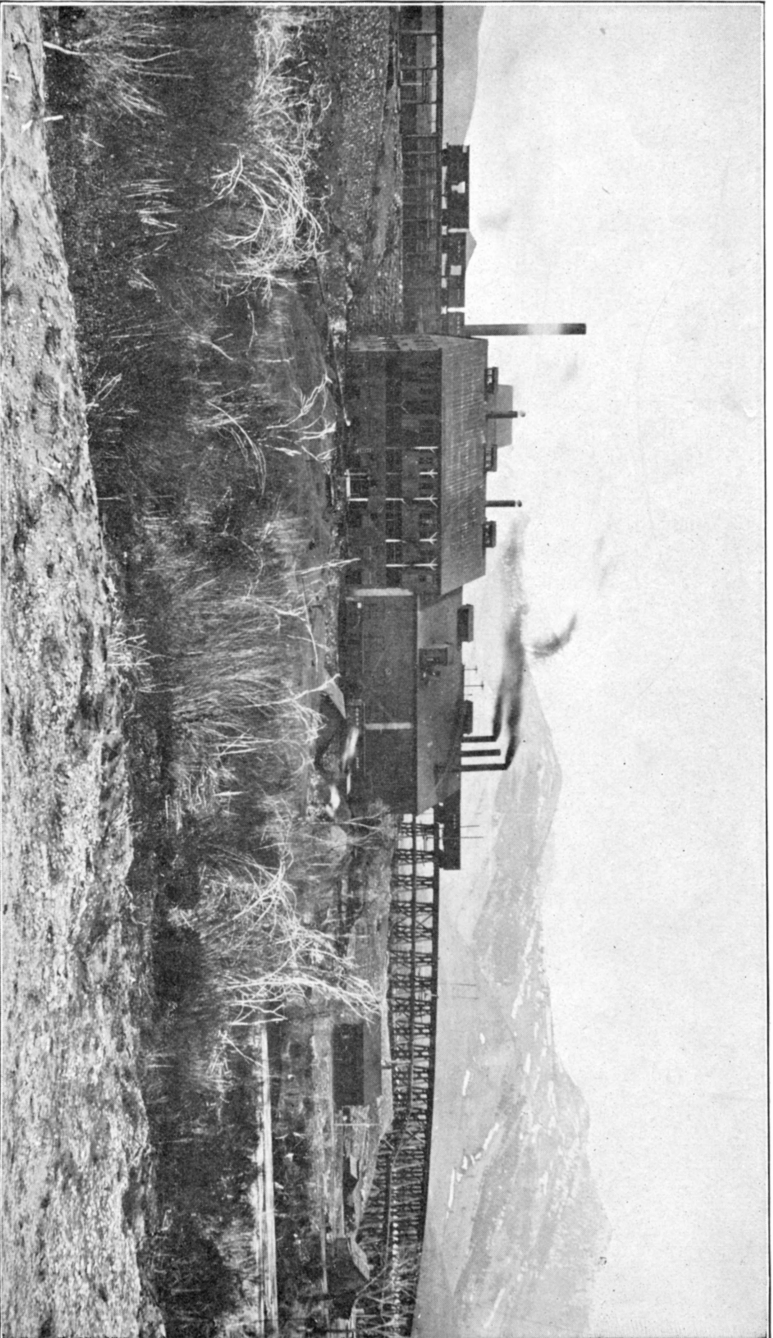
A new lead-silver mining enterprise is in process of development with a good force of men at the Clifton mine near the head of Lost River, forty-five miles west of Mackay, where a great lode or sheeted zone of concentrating ore occurs in limestone that is 60 to 150 feet wide and can be readily traced on the surface for a mile in the direction of its strike.

It is estimated that fully 70 per cent of the width of this great zone is ore—ore that will carry average values of \$12 per ton in combined values of silver and lead. A 600-foot cross-cut tunnel that is designed to tap the great ore course 370 feet below its apex is being run and now well under way, the success of which may develop the basis of a very extensive and profitable concentrating and smelting enterprise. Diagonal dikes cut the limestone walls of the lode and the geological and natural conditions in the way of water power, timber and chances for gravity handling are all favorable to the ultimate success of the venture, which is in the hands of experienced men.

A little life was kept up at the Bayhorse Mines by leasers and considerable ore shipped during the year, invariably with profitable results. The development of the lower levels of the Red Bird Mine at Squaw Creek have been brought into good ore and warranted the faith of the owners in the expensive plan of development that has



LOADING BIN AND ELECTRIC TRAM, WHITE KNOB MINE, MACKAY, IDAHO.



COPPER SMELTER, WHITE KNOB MINE, MACKAY, IDAHO. CAPACITY, 600 TONS DAILY.

been in progress on the property for the past two years.

Adjoining the Red Bird towards the Salmon River the South Butte Mine, owned by local people has proven itself a valuable property that apparently warrants extensive development, and shipped several cars of very high-grade silver-lead ore during the past summer.

At Custer, the Lucky Boy Mine was closed down in the early part of the season, owing to the necessity for further extensive development and equipment to get the best results out of its ore. This suspension caused a serious drop in the gold and silver yield of the county for 1904. The mine is reported to have extensive reserves of pay ore, but the constantly increasing costs of hoisting and pumping, as the work was carried down through a steeply inclined shaft located on the top of a high mountain, consumed all the profits. A splendid advantage is afforded for a deep cross-cut drain tunnel on this property, and it is to be sincerely hoped that capital will be found with which to resume operations on this line of development.

At Jordan Creek and Estes Mountain, nine miles west of Custer, important mining developments have been in progress during the year. The Golden Sunbeam Mine at the point in the Yankee Fork Mining District is extensively opened on a large vein of gold ore, and equipped with two Elspass mills of 25 tons capacity that have made a number of important shipments of gold bullion during the year. The Montana: Nearby the Golden Sunbeam on the steep slopes of Estes Mountain, a lofty cone shaped summit that raises to an elevation of 10,000 feet and is a landmark in the rugged topography of this part of Idaho, a strong company, composed of eastern capitalists and well known local mining men has recently been organized and are now at work developing the Montana Mine and a large group of very promising territory that adjoins and surrounds it. This is one of the most promising pieces of mining territory of its class in the State. It is in many respects comparable to the ores and formations of Tonapah and Goldfields, Nevada, and that the extensive development of its several pronounced fissures will result in "rich strikes" of bonanza ore there can be no doubt.

Estes Mountain is entirely composed of igneous formations, principally altered rhyolites, andesites and syenites with dykes that closely resemble phonolite in the near

vicinity of the rich ore, the whole underlaid at a great depth by quartzite siliceous limestone and granite.

These formations are traversed by a strong system of fissures that carry rich ore but very little development; the position of some flows of fine float ore along the strike of several of these veins strongly indicate that shoots of rich mineral may be encountered underground, while nuggets of almost pure silver mineral (argentite) carrying high gold values have been found in positions on the mountain side that preclude the probability of its coming from any of the ore shoots so far opened.

The Montana Mine, the central feature of property embraced by this new company has been worked by its original locators in a very crude fashion with a horse whim to a depth of 500 feet, and has produced a very considerable tonnage of high grade shipping ore ranging in value from one hundred dollars to one thousand dollars per ton, and has at this time a handsome shoot of milling ore three to six feet wide and a hundred feet long in its lowest workings; there are also several other excellent ore showings on other veins and claims embraced within the limits of the new company's lines. The ores of this group are free and easy to treat, and given sufficient capital for development there is no reason to doubt but the enterprise will prove a success, with the ever present probability during the progress of the work of breaking into "bonanza" ore at any time.

At Loon Creek, the famous Lost Packer gold-copper mine has been steadily developed during the year and the different adit levels have been extended on the vein and now expose and undercut pay ore bodies that run into the hundreds of thousands of dollars in gross value.

While several cars of crude shipping ore carrying the usual high values of from six to ten ounces of gold and 15 to 20 per cent copper have been sent out during the past season. Shipments, however, have been subordinated to the work of getting in a wagon road to the property which the company have undertaken entirely at their own expense.

This road was built from the terminus of the Jordan Creek road, seven miles west of Custer, over the Mount Estes Divide, and down a Loon Creek tributary to within four miles of the Lost Packer, a distance of seventeen

miles, during the last season, and will be completed through to the mine early next spring. This will greatly facilitate shipments and the development and equipment of the property, as everything has had to be carried in and out on mule back from Jordan Creek to the mine so far.

It is the intention of the Lost Packer Company to build reduction works at the mine next season, which will probably take the form of a concentrating and matting plant to reduce the ore to a high grade product that will better stand handling to market. This mine has already shipped ore to the value of \$60,000 from development work, and has practically paid its own way since it was discovered two and a half years ago, and the prospects of its becoming a very important and steady contributor to Custer county's metal output are very bright indeed.

The evidence of permanency, of size, depth and values exhibited by the development of the Lost Packer has stimulated the faith of other operators in the surrounding district, and considerable interest is being manifested in its development, as the district embraces a number of fine surface showings of mineral and good veins.

At Greyhound Mountain, on the head waters of the middle fork of Salmon River, the Greyhound Mountain Mining & Milling Company have recently developed a fine reserve of smelting ore by extensive drifting on a big vein 5 to 15 feet wide that is said to carry average values of \$19 a ton in gold, silver and lead. This property is approached from the Ketchum or Mackay railroad terminals over good roads to within a few miles of the mine. A saw-mill has been put in operation on the ground during the year and machinery hauled in for a 40-ton smelter, and the owners hope to have the property shaped up as a producer at an early date.

In Stanley Basin the Wormaks dredge was in operation during a part of the summer and produced some important gold shipments. The Valley Creek Mine and 20-stamp mill made a short run during the early part of the year, but the treatment of the ore was not successfully accomplished. This property carries a large vein with big average values in a simple combination of quartz and granite gangue with pyrites and a little further experimenting ought to solve the metallurgical question of its profitable extraction.

Some important progress was made in the development of the many interesting gold-bearing porphyry dikes and quartz veins in the neighborhood of Joe's gulch, Big and Little Casino Creeks at the east side of the Stanley Basin district, and it is eminently probable that very rich strikes may be recorded from this locality in the near future, for pieces of float ore have been found among its veins occasionally that have run up into the thousands of dollars in gold and silver values.

Sensational Ore.

A prospector, accompanied by a young boy, packed into Hailey last summer two horse-back loads of ore amounting to 475 pounds in weight, that contained substantial value in gold and silver. The assay results on the lot yielded at the rate of 1,020 ounces of gold and 456 ounces of silver per ton, and he received a check on the Hailey bank amounting to \$4,548.15 in settlement for his 475 pounds of ore.

It would be very interesting to know what district this ore came from. The fact that it was partly oxidized and full of native gold indicates that it was mined at no great depth, and weakens the probability of its being stolen ore from some other State. The man said it was from a prospect he had discovered on Salmon River, but refused to divulge that particular part of Salmon River he had gotten it from. Heated under the blow-pipe, and touched with nitric acid a small chip of the mineral that looked like fine iron sulphurets in bluish quartz gave a very pronounced reaction for tellurium. The grain and appearance of the quartz very much resembled the ores of Stanley Basin, and while the writer does not personally know of the discovery of tellurium ore in this part of the Salmon River country, I have often pointed out the probability of its occurrence, on account of the prevalence of fluorites in this section, a favorite associate mineral of tellurium.

I have also seen ore in the new Middle Fork District near the mouth of Wilson Creek in Lemhi County that closely resembled this rich stuff. If it should prove to have been mined in any of the many new gold districts of the Salmon River tributaries, and from a decent sized vein, it may lead to gold developments of great importance—possibly a boom district of the Goldfields order.

Elmore County.

Elmore County embraces a large and very important area of the rich gold-bearing granite formations that form a greater part of the upper drainage basin of the Boise River and contains many gold deposits of exceptional promise. The record of production of the precious metals from this part of Elmore County, according to agents of the Wells Fargo Express Company, exceed \$25,000,000 in value, nearly half of which was from the treatment of the rich ores of Rocky Bar and Atlanta.

The most important and principal source of gold from this county during 1904 was from the Franklin Mine at Pine, which with its little old 10-stamp mill hung up half of the time for repairs, produced gold bullion to the value of nearly \$70,000.

Extensive development has been carried on at this mine during the past year, amounting to nearly 2,000 feet of drift and tunnel work. At the No. 2 crosscut the vein has been drifted on 1,000 feet, and 700 feet of this drift is on good milling ore. In addition to this a 700-foot crosscut tunnel has been run that taps the vein on a level with the valley bottom 204 feet below No. 2, and 600 feet below the apex. A drift is now being run on the vein from this lowest cross-cut, that at last account had been driven 100 feet, and was showing some ore. When this drift has been extended far enough north to catch the main ore shoot on its pitch in the plane of the vein to the north, it will prove up ore tonnage pretty fast. The surface improvements at the mine and mill have been quite substantial and extensive during the year, and the property has been gotten into splendid shape for a long campaign of profitable production.

On the opposite side of the river from the Franklin, the "Mountain View" Mine has been bonded to an eastern party, who proposes to develop it quite extensively next summer. The Mountain View is regarded as having excellent promise. It has produced several important shipments of high-grade ore and is considered to have as good a showing as the Franklin had at the same stage of development. This mine lies well for adit tunnel devel-

opment, and it likely to give the camp another important gold producer when properly developed.

A new hydraulic placer mining enterprise has recently been undertaken near Pine by the Idaho Gold Milling and Amalgamating Company, Chicago, Ill., on an extensive tract of placer gravel that is estimated to contain between twelve and fifteen millions of cubic yards, and an average value of 9 to 19 cents per cubic yard.

There are splendid dumping facilities. The gravel is fine and washes readily. A water supply of 50 to 100 second feet can be made available by constructing a ditch and flume from Fall Creek, twelve miles long. With such a head of water on the ground and the proper hydraulic machinery installed, together with intelligent and conservative management, this body of gravel, which was formed by an ancient river channel could be handled at a very low cost per yard, and at the figures given should show a very handsome margin and the property prove a lasting and profitable investment.

The famous old mining camp of Rocky Bar has experienced a dull year during 1904. It is not exactly dead, but sleeping, and given the practical encouragement and stimulating touch of capital for developing its many promising resources, it will awaken to the healthy dawn of a profitable career again.

To illustrate the possibilities of this famous old placer and quartz district a vertical profile line representing a cross section of its granite formations, at right angles to the direction of the drainage would show a succession of deep cut V-shaped narrow gulches, and high, sharp ridges. These gulches represent the milled or eroded portion of the rich system of gold quartz veins, for which the district is noted, that have made the lower portions of the creek beds so famous as placer gold producers. The inverted V-shaped ridges would represent the unmilled portions of the same vein system, and to further illustrate how incomplete the work of Nature has been in the exhaustion of the gold stores of their veins—such a line would show at a depth of 500 feet directly under the deepest and richest placer tributary, at a point just above the town of Rocky Bar, the position of a single bonanza ore shoot on the Ida Elmore vein, that has produced to the efforts of man, high-grade gold ore to the total value of \$5,000,000, an amount

equal to fully one-fourth of all the placer gold recovered from the district, a result that fully warrants the extensive development of the numerous promising fissure veins of Rocky Bar.

Atlanta District.

Between Rocky Bar and Atlanta there stands a bold, barrier range 9,000 feet high, whose snow capped summit shuts out all wagon communication from Atlanta District and the rich mineral territory that surrounds it for fully seven months in the year, and at best, affords a very expensive and uncertain means of communication for a very limited season. This natural obstacle has seriously retarded the development of Atlanta and the other rich mineral districts adjacent to it which ought to be furnishing profitable occupation to a community of several thousand people.

The relief of this backward condition would be afforded by the construction of a wagon road from Boise City to Atlanta, up the Boise River, which may be made on an average grade of thirty or forty feet to the mile, at a reasonable cost, and would give an all the year around route with easy grades and practically free from heavy snow. Such a means of access would stimulate the development of what promises to become one of the richest mineral fields in Idaho, and the Legislature will be fully justified in considering the request for assistance in the construction of this important highway, as it will not only promote the expansion of our mining industry and other business interests, but will at the same time result in the development of a home market for the products of our farms that is likely to prove of vast importance.

Between 1865 and 1870 the gold mines of Atlanta were enjoying the same kind of an extravagant boom and sending out big ore shipments of equal richness as those that are making the present fame of Goldfields and Tonapah, Nevada. Results of development on these mines partially proved, however, that these bonanza values were due to secondary processes of comparatively shallow surface enrichment. This development also proved that these rich ores occurred in veins or lodes of most remarkable strength and associated with vast bodies of lower grade ore, which, under the extravagant methods and lack of metallurgical

skill of that early day did not warrant extraction and were considered too low grade to pay, but under modern methods of treatment should prove an important and extensive source of profit.

The Atlanta lode and its rich ores have formed the subject of reference in various scientific publications for thirty years. It has been compared by an eminent geologist, Prof. Clayton, who was very familiar with its early development, to the famous Comstock lode for size and strength.

This great lode or monster zone of mineralized gangue is built on an intrusive dike of trap rock, and bounded by walls of eruptive, porphyritic granite. It is from 50 to 150 feet wide and can be plainly traced along the crest of a high ridge by shallow surface workings for two and a half miles.

In connection with a system of important lateral fissures on which several good mines have been opened up near the main lode. It is safe to say that half a dozen of the principal properties of Atlanta contain proven pay ore resources amounting to over a million tons that will exceed \$5.00 per ton in gold value. A large proportion of these great ore reserves will do better than \$10 per ton; in fact, there are developed as much as 50,000 tons in the Monarch and Petit mines alone, of that value, and important pay streaks of a good deal higher grade. If material could be handled at a profit here, that carries from \$2.00 to \$3.00 per ton, there are bodies of mineral of that grade in the Monarch Mine that are 70 to 80 feet wide and could furnish an immense tonnage.

The best ore bodies are usually clean and well defined shoots of banded or shattered quartz of a bluish cast 2 to 20 feet wide and hundreds of feet in length that are absolutely free from perceptible lead, zinc or copper sulphides; they carry some silver minerals and a trace of antimony, with soft yellow iron sulphurets rich in gold. Recent practical milling tests in quantity have been made on the ores of this district by which 40 per cent of the gold was saved with a simple plate amalgamation, and a high percentage of the balance has been found to yield to chemical treatment by cyanide and chlorination methods.

These great reserves of fair-grade milling ore need working on a large scale in large mills and well warrant exten-

sive equipment. The district affords a splendid opening for a big custom mill. The greatest depth attained in the camp so far is at the Monarch mine, which is well equipped with a fine hoist and developed through a vertical shaft 600 feet deep, with extensive drifting at each 100-foot level, all in good ore; and there is every reason to believe that the ore and values will go down to the level of the Boise River, 1,600 feet below the apex of the main lode, with a strong probability that shoots of primary, bonanza ore of equal richness with that found at the surface levels will be encountered with extensive drifting at greater depth, as was the case with the Comstock lode. The Monarch is being actively developed at the present time.

Other properties near by or adjoining the Monarch that have more or less extensive development and good ore in sight, and are being further developed, are the Petit, The Big Lode, Minerva, Tahoma, Jessie Benton and Grey Eagle. All these mines are grouped along Atlanta Ridge within one and one-half miles of the town of Atlanta, which is beautifully situated on the east bank of the Middle Boise River, at an elevation of 5,300 feet above sea level.

The Grey Eagle has a vein of quartz 40 feet wide that crops out boldly at the surface for several hundred feet in length. The Jessie Benton, next to the Monarch, is being most actively developed. This winter a shaft is being sunk on a strong shoot of ore, carrying fifteen to twenty-five dollars per ton. A stamp mill of 20 tons daily capacity was erected to treat the ore of this mine last summer, which was gotten into commission during the fall, and made a very satisfactory run, making a high percentage of saving—so much so that the company are planning its enlargement next summer.

With the single exception of its remoteness and inaccessibility over the present route, Atlanta is a desirable place to live, a comparatively low elevation, with plenty of timber and water for large power capacity; it is situated in a lovely little basin, among small, grassy meadows and surrounded at a short distance with a circle of lofty granite mountains; a water grade wagon road up the river from Boise City, 85 miles distant, of which 40 miles is already built, would be a "god send" to this district and would, unquestionably, result in opening up a very prosperous mining community.

The Warrior District.

In August, 1903, the big ledges, lodes and veins that traverse the deep-cut canyons and high spurs that form tributaries of Black Warrior Creek, were found to be gold-bearing and the new "Warrior" Mining District was formed, having its center about 14 miles west of Atlanta; probably a hundred claims were located within sixty days after the discovery of a streak of rich ore on the Warrior Chief claim, the original quartz location. During the spring and summer of 1904 this new district attracted considerable attention from prospectors, and its ore-bearing limits were widely extended and found to reach for a length of six or eight miles, by two miles wide, and fully 200 more claims have been taken up during the past season.

Reading the future of a new mining district from grass root development is always a precarious and risky business, and comparative evidences, together with physical and geological features, are the only data available on which to predict its future, and these are often misleading and deceptive. I visited the Warrior District during the past summer, and examined its salient features pretty thoroughly, and I am free to say that on the whole it impresses me favorably, indeed.

The surface evidences of pay ore are more numerous and the general surface conditions more favorable for the establishment of a successful gold camp than in any district I have visited in twenty years' continuous mining experience in the West.

The Warrior District contains dozens of claims that show rich ore often containing visible native gold, carrying values of from \$25 to \$100; this class of ore, however, has proven to be confined to comparatively small pay streaks, and the future of the camp will have to be based on its evidence of extensive bodies of \$5 to \$15 milling ore, which, if the values are maintained underground, some big milling plants will be warranted.

The general formation of the district is granite that weathers to a soft, crumbly surface, and is traversed from northeast to southwest by a great system of nearly vertical

dikes of quartz-porphyry, diorite and andesite that in some instances stand out above the surface in bold relief like great walls.

These dikes are accompanied in contact, or closely paralleled with, gold-bearing ore courses that vary from monster bodies or shoots of massive white, to honey-combed brown or yellow-stained quartz, five feet to twenty feet wide, as at the Rico, Mammoth, Fourth of July and Hoosier groups, each of which are located three miles apart and nearly on the same strike. Intervening between these and on parallel courses, are equally large bodies of altered siliceous granitic or porphyritic gangue.

These great ore courses carry the values above referred to \$5 to \$15 per ton in width of five to twenty feet and shoots, apparently several hundred feet long in some instances. The whole system of dikes and veins or zones stands nearly vertical, strikes across the main drainage courses through elevations ranging from 1,000 to 1,500 feet between the bottom of the canyons and the tops of the high ridges they cut through, and are thus in effect developed by natural shafts represented by the erosion of the deep-cut canyons, and stand ready to be opened by adit levels.

The values are continued at the surface in different shoots along the strike of these great veins, through their extreme elevations, which would seem a guarantee that they would be continued underground, to the extreme depths reached in crossing the canyons, and that an adit drift would meet the same good and poor ore shoots the surface exposures indicate, but whether this fancy theory will work out remains to be seen by actual development work.

These natural advantages lend themselves to the rapid and economical development and operation of these veins which are well worthy of extensive investigation.

The north slopes of the canyons are densely timbered with very desirable red fir mining timber, while the lower slopes of the Creek carry a wide belt of fine yellow pine; water for battery purposes is abundant and convenient to all parts of the district, while unlimited water for power is available within a few miles, and with a well designed stamp mill \$5.00 ore under these conditions ought to be made to pay 50 to 60 per cent profit over all cost of min-

ing and milling, and I believe the district will furnish bodies of free milling ore of that value and better that will justify some big plants.

During the summer a small arastra was built on the Double Standard mine and run by water power, and an eight-inch ore streak treated that yielded from \$25 to \$30 per ton and small lots of sorted ore from other claims ran over \$50 per ton free gold by this method.

A five-ton custom stamp mill was erected in the center of the district for the purpose of treating selected lots of these rich ores, but was not completed until winter closed in, and the work was suspended until spring. Also, the machinery for a fifty-ton Elspass quartz mill and a saw-mill was hauled into the district late last fall for the Rico Mammoth mine, which was one of the finest ore showings in the district.

On a high gravel-strewn ridge forming the west rim of the Atlanta Basin, 1,500 feet above the river bed, and in a position that seems to preclude the probability that they might have been derived from the Atlanta lode the famous Daily boulders were found years ago that were of sufficient size to indicate they came from a streak of ore eight or ten inches wide, and were sold for their gold contents at the rate of \$5.00 a pound. Their vein source still remains to be discovered. The gravel-strewn ridge on which they were found is rich in placer gold, and at one point is worked while the snow water is running every spring for a few days, and yield placer gold at the rate of one to two dollars per cubic yard.

The origin of this placer gold and bonanza boulders is doubtless in the mountains immediately to the north and west of Atlanta, between the head of the Middle Boise and Queen Rivers, and offers a most inviting field for the prospector.

The bold spurs of the Sawtooth Range to the east of the Middle Boise are richly mineralized and known to contain many great fissure veins carrying gold and silver and massive float-boulders of galena lead ore are reported to have been found in some of their tributaries.

On the Yuba River slope east of Atlanta a number of strong veins of the characteristic Atlanta ore have been worked on that carry good milling values.

Skeleton Creek District.

It is only fourteen miles east from Atlanta over a good trail up one of the Yuba tributaries to a low saddle in the mountains that connects with the Skeleton Creek District where some very important strikes of rich gold ore have been made and considerable development work is now in progress.

At this district the Red Horse group, locally known as the Chattin Mine, has several hundred feet of adit and cross-cut tunnels exposing a fissure vein in granite thirty feet wide, carrying milling values all through, and a pay-streak on one wall from which a ten-ton lot of ore has been milled that yielded five ounces free gold per ton and a small lot of concentrates, carrying gold at the rate of forty ounces per ton.

The Red Horse is a very persistent fissure in the direction of its strike and carries several important properties on the same vein. The Old Sam or Turner mine makes a very handsome showing of ore, a tunnel has been run on this vein 230 feet in good ore all the way, two and one-half feet wide that has gained a face depth of 110 feet and recently expanded to a width of four feet, and careful average samples across the breast gave results of \$60 per ton in gold. A new tunnel has been started on this property which will be 700 feet long and gain a face depth of 500 feet, owing to the advantageous dip of the vein and the steep mountain slope it traverses.

The Frazier mine on the same vein, owned by the Drake Mines Development Company of Chicago, is also being extensively developed. A cross-cut tunnel has been driven into the vein, which is tapped at considerable depth and drifts are now being run to under-cut the rich ore shoots shown at the surface. The Nellie F. and Mary Glenn mines are two other flattering properties of this district which have recently passed into the hands of Lincoln, Neb., capitalists and are to be extensively developed.

The Skeleton Creek district is on the waters of the South Boise River. It contains many fine prospects and much promise of future importance as a gold mining field.

Moore Flat, Lime Creek and Dixie Districts.

At Moore's Flat, seven miles east of Pine, some important rich ore discoveries were made during the past

summer, and considerable development is in progress there at the present time, with the bright prospect that some good ore bodies will be opened up, especially on the Highland Mary and Smith mines.

A few miles further east, at Lime Creek, the President mine, has been quite extensively developed on a strong fissure and two large ore shoots opened up. This property was equipped with a 25-ton roller mill during the past summer, which ran fifty days on ore from the President vein, and made a good saving of free gold, together with a good yield of concentrates that sample \$150 per ton. An extensive plan of development is in progress which includes a tunnel 1,000 feet long that will tap one of its principal vein systems 600 feet deep. The natural conditions in the vicinity of these mines in the way of wood, water and adit tunneling advantages are fine, and very profitable results are anticipated.

A very important enterprise is now under way at the Dixie Mining District. Just west of the Rocky Bar stage line, at Dixie Station, at this point the Crown Point Mining Company are pushing a very important enterprise with a good force of men in the shape of a deep drainage and development tunnel started, just above the level of the Boise River that when completed will be 4,200 feet long and tap a strong system of steep-pitching fissure veins in granite at a depth 1,100 feet; one of these veins has been quite extensively developed through a shaft and found to contain strong shoots of rich ore from which important shipments have been made, but the water encountered proved troublesome and expensive to handle; the other veins of this system are of good size and promise. Adjoining this property to the west, what appears to be a very important discovery has recently been made in the shape of a wide dike or zone of rock that has been found to contain values of \$4 to \$8 per ton at a number of points where it has been cut into and it is thought to carry pay values through a width of 300 feet.

Neal District.

One of the most important gold-mining enterprises of the year was inaugurated at the Neal District in September, when a new stock company was incorporated to take over the Golden Eagle mine.

This property has previously been developed to depth of 300 feet, with an incline shaft, from which several short levels have been run, making a total of about eleven hundred feet of actual development work, from which free gold, concentrates and crude ore were shipped, containing a total value of \$40,000.

In the brief time the property has been in the hands of the present company it has been equipped with a large Chilian Mill and concentrating plant of eighty tons daily capacity; also a new hoist capable of going a thousand feet deep, and while waiting for this new machinery the small baby hoist on the mine was used to start a new shaft several hundred feet west of the old one. This new opening has been carried 100 feet deep in fine milling ore, all the way, and has demonstrated that the ore shoot being worked on is more likely to be 500 feet long than 100, as indicated by the old works.

The Golden Eagle is a wide zone of altered quartz and granitic gangue, heavily mineralized and impregnated with high-grade gold-bearing iron pyrites quite free from lead and zinc, that can doubtless be cyanided right on the ground. The gold-bearing width of this zone varies from five to twenty feet and the average values from \$10 to \$15 per ton, of which 40 or 50 per cent may be saved on the plates. The material is friable, mines easily, and crushes rapidly to a granular, free running pulp that concentrates readily. Bands of clean, sulphide mineral are often encountered in the vein, up to a foot wide, that carry values of from \$100 to \$150 per ton gold. This great vein or zone has every appearance of permanency, and considering its width is high grade; it has been traced out in the direction of its strike for several thousand feet; it is being well handled, is situated within a two hour's drive of Boise City over a splendid road and has every appearance of shortly becoming one of the largest and most profitable gold mining enterprises in the State.

Other parts of the Neal District have experienced rather a quiet year. Recently, however, an important discovery has been made in the Daisy Mine, one of the well-known properties of this district, which adds materially to its visible wealth. Considerable work was done at the Homestake, and fine reserves of rich ore put in sight. Work is

in progress at the Ella Hill, South Star and Badger properties and the prospects for the future success of this district are extremely bright at the present time.

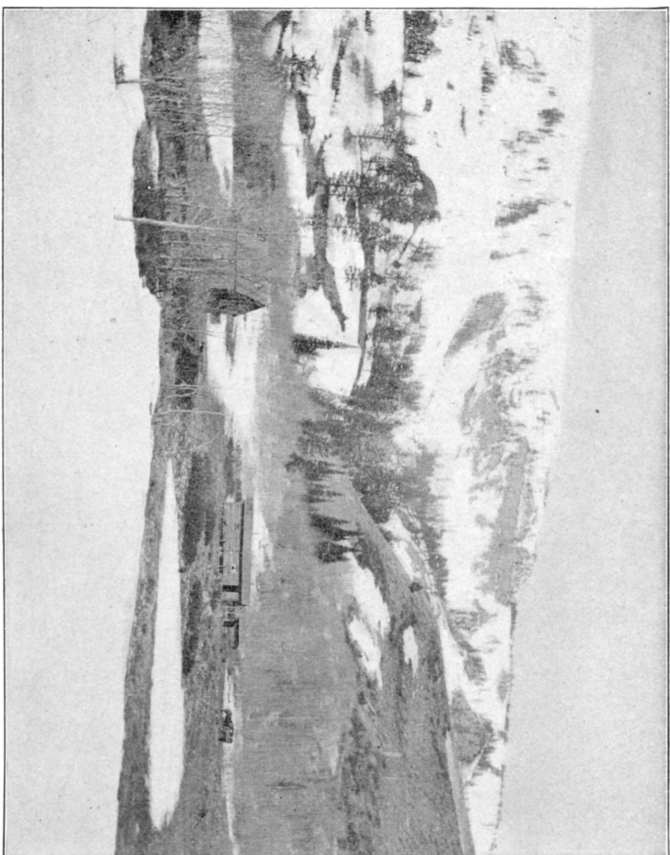
Fremont County.

The most important mineral resources of Fremont County so far discovered is a series of beds of bituminous coal of excellent quality that occur in the foot-hills that border the west side of Teton Valley, where at the Horseshoe mine a small force have been employed since early last spring, and during the fall developed a producing vein of fine fuel, four feet wide, from which 1,500 tons of coal were marketed during the last ninety days of 1904, and active production will probably be continued during the balance of the winter, while good sleighing lasts. The mine was putting out and selling twenty-five tons of coal a day at last accounts.

The coal produced comes from a comparatively shallow depth, and is rather inclined to break up small on mining, but it is a very high grade fuel, carrying between 90 and 95 per cent actual combined carbon, and consequently a very low per cent of waste products in the shape of ash and moisture and finds a ready market at \$2 per ton on the dump among the farmers of the region, who have little else to do for their teams in the winter season, and are enabled to come as much as fifty or sixty miles to buy their coal on account of its cheapness and the excellent valley roads for which the country is noted.

There has been over a thousand feet of development work done on the Horseshoe property, and the main objective point of the company has not yet been reached. All the present output of coal is from a blind vein, whose existence was not suspected. It was found in a cross-cut tunnel that was being run to tap a ten-foot vein that had previously been opened at another point.

When the new vein was cut into the cross-cut was stopped and a drift started on the new discovery which has been continued 375 feet in a fine quality of clean coal all the way. A deeper adit tunnel was started to develop



THE HORSESHOE COAL MINE, FREMONT COUNTY.

the ten-foot vein, at a much lower point. This opening has been extended in nearly 400 feet, is still in progress and is expected to cut into the big vein any day.

This property carries a system of steep-pitching coal veins, five in number, that range from eighteen inches to ten feet wide. They strike in a northerly and southerly direction and dip west at an angle of about sixty degrees; they are enclosed in a wide series of soft, fossiliferous sandstones, shales and thin bedded limestones of Cretaceous Age.

One of the smaller veins carries coking coal of an excellent quality, a hundred-pound sample of which was tested by the Anaconda Copper Company, and yielded a coke that for strength, texture and freedom from impurities equalled the best coke produced from any point west of Pennsylvania. The company was sufficiently interested in the discovery to ask for a shipment of a carload of the fuel for the purpose of making more extensive oven tests.

The aggregate width of clean coal embraced within this closely parallel series of veins on the Horseshoe property is twenty feet, and unless the formation prove too badly disturbed, a very large tonnage can rapidly be put in sight by drifting on the ten-foot vein, when it is cut, and cross-cutting the balance of the system from the main drift.

The country is sufficiently settled to warrant a local market of 10,000 to 15,000 tons of coal a year, and a nice little business may be built up while development is progressing.

These same veins have been opened to considerable extent on the strike two miles north of the Horseshoe mines, where some of the same excellent quality of coal is being produced and marketed from similar good sized veins; two other properties on other parallel veins but two miles further east down Horseshoe Creek are working a small force of men and turning out some coal. All the veins of this district strike through high foot-hill spur ridges and afford an easy means of access and development. The field is twenty-six miles in an air line, due east of St. Anthony, the nearest railroad point, and an excellent wagon road extends to the mines, with easy grades, by which it is thirty-six miles to St. Anthony, and about the same distance to Rexburg.

Idaho County.

Several things have conspired to retard the development of the mining industry in Idaho County during the past year. Many of its properties dependent on the sale of treasury stock for working capital met with the usual apathy of interest common to a presidential year. This, and the failure to get a connection with the new State road to Thunder Mountain caused a rather dull season among the mines of the Big Creek District.

At Buffalo Hump the chief source of bullion production was cut down by lack of water for power, which reduced the capacity of the Jumbo mill by about half. This weakness is about to be overcome by the installation of a new power plant by the Jumbo Company.

The failure due to legal complications in the early part of the year by the American Eagle mine, which made such a fine record of production during 1903, had a tendency to flatten out interest in the Elk City District through the summer, which was revived, however, in the fall by the success of the Great Hogan mine, and the encouraging news late in December that the affairs of the American Eagle had been adjusted and that the mine would be started up again within a short time.

Thunder Mountain.

The completion of the Thunder Mountain wagon road, together with the increased bullion production of the Dewey mine, and the successful developments at the Sunnyside, gave the Thunder Mountain District around Roosevelt a boom during 1904, and the camp has made more real progress than during any year of its history. This new road has proven quite a success, and is said to have carried more freight during the first three months after its completion than any other of our new State roads have done in a year after their completion. This new road has stimulated development, not only in the Thunder Mountain District, but all along the route. It has been strung with the wires of the Rocky Mountain Bell Telephone Company, which are now in working order to Johnson Creek Station, within thirty-eight miles of Roosevelt, and will be completed through to Roosevelt in the spring;

and during the last three months of 1904 was probably the busiest thoroughfare in the State.

The Dewey mine, the oldest and best known mine in the district, has enjoyed a remarkably successful year of development and production.

This property is equipped with a ten-stamp mill, built in 1901, that had to be made in small section so that it could be transported on mule-back to what was at that date the most remote point in all Idaho.

It is common experience for a patchwork mill of this kind to give lots of trouble and prove hard to hold up in repair, and this mill is no exception to the rule, but causes lots of trouble and loss of time to its operators to keep it in adjustment. While running, however, it has proven a great gold saver and demonstrated that in good hands the ores of Thunder Mountain yield a little higher percentage of their gross value to plate amalgamation than any other district in the State, close sampling of the battery heads and tails showing an actual recovery of over 85 per cent of the total value of the ore as free gold.

No better evidence of the way the Dewey mine has developed is needed than the statement that the little plant with which it is equipped for an actual running time of seven months, during the year of Grace, 1904, produced gold bullion amounting to a total value of \$78,000, the mint receipts of which are available, and prove more eloquent evidence of the merit of one Thunder Mountain property than whole pages of descriptive literature could, without the gold.

Mr. Dewey is to be congratulated on the present successful development of the property, which he has insistently pushed against very adverse conditions, and, by the way, this is not the first time the name of Dewey has, with persistent energy, gone against long odds and all sorts of talented advice, and forged successful results from very slim indications in Idaho mining history.

It is to be sincerely hoped that the ore bodies from which the above results have been obtained will continue to maintain their values and expand to a point where the installation of the company's 100-stamp mill will be justified, and the fact that the richest ore is being derived from the lower workings of the mine, is a strong point in the prospects that they may. The average values of the ore

treated during the year have ranged from \$18 to \$16 per ton.

Thirty-five men were employed on the property during the greater part of the year, and in addition to the development of the mine a great deal of road building and surface improvement work was accomplished, and the property is said to be in splendid shape and quite a credit to its able superintendent, Mr. Bert Haug.

At the Sunnyside mine a crew of from 200 to 300 men were employed during the greater part of the year, largely in the construction of the company's forty-stamp mill and aerial tramway, building roads and other surface improvements.

All the machinery for this large mill was hauled over the new road, delivered in safety, placed in position and ready to run, early in December, to accomplish which called for some strenuous effort on the part of the management and a lavish use of money.

The plant was started up but had to suspend operation immediately, owing to a defect in the tramway, which it is thought can be remedied, however, at no great cost, but at an aggravating loss of time.

The weakness developed consisted of defective grips by which the tramway buckets are attached to the rope; these proved too weak to stand the strain over an unusually long, steep span on the line of the tram. These are to be replaced with stronger attachments as soon as they can be gotten in there, and the Sunnyside is due to make good with a fine showing of bullion at an early date.

The stopes of the Sunnyside Mine are reported to be in shape to supply 150 tons of ore a day, containing average free gold values almost equal to the ore milled at the Dewey. The mine has been quite extensively developed and the work on the property seems to have demonstrated the occurrence of a blanket-shaped deposit of tufaceous igneous rock thirty to forty feet or more in thickness or depth, of wide extent and conformable to the general surface but capped over at some depth by a barren sheet of harder, igneous formation.

The writer led the first loaded pack train over the snow capped summit of Thunder Mountain to the Dewey mine from the east side, on the first day of June in the boom

year of 1902. That pack train was loaded with a first class complete fire assay outfit and accompanied by an expert assayer from Colorado to manipulate it. I ransacked the surface of the Thunder Mountain district, faithfully and consistently for two months, visiting all of the principal claims over an area of five miles square about the Dewey mine, and had over 300 samples tested without finding a single result, outside of the Dewey group, that contained paying values or that gave any evidence or encouragement that would justify development, with the exception of finding pay ore, and a number of practical mining men from other mining states, who gave the surface a thorough investigation that season, met with similar negative results; the successful development and discovery of extensive bodies of pay ore at this time puts a premium on optimism to say it mildly, shows how misleading surface evidences may be, and in a measure justifies booming on a very slim surface showing of values.

I am advised by Hon. W. D. Timm, who has been running a custom assay office at Roosevelt for the past three years, and is now spending the winter in Boise as legislative representative for Idaho County, that during his three years' business in the assay office, the general run of results obtained by him have progressed steadily in value as development work has proceeded, and he is of the opinion that with conservative practical management, some of the big bodies of milling ore now exposed in the district will justify large mill equipment, and prove an extensive and reliable source of profit.

The H. Y.-Climax Company, who own a well located group of claims near the Dewey mine, have a hoist and saw mill installed on the property and have ordered a ten stamp mill. They have cut the necessary lumber for the construction of commodious camp buildings, and have let a contract for sinking their shaft to a depth of 400 feet. This company is employing about thirty men.

The Twentieth Century Mining Company has installed a saw mill and are employing ten men in tunnel and other work.

The East Dewey Gold Mining Company has driven 350 feet of tunnel during 1904, and is now employing four men in the same kind of work.

There has been a large amount of development work done in the district, by different companies and individuals, during the year, of which detailed data is hard to obtain; the probably productive area has been widely extended, and intelligent investigation is being carried on at a good many points this winter; the total number of men employed in the different properties tributary to Roosevelt this winter is estimated at 500.

Warm Lake District.

At the Warm Lake District on the new Thunder Mountain Road, the year's development has seen some important disclosures of fine milling gold ore, in its big fissure veins, at the property of the Trapper's Flat Company, managed by Mr. George M. Snow, of Nampa; a vein of pay ore several feet wide has been drifted on for some distance that carries average gold values of \$10 to \$27 per ton, and a large amount of such ore is now on the dump together with a fine reserve undercut in the mine—so much that the company feel justified they can supply a mill of considerable capacity, and are planning to erect one next summer.

This company have installed a saw mill and are in good shape for further improvement. The principal vein on this property is as much as thirty feet wide and carries big milling values all through; the plan of development now under way will prove it to a depth of 310 feet from the surface and a mill of large capacity is likely to be warranted.

The Fidelity Mining Company's property, located near the above, has similar strong fissure ore bodies containing big milling values and is being actively developed this winter.

The surface of these claims have been thoroughly prospected, exposing a succession of fine ore shoots that practically guarantee a big supply of good milling ore, and a tunnel is now being run calculated to tap these ore bodies at a depth of 300 feet, which it is anticipated will be completed by early spring, and justify the installation of a good sized mill next summer.

Another large group of claims adjoining the Fidelity

has recently been acquired by an eastern syndicate, who are planning an early campaign of development.

Everything seems favorable for the establishment of a successful and profitable camp in this district. The district is made easily accessible by the new State wagon road. It already has a postoffice established, named Knox, and the natural conditions that surround it favoring economical development and operations could hardly be excelled.

Big Creek District.

On the lower portion of Smith Creek, about four miles from Big Creek, is situated the Werdenhoff and the Coveney Companies' claims. The Werdenhoff has been pursuing a steady system of development work for the past two years, which has progressed so far that the machinery for a thirty-stamp mill was shipped in last July and August, but did not reach the mine on account of the wagon road not being completed. The company is now pushing its main tunnel, which is in about 800 feet, and expected to cut the main lead at any time, after which a raise will be run to the surface, and the ledge drifted upon.

The surface showing upon the Werdenhoff property is a remarkable one, and if sustained in the deeper development will become an important producer.

The Coveney Company, adjoining the Werdenhoff, is also pushing its development work this winter. It is aiming to drift upon the large mineralized dike that passes through the Werdenhoff, and is also prospecting several of the cross-ledges.

Among the mines of Logan and Smith Creeks are: The Empress, which now has 1,460 feet of deep development; 235 feet of this has been done during 1904. Their main tunnel, 553 feet in length, attains a vertical depth of 290 feet. A cross-cut at this point, 158 feet in length, is in ore its entire length. There are three other tunnels run higher up on this mountain, developing the same ore bodies, and their full extent is not yet known. While the mass of these great ore bodies are low grade, yet there are streaks of ore whose values run up into the hundreds.

The Logan group adjoins the Empress on the east, its leads are practically of the same character as those developed on the Empress. They have accomplished between

400 and 500 feet of development work, about 300 feet being done in 1904, principally through tunnels. Their main tunnel has developed some very high values.

The Crown property adjoins the Empress on the north, and is on the same great dyke. There has been about 900 feet of development work done on this property, nearly all in ore; 250 feet of tunnel has been driven during the past year, the grade of ore being not quite so good as that on the Empress.

The Independence adjoins the Crown on the north and east, and opens up the same grade ore bodies by means of three tunnels of an aggregate length of about 750 feet, 350 feet of which has been driven in 1904. Eight men are employed on the above properties for the winter, and there are about seventy-five men working at all points in Big Creek District.

The Copper Glance and Crown Extension have each about 100 feet of development work on the same vein system as those mentioned above. The ore bodies opened in all of the above mentioned properties are of a value to return a good profit with the installation of proper mills to handle same.

The district is greatly handicapped at present for want of wagon roads or other means of cheap transportation.

The East Dewey Gold Mining Company, which owns the Golden Gate mine in Yellow Pine Basin, has driven 180 feet of tunnel in 1904, and are now employing four men. This company has built two miles of road from its mine up Johnson Creek toward the nearest point on the present State wagon road at Johnson Creek Station, with a design to complete the stretch of nine miles between these two points early in the spring.

The Blackfoot Extension and Campfire Companies had surveys made to connect this road by way of Yellow Pine Basin and Profile Creek to their properties at the head of Profile and Quartz Creeks, seventeen miles distant. From this point a road could be constructed down Big Creek to the mouth of Government, and up that stream to the mines, very cheaply, the distance being only about eighteen miles, making a total distance from Johnson

The above outlined route by M. F. Kirkpatrick, engineer for the Crown Mining Company, who is very familiar with

the country, is considered the most feasible one into the Big Creek District. It will cost at the average of about \$500.00 per mile to construct this road on a grade not to exceed 12 per cent. The Empress Mining Company and others have sawmill and quartz mill machinery at railroad terminus awaiting transportation.

Considerable activity was manifested during the year at the old Warrens Mining District, and considerable machinery installed; one of the most important equipments in this district during the year was that of the Warrens Meadows property, two miles below town, where a large bucket elevator dredge was installed and gotten in readiness for a full season's run during 1904.

The placer property on which this plant has been installed is owned by an English Company. It is an extensive one, carries good values and ideal natural conditions for a successful dredging enterprise and will doubtless take rank as an important producer of gold with the opening of the placer season of 1905.

The well known Little Grant mine, at Warrens, has recently been incorporated. This property has been developed to a depth of 230 feet, and has produced gold bullion amounting in value to \$350,000.

It is equipped with a five-stamp mill, with which the above fine bullion record was made. A good deal of the ore treated yielded \$100 per ton in free gold.

It is the intention of the new owners to prosecute an extensive plan of development on the mine, increase the milling capacity and supply the whole plant with electric power.

At Grouse Creek, near Resort, fifteen miles west of Warrens, the Golden Rule Hydraulic placers enjoyed a successful season's run and made a good output of gold; the plans in progress for the improvement of the property are expected to increase its output materially. There are several other fine placer properties in the vicinity of Resort that are likely to continue an important yield of gold for years.

Buffalo Hump.

At the Jumbo mine, the present chief source of production in the Hump, the management experienced the driest season in the history of the camp. The 630 foot head

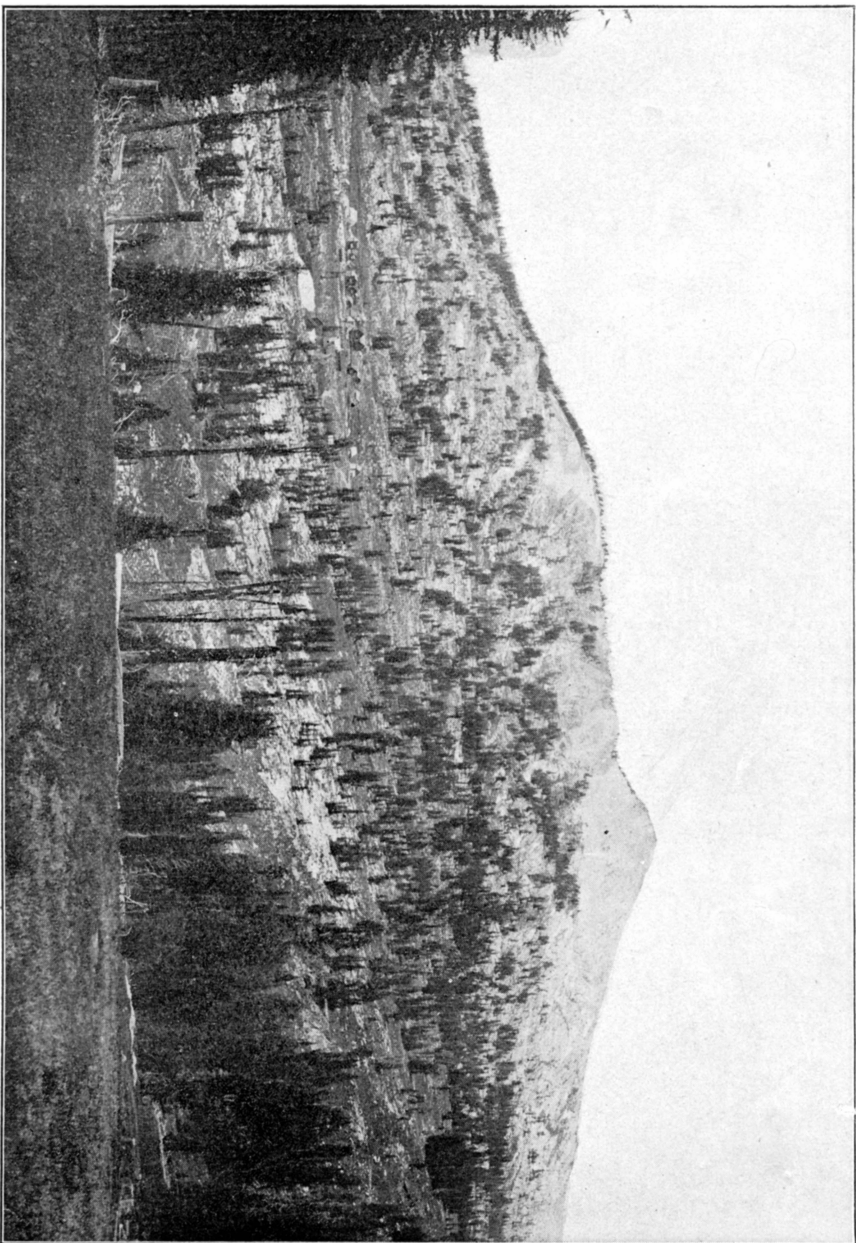
water power plant, running to the Jumbo mill, has given only about half the power required during the year. This Company have installed a new power plant on Deer Creek, which embraces a 3300 foot flume, and a pipe line 1320 feet long, giving a head of 435 feet, and an increased water supply. An electric plant will convert the power back to the mill and mine; it is expected that this additional equipment will all be installed and in running order early in the year, and furnish ample power for all purposes.

In addition to the good percentage of free gold produced by the Jumbo mill, there has been accumulated during its operation a large pile of clean high grade concentrates estimated to contain a gross value of \$50,000, and for the treatment of this product a small chlorination plant is being installed, by which it is estimated, after a good deal of experimenting, that 85 to 90 per cent of the values in the concentrates can be saved. The successful turning into money of this product of the mill, by a cheap chemical method right on the ground, ought to put the Jumbo in the dividend class.

South of the Jumbo mine an important discovery of rich ore was made while annual assessment work was being performed on the Furor claim last fall that seems to promise an ore shoot of the same magnitude as those of the Jumbo.

The Concord Mining Company of this district have worked a good force of men during the year on their Mother Lode Number 2 vein. A new shaft is being sunk, and is now down 175 feet from which cross cuts and a drift have already been made, exposing a vertical fissure vein of quartz carrying good milling values for fifteen feet in width and small pay streaks of rich mineral that run several ounces gold per ton. This property has a good hoist and is well equipped to continue development; it is well managed, is showing up the evidence of an immense reserve of pay ore, and comprises in addition to the Mother Lode No. 2, a number of the best located claims in the district, that when sufficiently opened up are likely to prove the basis of a very profitable gold mining and milling enterprise.

The same fissure system being developed by the Con-



BUFFALO HUMP, IDAHO COUNTY.

cord Company has also been opened to some extent and shown good values on the Dobbins, Phoenix-Fraction, Lost Lake, and Colonel claims, all of which carry ore bodies of large size and gold values ranging from \$2 to \$50 per ton.

West of the Concord property the Atlas group of claims carries quite extensive development on a wide fissure vein in which large reserves of good ore have been exposed and a new stamp mill recently installed.

Good ore bodies have been encountered in the deep adit tunnel of the Big Buffalo property which has been extended in over 1,000 feet on the course of the vein with results so satisfactory that the force at the mine has recently been doubled.

The Cracker Jack mine has experienced a season of hard luck, including a disastrous fire, which destroyed the buildings over the mouth of their long tunnel that gave three men employed at the face of it a close call to being smothered by smoke, who were only saved by the quick action of one of the miners, who had fought fire under ground before, in building a temporary bulkhead across the tunnel. The lack of power retarded the coveted connection from this lower tunnel with the rich ore bodies shown in the upper works.

Plans are being formulated for the incorporation of the St. Paul-Alhambra group, on which it is expected extensive development work will shortly be inaugurated; this is one of the best surface showings in the camp and should prove a very valuable property. A number of other properties in the Hump are being developed and attracting the attention of capital, and with the settled business conditions and the attractive opportunities held out for legitimate mining enterprises in this district, it ought to forge ahead rapidly during the coming year.

Elk City.

In spite of its many setbacks the Elk City district is unquestionably destined to make one of the most prosperous gold mining and milling districts in Idaho, if favorable geological conditions and results so far obtained are any guide to the future.

The district has a large yield of placer gold to its credit

to start out with; it has a primary formation, traversed by some of the largest, strongest and most continuous gold-bearing quartz filled fissure veins found anywhere in the State, whose development have nowhere been carried far enough to thoroughly prove their full worth, yet sufficient in several instances to disclose large bodies of fine free milling ore, and in some instances, tellurium ore of remarkable richness that may lead to high shipping values in important quantity.

None of these fissures have been developed below water level as yet; they are often accompanied by, or form a replacement of, dikes of aplite porphyry and may be depended on for permanency and staying qualities to great depth; several of these quartz fissure properties are being developed, and that among them some valuable and profitable mines will be disclosed in the near future, there can be no doubt. Another variety of gold deposits that are likely to prove of the utmost importance, not only to this district, but to the gold-mining industry of the whole State, are its great belts or zones of mineralized and gold-bearing granite gangue, locally called dikes, for which it is noted.

A typical example of this promising resource is that of the Great Hogan mine at Ore Grand, on Crooked River. This property carries a zone of altered granitic country rock, several hundred feet wide, and traversing the company's property for several thousand feet in length, a shattered, schisted, silicified zone of movement that has subsequently been intimately saturated and impregnated with gold-bearing iron solutions, and now represents an average gold value through its great width, conservatively estimated at between \$3.00 and \$4.00 a ton, of which it is said that 50 per cent has been saved by simple plate amalgamation, and that 90 per cent of the balance may be recovered by cyaniding.

The gold disseminated through this mass of mineral matter, is generally very fine, but not all fine, for occasional cavities or seams are found crusted with iron oxide, spotted with visible native gold.

This great zone could hardly have been put in a more economic position, if made to order. It parallels the narrow valley of Crooked River, which affords a water power of large capacity; the property has been equipped

with a twenty-stamp mill, run by water power, and is worked by the "Glory Hole" method, which consists of quarrying the material into open raises connecting with a 500-foot tunnel, driven into the zone from the back of the mill, where it is drawn off in big cars and run out to the mill bin, and goes automatically through to the tailing pile, the necessity of shoveling being left out of the whole process.

The mineral is very friable. Deep holes are put in with long churn drills and the heavy blasts thus prepared break it down in large quantities that call for little bull-dozing, as the largest boulders can generally be readily broken small enough to pass the coarse, grizzly bars set at the head of the chutes, with a sledge.

During my visit to this property last August the mine and mill was in full operation, handling nearly 100 tons of ore a day, and the total force in mine and mill, including the manager and cook, amounted to fourteen men; the total cost of mining and milling was estimated at less than 60 cents per ton, and the saving of free gold on the plates at \$2.00 per ton.

Extensive experiments were made on the tailings for the recovery of the balance of the values, which were found to be amenable to the cyanide treatment, and late reports from Elk City say that the company are now building a 100-ton cyanide plant, and the successful solution of the problem has created quite a stir of interest in the district, as there are several other immense deposits of the same class of low grade gold-bearing rock in the district.

The progress of this enterprise will be watched with absorbing interest for its continued success will doubtless mean a rapid expansion of plant as the supply of material is practically inexhaustible, and gold producing enterprises of the Treadwell and Homestake class may result. The manager of this property has certainly touched the lowest notch in Idaho mining and milling costs, and set an example of economic practice that will doubtless be aimed at by other operators, for there are similar great bodies of low grade, gold bearing material at several points in the state where a dollar a ton profit would justify a big business.

The placer resources of Elk City Basin are by no means exhausted, as the district still contains some extensive

tracts of flat meadow land that are adapted for dredging and known to contain good values. The Buffalo Hill old channel diggings of the district have been proven to contain an extensive body of rich gravel. A broad plan of development has been carried on at this property for several seasons, and has progressed to a stage where a big yield of gold may be expected with another season's work.

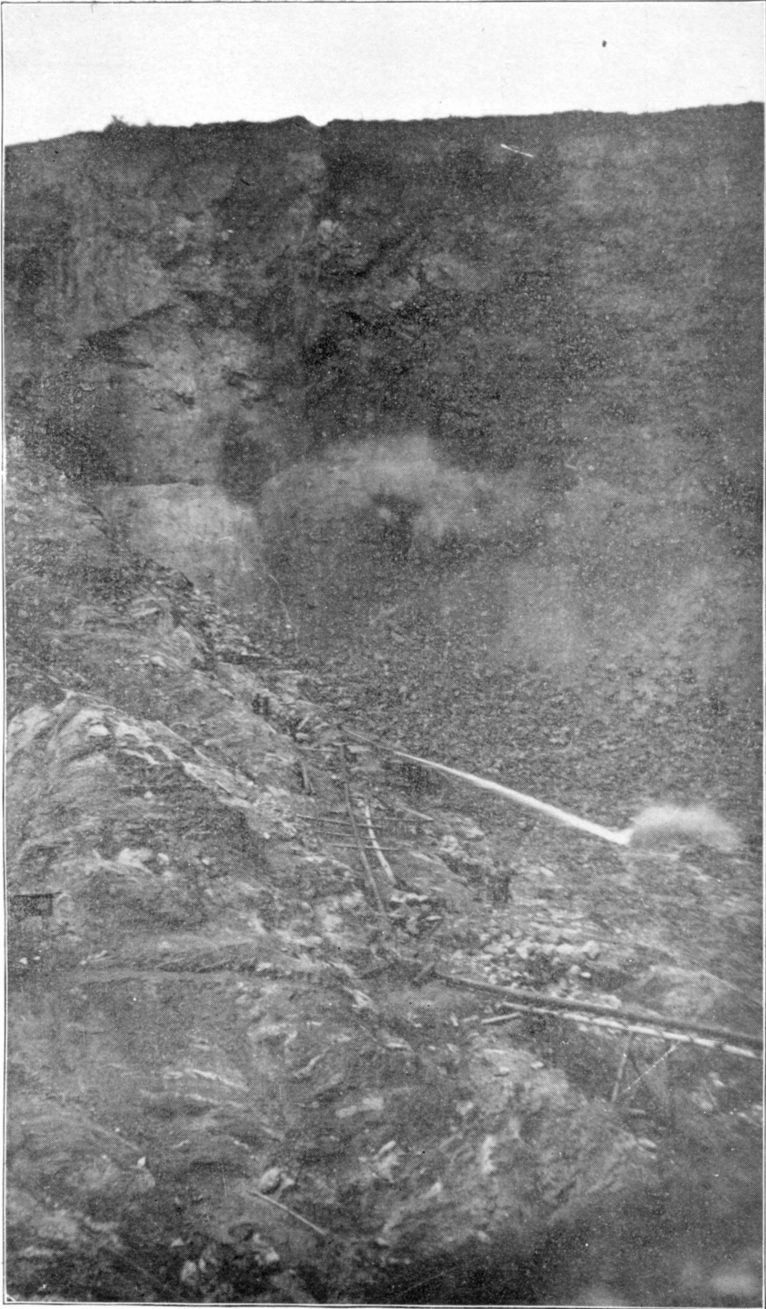
Newsome Creek District.

At Newsome Creek, on the road from Elk City to Stites, there are also some extensive hydraulic placer mines. The Moose Creek placers are a type of several others in the same vicinity. The geological phases of these deposits are of peculiar interest and worthy of a detailed description.

Moose Creek Placers.—"This property is situated in the Newsome Mining District, Idaho County. It consists of 300 acres adjacent to the South Fork of the Clearwater River, covered with auriferous gravel of varying depths. Part of the gravel is the shallow, local wash from the erosion of the adjacent hills; the more important deposits, however, are the remaining portions of what were presumably sub-glacial, and super-glacial river channels. The remnants of those channels now existing through this and the adjoining Elk City District seem to be largely confined to the "pot-hole" areas, for, so far as known to the writer, all of the deposits that have been worked in these old channel gravels, have shown great depressions within the deposit, much lower than the lowest portion of the surrounding rims. These rims have had to be cut by tunnel or open cut in order to bottom the deposits, and there has seemed to be no defined fluvial grade between one deposit and another. On the Moose Creek property there is a difference of over 100 feet in the level of the bottom of two of these pot-holes, less than 2,000 feet apart. The old channel deposit now being operated on at Moose Creek is 1,100 feet long, with a known width of 610 feet and a known depth of 201 feet, with one side and the bottom yet to be found. The lowest point yet demonstrated is approximately 600 feet above the level of the river, flowing approximately 1,000 feet distant, so



HYDRAULIC GIANT AT WORK UNDERCUTTING 160-FOOT BANK.
MOOSE CREEK PLACER, NEWSOME CREEK, IDAHO.



INSTANTANEOUS PHOTOGRAPH OF CAVING A BANK.
MOOSE CREEK PLACERS, NEWSOME, IDAHO.

the conditions for grade and dump are ideal. The gravel is soft, requires no bank blasting, and the giants operating under 150 to 195 feet pressure, are able to break the ground very rapidly, with 600 miners' inches of water, the maximum present ditch capacity, approximately 2,000 cubic yards of gravel per day can be broken and washed through the sluices. The sluices are thirty inches wide, set on a grade of six inches per twelve feet, and are supplemented by undercurrents for saving the finer gold.

There are, all told, of main and auxiliary ditches and flumes about twenty-one miles for furnishing water to this property.

The gold from the local gulches is worth about \$16 per ounce. That from the old channel runs as high as 940 fine, \$19.37 per ounce.

The local gulches have shown a value of approximately 25 cents per cubic yard from the pits mined. From pits aggregating between 370,000 and 425,000 cubic yards of the old channel gravel mined, \$78,799.24 was recovered, showing values of 18 1-2 cents to 21 cents per cubic yard. There are upwards of 3,000,000 cubic yards of gravel yet remaining on the property. It is operated by a Grangeville Company, of which Chas. P. Richardson of Newsome, who has been identified with the property for a number of years, is resident and Manager.

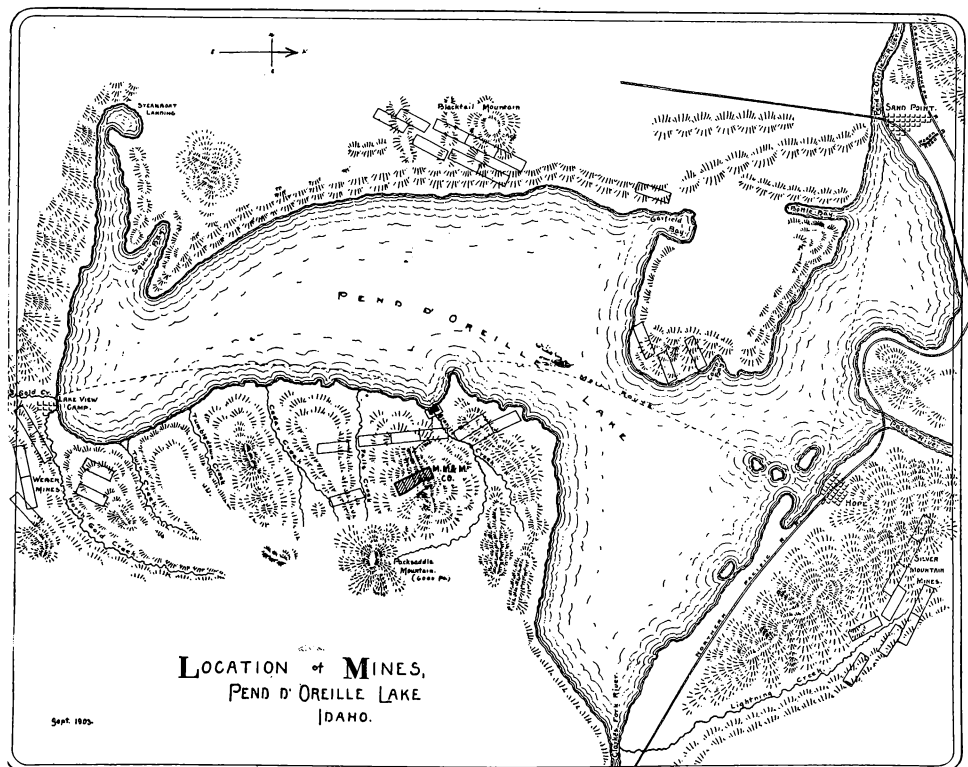
Idaho County has two Dewey mines, No. 2 in this description the Dewey Consolidated is situated on the South Fork of the Clearwater River, six miles from Grangeville, the County Seat, and in some respects parallels its namesake at Thunder Mountain in the fact that it occurs in igneous wallrocks (dia-base) covers a wide, mineralized zone of 180 feet between extreme limits, containing well defined ore courses ten to forty feet wide. It produces some gold specimen ore and has sent out small shipments of very high grade mineral.

The character of the ore at this mine, however, is entirely different from that of the Thunder Mountain Dewey, and while it is believed that the great bodies of oxidized surface ore it has in sight can be made to yield their gold values at a good profit by cyaniding, copper is likely to be the predominating metal in this instance, as very fine chalcopyrite ore has been found wherever this deposit has been opened to any extent.

This property has been undergoing improvement lately. It has considerable development, but mostly of a shallow nature, and at no place has the upper surface of ground water level been reached, as yet. The property is of good promise, and if developed at depth, there is very strong probability that extensive shoots of high-grade copper-gold ore will be encountered.

Kootenai County.

The chief industry of Kootenai County at present is based on its magnificent forests of timber which are producing choice lumber products at the rate of 120,000,000 feet a year, all of which is manufactured within the county and shipped to outside markets at good profit.



The mineral resources of this county, however, are extensive and varied. They have been developed sufficiently to demonstrate their size and staying qualities to very considerable depth at several points, and include gold, silver, lead and copper deposits of large size and good values, and I think are destined to cut a very important figure in the total metal output of Idaho at no distant date.

The Couer d'Alene lead-bearing series of altered sedimentary formations show a wide development in this county and contain many fine veins that in some instances are being extensively developed with gratifying results.

The accompanying cut of Lake Pend d'Orille, showing the location of mines aptly illustrates the thorough mineralization of the territory surrounding this beautiful body of water.

Among the best developed and most promising properties of this section are the following: The Minerva Mining Company's property, situated near Granite Creek on the east side of the lake, is opened on a well defined fissure vein in quartzite that varies in thickness from one to eight feet in clean cut walls, carrying a free-tale gouge, a condition that may be relied upon to carry its ores to great depth, and the vein is plainly traceable by surface workings through the property for nearly 2,000 feet in the direction of its strike.

This property has several hundred feet of adit tunnels or drifts run on the vein, to which economical method of development and drainage the steep pitching vein coursing down the steep mountain slope especially lends itself. The ore is a concentrating variety of lead-zinc sulphides, with some high-grade gray copper, and makes a fine product that runs well in all the metals mentioned; several good ore shoots have been opened up and various practical tests of the mineral have been made with results showing as high as \$291 per ton in combined values.

On the opposite side of the Lake the Blacktail District has some very flattering ore showings, and extensive plans of development under way. The B. R. & B. Company of this district own an extensive group of claims that are well developed, and expose a clean cut fissure carrying high-grade silver-bearing gray copper ore.

The accompanying half-tones show an electric drill set

up ready to run at the face of a long tunnel on this property, and the same face after a blast.

This tunnel is a splendid piece of work. It is a cross-cut drain tunnel driven through the country rock of blue slate 1,840 feet, and taps the vein at a vertical depth of 460 feet and 726 feet on the dip, where it was found in the same clean cut, normal condition as near the surface, and containing thirty inches of high-grade ore. A raise has been put through which connects with an upper tunnel and with the surface, and a number of intermediate levels are being started for the purpose of blocking out the ore preparatory to stoping, and the mine should soon be in shape to make an important production.

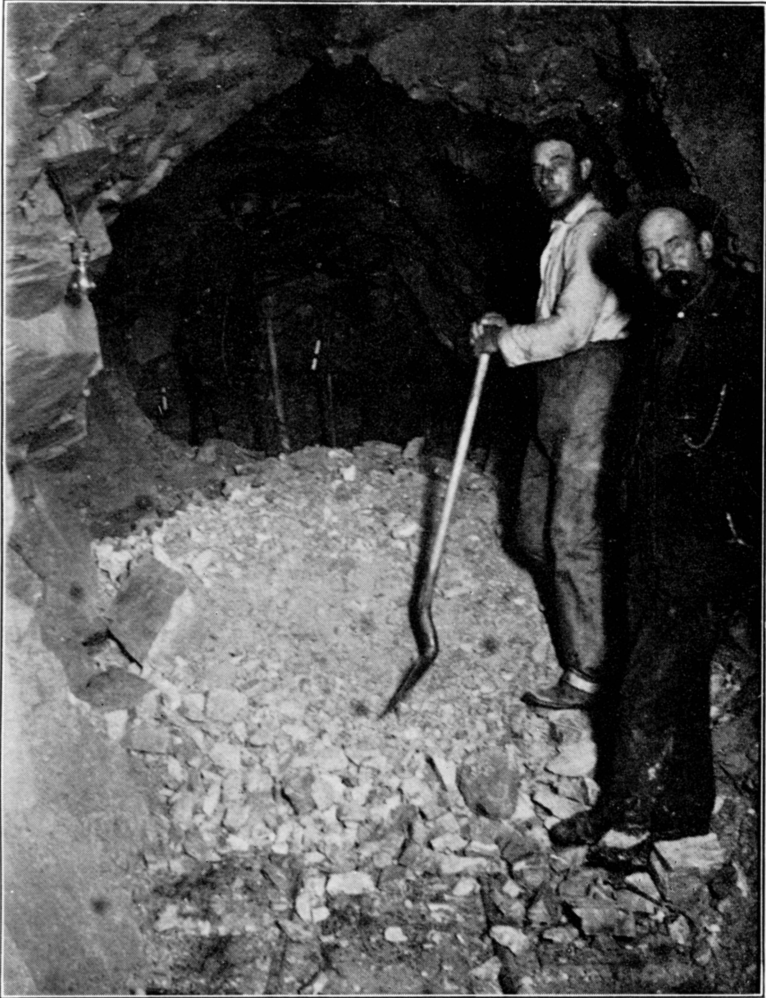
The ore of this vein is high-grade gray copper in a siliceous gangue and requires sorting, but well defined pay streaks of very clean mineral are encountered three to ten inches in width, that average 800 ounces silver per ton. The vein shows remarkable strength in the direction of its strike, and has been followed for fully 3,000 feet through the property and found to contain the same high grade silver mineral at almost every opening. A commodious camp equipment accompanies this quite extensive development, which represents a total outlay to date of \$125,000. The property is owned by a close corporation of eastern capitalists. Several shipments of ore have been made that returned results ranging from 400 to 1,600 ounces silver per ton. A force of twenty men is employed, under the management of James A. Brown, and the present condition of the mine warrants the anticipation of dividend results in the near future.

The B. F. & H. mine of this district is of the same type as the above, is owned by Mr. J. A. Evans, is rapidly developing into a young bonanza, and shipped two cars of high-grade ore during the past season that netted its fortunate owner \$12,000.

This property has paid its own way from its discovery and practically cost nothing but the results of one man's muscle and well directed energy. It has been quite extensively opened by shallow workings, and is now being developed by a cross-cut tunnel 700 feet long that is well under way, and will cut the vein 200 feet deep. Nine men are employed.



B. R. & B. MINE, BLACKTAIL, IDAHO. 1200-FOOT TUNNEL, ELECTRIC DRILL.



B. R. & B. MINE, BLACKTAIL, IDAHO. 1200-FOOT TUNNEL AFTER A BLAST.

The Mariposa is another promising property of the same type owned by the Wisconsin Mining and Development Company, and embraces a group of thirteen claims that carry 2,500 feet of development work, exposing a strong vein and numerous showings of high-grade ore. A new shoot of ore was encountered at this mine on November 11th, in the face of a 570-foot tunnel that gave a result of \$300 per ton in gold, silver and copper, across a three-foot breast of ore. The ores of this mine carry important values in gold as well as copper and silver.

The character of the ores, veins and formation of the Blacktail District very closely compare with the conditions found at the Skylark and Ramshorn mines of the Bayhorse District, Custer County, Idaho, which have been worked for over twenty years, developed 2,000 feet deep and produced over \$5,000,000 worth of silver bullion. There are many fine prospects in the Blacktail District that warrant exploitation and that the history of production in the southern camp mentioned will be repeated at Blacktail is more than probable.

A commendable enterprise is being inaugurated at Sand Point, Idaho, whose consummation will greatly stimulate the development of Kootenai County's extensive mineral resources, and deserves all possible encouragement.

This is the Pan Handle Smelting and Refining Company, who have made considerable progress towards the installation of a 200 ton custom smelter at this point which is very centrally located for such an enterprise, and ought to develop a good business as the immediately surrounding and tributary county to the north, south, east and west would afford a combination of ores that would make a very desirable smelting mixture, and the coal fields to the north around Fernie, B. C., could be drawn on for fuel.

The building for this plant, including ample ore bins, sampler and furnace rooms are all completed, and it is expected that the machinery will be installed and ready to blow in early next season.

Inter-related with the above Company, and under the same management, is the Pend d'Oreille Transportation and Development Company, whose steamboat barges, docks and warehouses already handle an important shipping

business, and one that is capable of being extensively increased. Another affiliated concern is the Pan Handle Development Company, organized for the purpose of buying mines and ore and the exploitation of a new town-site near Sand Point.

The assets of this last mentioned company consist of a fine water-power, equipped with a four by four foot flume 3,500 feet long, for carrying a volume of water to a drop or head of 270 feet. This is shortly to be equipped with an electric light and power plant capable of developing 300 horse-power at the lowest water stage. This company also own and are now developing some very promising mining properties; one of these, the Venezuela group of four claims, is situated near the Keep Cool and Weber mines, in the Lake View District at the south end of Lake Pend d'Oroille. They also own a thirty-foot vein of fine fluxing iron ore near the Lake.

The Venezuela group carries a wide fissured vein or zone, forty feet between walls, that samples sixteen ounces silver and \$1 gold per ton across its full width. The country rock of this district is limestone and quartzite. The Weber mine is a similar great zone of siliceous ore to the Venezuela that carries \$9 average values in gold and silver and is more extensively developed. This property has been subject to a close investigation and sampling by a well-known and capable expert who found the ore susceptible to treatment with the cyanide process and promising high results of extraction.

In sharp contrast with the Weber, the Keep Cool mine, on the same great vein or zone, and also extensively developed, carries a galena silver-lead concentrating ore of fair grade. The Lake View district contains some remarkably promising and extensive deposits of mineral and is likely, in time, to become a shipping point for a large tonnage of pay ore.

The Idaho Continental mine near the north end of Kootenai County shipped several hundred tons of high-grade lead ore to the smelters at Tacoma and East Helena during the past year. This Company was working a force of twenty men on development recently.

This property carries a monster fissure of fine concentrating lead-silver ore, thirty feet wide and 10 per cent in

value, accompanied by a pretty consistent pay streak twelve to thirty-six inches wide along one wall, of high-grade shipping mineral that averages about 60 per cent lead and thirty ounces silver. There are several other splendid properties of the same class, including the property of the Priest Lake Mining Company, now undergoing development just south of the Continental, and when the problem of transportation has been solved a very important new source of lead and silver ore will be opened up.

Some likely gold ore discoveries have been made during the past year at Pine Creek, eight miles north of Priest River Station on the Great Northern Railway, where the "Farmer Jones" Mining Company of Spokane have acquired and are now developing a promising group of claims carrying a system of fissure veins in a porphyritic country rock, that are from a few inches to two and three feet wide.

The development on these claims is very shallow as yet. One ore shoot 200 feet long is said to average \$20 per ton and recent development has produced some thin slabs of quartz, thickly sprinkled with plainly visible native gold. There are a number of other good prospects in this district that promise profitable results and are worthy of investigation.

In the Full Moon District near by the Bear Creek Gold Mining and Milling Company are working a small force of men and have a likely showing of mineral. Other prospects that hold out good promise of valuable ore development are the Camp Bird which has a fine vein of carbonate and galena silver-lead ore. The Big Casino, Little Casino and Tiger, the latter with 500 feet of development, show up well.

A little further west near the Idaho-Washington line the Flower mine carries a forty-foot vein of massive iron sulphide containing light values in gold, silver and copper.

Lincoln County.

Gold to the value of \$1,558 was mined in Lincoln County during the year from small sluicing operations along the Snake River Fine Gold Bars. The Snake River forms the south boundary line of this county for over eighty miles, and along the Lincoln County shore there may be found a number of examples of the fine float gold deposits, and under this head a discussion of the origin of these elusive colors may prove of interest. I herewith append two papers on the subject which have appeared in the columns of the Engineering and Mining Journal:

Origin of the Fine Gold in Snake River, Idaho.

It was the good fortune of the writer to have been selected by an eastern syndicate, in the summer of 1899, to investigate a certain region in the northwest corner of Wyoming, bounded approximately on the north by the Yellowstone National Park, on the east by the summit of the Rocky Mountains, on the south by Green River, and on the west by the Idaho State line.

This region embraces what is known as the Jackson Hole country, a portion of the Teton and Wind River Mountains, a greater portion of the Grand Canon of the Snake River, and many large streams which form the magnificent proportions of the Snake and Green Rivers, as they, with their crystalline contents debouch from the dome of the North American Continent.

The investigation was specifically called for to determine the truth of certain stories brought to the ears of the syndicate by vendors of fabulous riches in fine placer gold—"Snake River Gold" supposed to be contained in the sand and gravel of the above described country. Sixty days were spent with pack and saddle horses, a good guide and helpers, in covering most fully all parts of this remarkable and comparatively unknown region.

It was soon found that for enormous deposits of alluvial

matter, consisting of sand, gravel and boulders up to twenty pounds in weight, the region was certainly worthy of notice. Gravel deposits so extensive as to crown and envelop mountains more than 11,000 feet high (Mount Leidy), veritable mountains of gravel on which from base to summit no evidence of outcrop of any rock formation in or out of place can be seen; forming bars or mesas of terrace shape, miles in length and breadth, and of unknown thickness, with not a square foot of the original strata in sight. Gold was found anywhere, no matter if the gravel came from a mountain top or from extreme low water mark in some great river bed, even the very leaves of the sage brush, chicos and bunch grass, would show in the pan the inevitable color of fine, brassy gold, so light that a fraction of a second exposure to the air would cause it, at the next touch of water, to mount and float away like an elusive spectre. Further research showed the bars that carried the most sand had the most gold; bed-rock where found was no richer than the top layer of gravel and repeated holes sunk failed to find more compact conditions with depth. Where the streams had by their classified action formed bars of limited extent, consisting exclusively of fine sand, the most gold was found; either in the stream beds of today or in similar bars, at a higher level, formed in pre-historic times. These last facts are fully recognized by the prospector of the land, and he is far too wise to put in any of his time digging for gold in the larger unclassified bars. Some of these fine sand bars were found that would have paid to work on a small scale, but no great wages would have resulted. About 200,000 colors of the average gold seen would weigh a dollar, the best of the fine sand bars would contain 2,000 colors to the pan, and the average pan taken from the great mass of the wash would contain eight or ten colors. It was observed in the higher portion of the region, the colors often bore a more rough, angular appearance than those down in the lower levels, and in many of them the peculiar sulphuretted, submetallic glow, that gold exhibits when just released from its combinations with some form of iron, was plainly noticeable. Examination of the boulders revealed in many instances not only small particles of finely divided pyrite as yet

unoxidized, but also many pre-existing pyrites fully reduced to oxide form. The boulders containing the pyrite were apparently of igneous origin, the nature of which was difficult to determine by the eye, but probably a lavitic rock of a semi-basic andestic composition, in which the feldspar had been partially replaced by auriferous pyrites.

A careful lookout was kept to discover this formation in place, and although several hundred miles were traversed, none similar to the auriferous boulders could be found. A lavitic rock, capping the continental divide, just north of the Wind River range was found in a great flow, but it was of a character known as basalt, and of an exceedingly basic vitreous type.

All the wash bears indication of intense attrition, rounded and smoothed to a perfect finish. It seems evident that an old shore line, probably to the north and east of considerable extent, but now obliterated in this region, had existed; a prominent rock of which was of volcanic origin and that during some period it had been impregnated by replacement action, with gold bearing pyrites, rendering it susceptible to rapid disintegration. There were also evidences of periods of mountain building, faults were seen showing thousands of feet of displacement in strata, alternating with profound glacial activity, followed on the retreat of the latter by great floods of rushing, seething torrents, which formed no doubt numerous large inland seas of fresh water, a period of rest, and subsequently a gradual continental emergence as it exists today.

Hypothetical deductions from the foregoing premises as to the origin of Snake River gold are as follows:

1. The presence of volcanic boulders charged with auriferous pyrites accounts for the primary source of the gold, and the fine grained pyrite accounts for the minute size of the gold colors.

2. Sulphretted, angular conditions of many of the extremely fine colors of gold indicates proximity to their original home, as seen up near the Continental Divide; whereas the majority of those down in the Snake River plains show a more battered, nugget-like appearance, indicating they have traveled far, and the mountain masses

of gravel indicate remnants of former immense glacial moraines.

3. The great glacial activity accounts for the enormous accumulations of wash.

4. Torrential action accounts for the smooth, elliptical form of the boulders near the mountain top, where the lake seas could not reach them. Eddying, swirling action accounts for the deposits of the fine, workable auriferous sand bars.

5. The intensity of all this hydraulic activity, aided by great uplifts and subsidences, accounts for the widespread extent of the gold-bearing gravel, found from the region specified, down Snake River for several hundred miles, to a lesser extent down the Green River, and to a still lesser extent down the Wind and Yellowstone Rivers, all debouching from the same dome-like center.

6. Atmospheric action, subaerial decay and other agencies acting upon the gravel mass have oxidized the pyrite and hence released the gold, and as these processes are continually going on, the gravel supply inexhaustible, certain bars, with every annual flood are enriched to some extent.

7. The great deposits of wash now to be seen in Jackson Hole, a country 3,000 miles in area, and on the head of Hoback River, which empties into the head of the Grand Canon on the Snake just below Jackson Hole, have no doubt in the past been of much greater bulk, all of which were transferred by the action of water to its present location many miles down the Snake River. The gold-bearing formation was more tributary to the Snake River watershed than to the other large rivers heading in the region, as evidenced by the richer gold contents of the Snake River gravel, although the other rivers carried more or less similar fine gold.

By J. H. SHOCKLEY,

Second Paper.

Engineering and Mining Journal, Feb. 22, 1902.

The origin of the fine gold of Snake River has been a subject of much speculation for years, and has entirely baffled the theories and researches of the ordinary prospector, who has traced it from the mouth of the river to its very source, only to find, contrary to the experience of almost all other placer fields, that the same uniform fine-

ness and filmy conditions of the delicate colors prevail throughout.

One of the most plausible theories that have been suggested touching the origin of this extensive distribution of the precious metal was advanced by Captain N. L. Turner, a West Point man, who spent considerable time investigating the problem in the early eighties. Captain Turner advanced the theory that the gold was originally held in solution by the waters of a great inland sea or lake that occupied the Snake River Valley subsequent to the Miocene period and that the gradual and repeated evaporation of this great body of water by subsequent lava flows resulted in the precipitation of its metallic contents, generally and evenly over its basin area. This theory would seem to account for the uniform size and quality of the golden colors so generally disseminated throughout the enormous acreage of fine gravel beds through which the Snake River now courses.

The geological record of the rocks left along the borders of this stream, and in the Grand Canon below Weiser, offer conclusive evidence of a land-locked body of water that covered the whole valley and that probably exceeded Lake Bonneville in depth and areal extent at some of its higher levels. This great body of water, which might aptly be called Lake Idaho, for the purpose of this article, was created by the closing of the lower valley by a great dam of brown Columbia lava 6,500 feet high, now plainly exposed by erosion. Its highest level is indicated by a stretch of conformable shoreline conglomerate gravel, along the west side of Wood River near Hailey and numerous other points, at an altitude of 6,000 feet. At this level the water of Lake Idaho must have extended along the present course of the valley from below Weiser to the foot of the main range, and covered a distance of fully 500 miles in length by 150 miles in breadth and over 4,000 feet deep at its deepest point.

This lake suffered numerous and extensive variations of level during the later Tertiary periods. Some of the more recent horizons are still exposed at Pocatello, where on either side of the Portneuf Estuary, in plain sight from the depot, well defined benches or terraces of shore-line gravel are left exposed 100 feet high above the town; and a succession of low step terraces of lake shore gravel, cut by

the main track of the Oregon Short Line Railway between Pocatello and American Falls, plainly indicate the rapid recession of the lake levels of this period, and its final drainage and complete obliteration by the erosion of the Snake River channel to its present level.

These varying lake levels are well established throughout the valley within a vertical range of 4,000 feet, and are now represented by the beds of conglomerate gravel alternating with great flows of black basaltic lava of more recent date. Most of these conglomerate deposits are gold bearing and their sub-aerial disintegration and erosion by recent stream action is doubtless responsible for the immediate source of the fine float colors, now so generally distributed through the loose gravel and silt of the present river channel and its wide flat bars.

Prior to the inception of the great floods of black lava that have filled the valley, the shore lines and basin area of Lake Idaho were almost all composed of granite and Palaeozoic formations. These formations were rich in placer and quartz gold, as proven by the higher slopes of the present drainage basin, and by the number of island summits of those formations that have been left exposed above the sombre lava floods. The chemical reactions set up by this combination of conditions and events would readily account for the aqueous origin of the gold, and it seems to me altogether probable that Captain Turner's theory is correct.

The quality of Snake River gold is high, and when properly cleaned mints for \$19.35 per ounce. The colors are not only fine, running from 1,000 to 2,000 to the cent in value, but they are also flakey in shape, and are washed down stream with every summer flood, enriching the low, shifting bars at every short bend in the stream where a favorable condition for their concentration is presented. Bedrock is not important to the deposition of the values. In the high banks of loose gravel that border the stream, as well as in the low bars and flood planes, the richest values are represented by thin lines of gray silt and calcareous sediment. These lines of enrichment represent flood periods. They are usually from a few inches to one foot or more in thickness, and one foot to ten feet apart. The intervening space all carries gold, but much more sparingly.

Subjected to microscopic examination many of the colors show rounded edges and a concave or cupshaped depression in their flat surface, and quite a proportion of them are coated with a sugary incrustation of silica or some other substance, which involves the necessity of scouring them in a clean-up barrel or an arrastra pan before they will unite freely with mercury. Under a sharp focus of the microscope all the colors show a delicate lace-like tracey of fine brown lines, that suggest chemical reaction. The particles were probably precipitated from their original watery solution as chloride or bromide of gold and afterward transmitted to metallic by natural process.

Aside from the above characteristics, under a powerful glass the fine particles reveal the natural yellow color and worn, knotted appearance of high grade gold nuggets. The only natural alloy that government assay office at Boise, Idaho, accounts for on shipments of Snake River bullion is a small amount of silver, and as the fineness of the bullion after deducting the silver does not exceed 950 there still remains considerable room for other natural alloys, which it is not unlikely may be in part made up by platinum or iridium. In fact, a gray-white metal in impalpably fine particles has been noticed at several points along Snake River. This is supposed to be one or the other of the rare metals above mentioned.

A series of analyses of concentrates and bullion from different points along the stream are being made by the writer at the present time and should they prove to contain an appreciable amount of either platinum or iridium, the fact will lend an added incentive to the recovery of Snake River fine gold.

By ENGINEERING AND MINING JOURNAL.
December 30, 1901.

Latah County.

Latah County bears an important relation to the future development of the mining industry of Idaho, in the fact that the State University and School of Mines are located at Moscow, its beautiful County seat.

The University comprises the College of Letters and Sciences, the College of Agriculture, and the School of Mines.

During the year of 1896-97, the enrollment in the Department of Mining and Metallurgy was about one-twenty-fifth of the total enrollment in all the affiliated colleges of the University. The growth and the progress of this department have been such that during the year of 1902-03 the enrollment in the Department of Mining and Metallurgy reached one-fourth of the total enrollment of collegiate students in the University.

This department embraces the departments of mining engineering, metallurgy, geology and mineralogy. The work in this department, together with the work in mathematics, physics, chemistry, surveying, engineering (mechanical, electrical and civil), which is prerequisite to this work, leads to the degree of bachelor of mining engineering. The department aims to give the student the theoretical and the practical instruction which constitute the groundwork for his professional career. The best proof of the efficient training received in this department is the fact that the graduates have taken responsible positions immediately after graduation, and have proved themselves capable to do the work.

The department occupies nine rooms in the new School of Mines building. The fire assay room is supplied with coal and hydro-carbon furnaces; the crushing room with hand and power crushers; the wet assay room with desks supplied with sinks, water, gas, reagents, a leaching plant and a small cyanide plant; the geological laboratory contains tables and apparatus for determinative work in mineralogy, collections of minerals, rocks and fossils; the library room contains the best books on mining, metallurgy and geology, and the leading mining, metallurgical and geological journals are received.

The legislature, which meets in January, 1905. will be asked to appropriate \$35,000 for a metallurgical laboratory and the equipment of the same. This amount will enable the authorities to erect a building and install sufficient machinery to illustrate the physical laws of mineral separation, and the principles underlying the different metallurgical processes, and to make small quantitative tests. It would also give facilities for original investigation.

The legislature can make no mistake in giving this branch of our State University the financial support asked for. Its purpose is strictly in line with the advancement of our primary industry and will prove a potent factor in bringing it to a condition of first importance.

The additional equipment needed would broaden the opportunities of our young men in a line of study that holds out the finest inducements for success and promise of remuneration.

Chemical and metallurgical problems are the bane of many of our most extensive ore resources today, whose solution would have an important bearing on the general welfare and upbuilding of our State. These resources would afford a fertile field for original investigation.

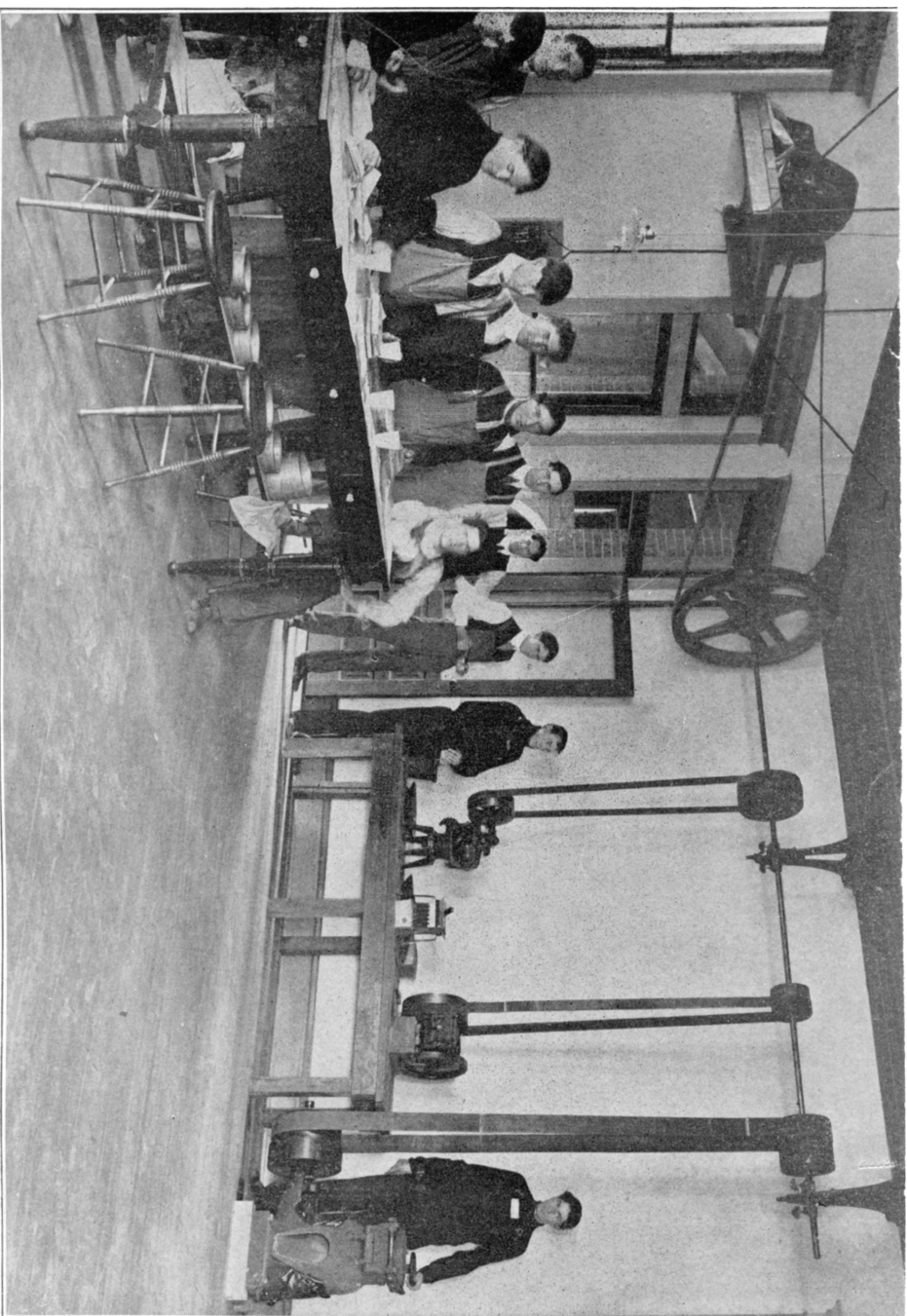
For instance: A cheap chemical method of extraction of copper and silver from a simple copper carbonate ore in a straight silica gangue stands between the success and failure of one of the largest copper ore deposits in the State—between an otherwise barren mountain camp and a prosperous community of 2,000 people or so.

To turn loose a class of earnest, native born young men, imbued with a pride in the mineral resources of their State and systematically trained in this particular line of thought could not help but prove a powerful factor for the general good of the State.

Latah County is one of the richest agricultural Counties in the State, and is situated in the Columbia plateau region, within the humid zone where bountiful crops are raised without irrigation. The climate is mild and healthy and Moscow one of the prettiest little cities in the State. This County also, contains a variety of mineral resources including some fine placer ground in the Hoodoo district, which with a small head of water running a few



CORNER IN THE FIRE ASSAY ROOM, STATE SCHOOL OF MINES, MOSCOW.



CORNER IN THE CRUSHING AND FLUXING ROOM, STATE SCHOOL OF MINES, MOSCOW.

days in the spring, yielded \$2,000 worth of precious dust during 1904.

At the Blackfoot Mining District there is a copper vein in granite, twelve feet wide, developed with a 280 foot shaft, and several hundred feet of drifting that carries a hundred pounds of copper bullion per ton, together with some gold and silver, also a small paystreak on one wall that runs from \$50 to \$70 per ton in combined values. Some of the most extensive deposits of mica in the United States occur in this County, which when some present title affairs are adjusted, are likely to bring the County into prominence in the production of this useful mineral.

Lemhi County.

Twenty years ago, when the present great lead bonanzas of the Couer d'Alenes were in the embryotic process of being discovered and recognized, Idaho had already attained great prominence in the lead markets of the United States, by the remarkable output of lead ore from the famous Viola mine, in Lemhi County.

During the five years subsequent to its discovery in 1882 the Viola mine in Nicholia, sixty-five miles west of Dubois, a station on the Butte branch of the Oregon Short Line railway, was shipping the equivalent of 20,000 tons of lead ore a year, containing an average value of 60 per cent lead and twelve ounces silver per ton, which was all clean sand carbonate ore, derived from a single monster body of mineral, in shaly blue lime, near a quartzite contact that was 1,000 feet long, and from one to seventy feet thick, and went down on a flat dip of about twelve of fifteen degrees for 200 feet, where it terminated in a body of soft, brown iron-oxide gangue, fifty feet thick, containing light values in lead.

During the period of the Viola's active production, the Texas-Spring Mountain Districts, covering fifteen miles of the slopes of a lofty range of mountains, that form the opposite side of the broad Birch Creek Valley from Nicholia, were discovered, and a hundred promising claims were

located, and probably two dozen of them made shipments ranging from a wagon load to several carloads of high-grade lead-silver, silver-lead and rich dry silver ore.

These prospects were pecked at for several years, but no serious amount of intelligent development work was done on any of them, and with the sudden exhaustion of the Viola, and the low price of lead under the Cleveland administration, interest in this district waned, and a majority of the claims were abandoned. A group of these old claims were purchased two years ago by F. G. Lauer of Dubois, Pa., for himself and two associates, who still own the property under the name of the Gilmore Mining Company, and also have acquired and control an extensive tract of fine mineral territory, adjoining the original purchase.

The original group of five claims, which was purchased for a trifling sum, has been cautiously developed under the personal management of Mr. Lauer, and the result of this work has disclosed what appears to be the making of one of the most important lead-silver ore bodies in the State.

Mr. Lauer's previous mining experience was practically nil, and amounted to a brief visit to the Tintic Mining District in Utah, where he had invested some money in the stock of one of the well-known lead-silver mines of that camp.

While not a miner, Mr. Lauer is a shrewd, close observer and man of affairs, with a wide experience in eastern railway and manufacturing enterprises. He took in the Tintic District, both at the surface and under-ground, with wide open eyes, and when his attention was called to the Texas District by an itinerant promoter in Salt Lake City he was able, after getting on the ground, to recognize a closely parallel series of limestone quartzites and eruptives, to those he had seen in the famous Utah District, and found associated with them a far superior array of surface evidences of veins and ore deposits, with the result of the purchase above referred to.

Before undertaking the development of the property, Mr. Lauer took the wise precaution of calling in the services of an experienced mining engineer, to examine and report on the ground, and devise the best method of attack, with the result that a cross-cut tunnel was decided on, to be run 300 feet, with a view of tapping the vein, on

whose shallow surface showing of mineral the purchase was made, at a depth of something under 200 feet.

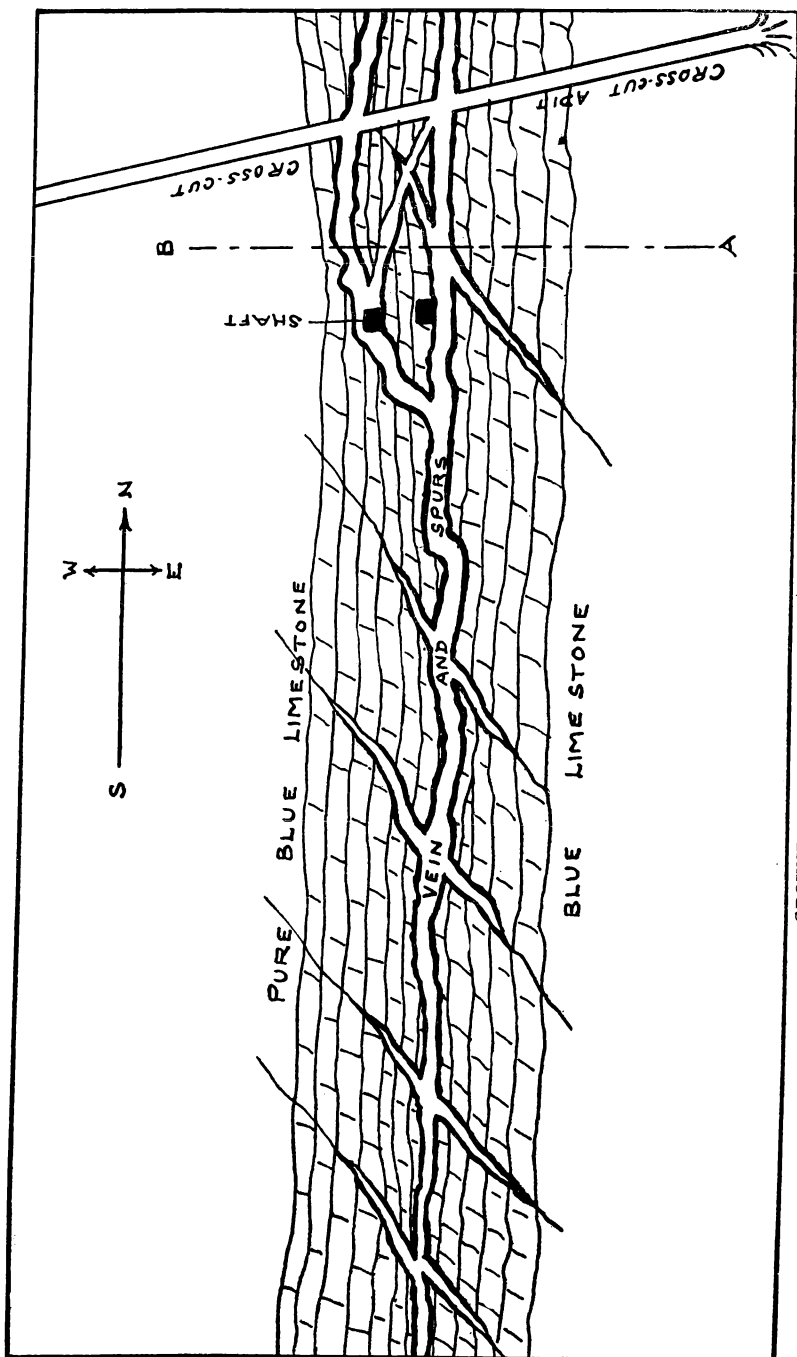
At a point ninety feet in from the portal of this cross-cut a blind vein was struck and has since developed all the ear marks of a vertiable bonanza.

A drift has since been carried along the course of this blind vein to the south for 400 feet, which proved to have a continuous pay shoot of shipping ore, all the way, varying in width from one to five feet, with a succession of lateral fractures or feeders, whose junction with the vein usually formed an enlargement of the ore body (see diagrammatic ground plan at adit level, and vertical cross section, Gilmore mine, illustrating the vein structure and ore occurrences here described). One of these spurs was followed out into the hanging wall to the southwest, and carried a wider body of ore than the main vein.

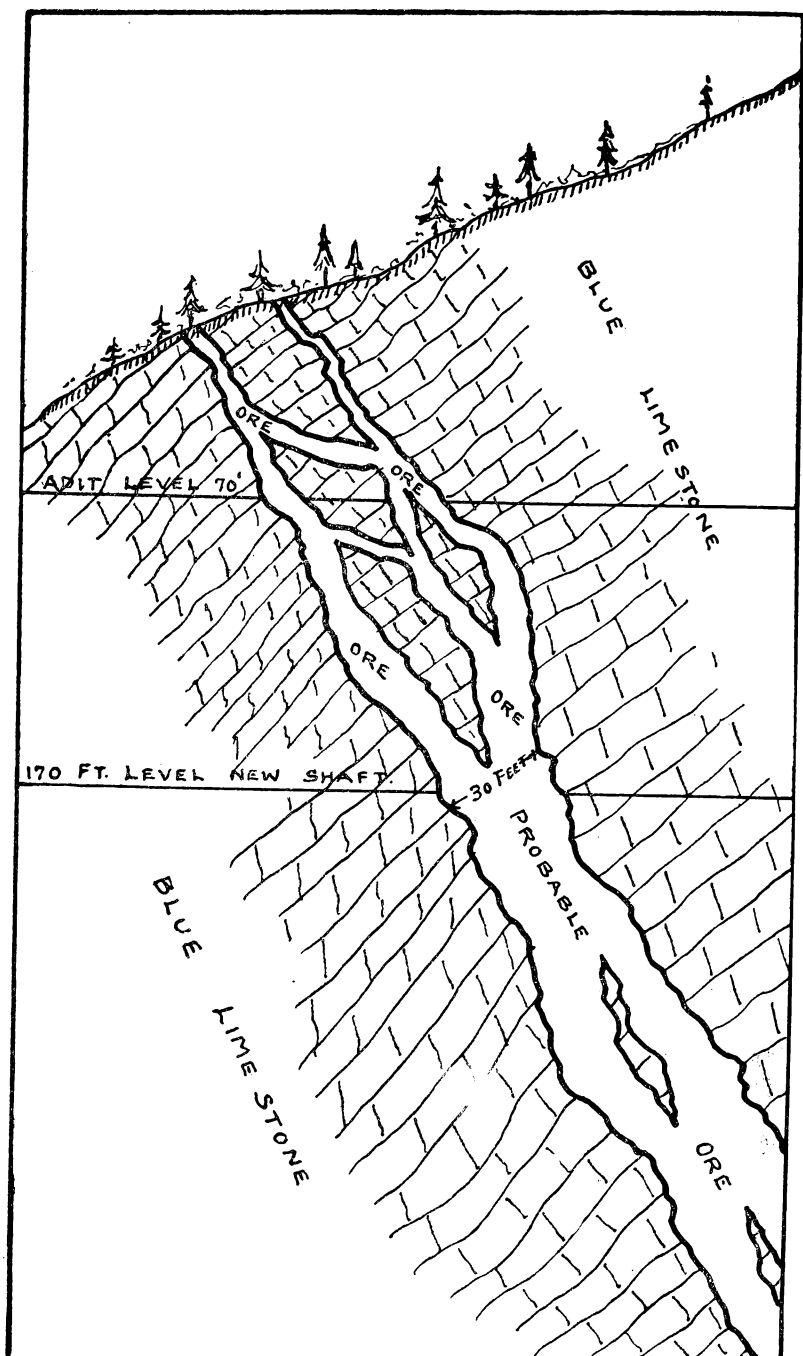
A raise was put up near the center of this ore shoot, and followed a good body of continuous shipping ore to its apex, which was found to be covered with a few feet of surface soil and debris. This raise broke through at a point on the mountain side seventy feet above the level, where one of the old time prospectors had leveled off a place for a bed, the shallow hole still containing the withered fir boughs he had lain on.

During the summer of 1903 this fine showing of mineral was neglected for the purpose of attending to the acquisition of new territory and other surface work, and only seventeen cars of ore were shipped. During the summer of 1904, the development work on this vein was also very limited, and amounted to sinking a fifty-foot incline and vertical shaft, 100 feet deep below the tunnel level. Also a short drift at the bottom of the incline.

From this limited development and a trifling amount of stoping, the Gilmore mine shipped during the season of 1904, 2,000 tons of crude ore, without preliminary dressing, that averaged 45 per cent lead and twenty-two ounces of silver per ton. This ore is an ideal smelting mixture, consisting of almost straight carbonate of lead, and soft brown oxide of iron, high in iron and very low in sulphur, silica and zinc; it is desirable and in good demand by the smelters for its fluxing effect on more refractory mixtures.



GROUND PLAN, GILMORE VEIN, 70-FOOT LEVEL.



VERTICAL CROSS SECTION, GILMORE VEIN ON LINE A-B.

The vein is a true fissure in blue limestone wall rocks, and the ore a replacement of the limestone, which in consequence appears rough and irregular when the ore is removed, but in places is locally smooth and slickensided, showing distinct vertical and diagonal scratches, or striation marks that indicate movement in two directions, also indicating in connection with the great length of the vein at the surface, a very profound and deep-seated fissure.

The complex of veins and spurs of ore and their intervening bodies of lime in the vicinity of the two shafts or winzes rapidly changes below the level, and the proportion of ore has materially expanded at a fifty foot station below the cross-cut level, where a drift has been extended seventy feet, all in big ore; at the 100 foot station the intervening limestone has been entirely dissolved out and replaced with a body of clean, shipping mineral, thirty feet wide at right angles to the strike. While this remarkable showing of rich mineral may prove to be a local chamber or swell, the conditions are exceptionally favorable for it to prove the inception of a monster shoot of the Viola type, with the advantage of standing nearly on end in the formation.

The property is undergoing quite extensive development this winter, and should make a fine shipping record during 1905. The ore is hauled by wagons to the nearest railway point, which is Dubois, eighty-five miles distant, but over one of the finest natural roads in the world. The cost of this wagon haul is \$10 per ton, and a ton to the animal is the normal load; there is not a single hill on the road from the mine to the railway, and the 1,500 feet difference in elevation is so evenly distributed and gradual that the grade is not noticeable on the return trip.

The camp of Gilmore is situated in a prettily timbered horseshoe-shaped cove, near the foot of the main mountain uplift that towers to elevations of 10,000 to 11,000 feet above sea level behind it to the southwest.

These mountains are built up of deeply fractured and faulted masses of quartzite, limestone, dolomite and eruptives, and in spite of their lofty elevations and deep snows, aside from occasional small springs, carry no flowing surface creek, but form a desert range of the Great Basin type for forty miles to the southeast, where they suddenly

terminate as low "hog-backs," in the Snake River desert. This structural peculiarity would indicate that the desirable oxidized condition of the ores of this district will be maintained to very considerable depth.

A postoffice has been established at Gilmore, and quite an array of substantial buildings erected, including a well-stocked general store. Water has been brought in from a nearby spring gulch; several other properties are being developed in the near vicinity that give the place quite an appearance of thrift and permanency, which, together with its accessibility and grand surroundings of mountain and valley landscapes, forms a healthy and desirable place to live.

There are quite a number of small development operations in progress at the present time, along the range east and west of Gilmore, and during the past year, ore shipments of from one to four cars were made from half a dozen different properties.

The Silver Moon and Murphy veins, three miles east of Gilmore, carry high grade silver ore in limestone fissures, and are of very considerable promise; the former has a snipping record of \$50,000 from shallow workings done in the early days of the camp; considerable of the ore from this mine ran several hundred ounces per ton in silver.

The Winnie mine at Spring Mountain Gulch, ten miles east of Gilmore, is developed 200 feet deep, and has a very handsome showing of mineral under conditions that promise considerable extent. This mine has shipped a number of cars of rich lead-silver ore within the past two years, and one of these shipments returned \$8 per ton gold, in addition the lead and silver it contained.

Three miles west of Gilmore, the Hughes mine produces good gold values, in addition to high results in lead-silver, and has shipped considerable ore. The Grooms Democrat mine, just below the Hughes in the low foot-hills, has an extensive surface blossom of lead-bearing gangue minerals, including some streaks of very high-grade lead-carbonate ore, which, while low in silver, presents conditions that promise to lead to large bodies of high-grade ore at depth.

The McClellan-Stevens claims, a short distance above the Democrat, have a strong, well mineralized vein, and every promise of developing some very valuable ore shoots.

These claims, from shallow, surface gouging, produced some important shipments of ore during the early days, that were high-grade in both silver and lead and are locally very highly thought of.

The whole mineral belt along which these properties are located, contains numerous fine openings for the investment of capital for development work, and is attracting a good deal of attention at the present time. The Gilmore mine has set the pace for a very important and productive district, which is likely to furnish a succession of rich strikes, if comparative surface evidences of mineral are any guide.

Lemhi County mineral resources are varied, and embrace extensive districts, rich in gold and copper resources, as well as lead-silver, and its lack of railway transportation facilities is the only obstacle that stands in the way of an extensive mineral development.

The placer gold resources of this county have maintained an important annual output of gold since 1867, and while many of the old diggings are exhausted, they are being gradually supplanted with quartz gold discoveries.

In the Ulysses mine, owned by the Kittie Burton Gold Mining Company, and situated at Indian Creek, north of Salmon City, Lemhi County has the distinction of containing the largest producer of any mine in the State worked exclusively for its gold value.

This property has extensive reserves of \$10 free gold ore, and according to late information some large bodies of much better grade have recently been struck in one of its outlying claims. The equipment of this mine consists of a modern thirty-stamp mill, which has been run steadily during the year, and furnished dividends of 3 per cent a month on a large capitalization.

A recent telegram from Shoup reports the discovery of a rich body of ore in the lower workings of the old Grunter mine, which is being developed under bond by some officials of the A. S. R. Trust.

This property produced about \$50,000 worth of gold from some shallow surface cuts on great bodies of good milling ore, nearly twenty years ago, but its career was cut short and badly butchered up by poor management. It is gratifying to know that it has fallen into such strong hands, as it is one of the most meritorious gold deposits



1,500 TONS OF CRUDE LEAD-SILVER ORE. 50 PER CENT LEAD, 25 OUNCES SILVER PER TON.
GILMORE MINE, GILMORE, IDAHO.

in the County, and likely to become an important producer again.

Some recent discoveries of rich gold ore are reported from the Middle Fork of Salmon River, in the vicinity of Wilson Creek, only a few miles east of Thunder Mountain, and it is possible that the small shipment of bonanza ore, marketed at Hailey, that was referred to under "Custer County," may have come from this locality. The writer has personally visited this district, and can say that it is a likely one, and that the formations and conditions are very favorable there for such a strike.

Several new gold mining enterprises were lately inaugurated in the vicinity of Yellow Jacket that promise profitable results, and the Singiser mine, a few miles south of Yellow Jacket, has been taken over by a new company. This property carries high-grade, gold-silver milling ore in an igneous formation, in which bonanza values are likely to be encountered, as this deposit is of the same character as some of the Custer County and Owyhee County mines which have produced some great dividends. The Ramey mine, near the Singiser, is another of the same class of deposits and contains some very high values.

At the old placer district of Leesburg Basin, considerable lode mining development has been in progress during the year, the most notable undertaking being the driving of an 1,100-foot cross-cut tunnel at the Haidee mine. In the progress of this work the tunnel has passed through a zone of altered granite ninety feet wide, containing a net-work of small seams of rich ore, and it is estimated that the whole width of the ninety foot zone will yield average values of \$4 per ton in gold.

At the Little Chief mine, just below the Haidee, a pay streak of fine milling ore, two and a half feet wide was discovered during the year. Below the Little Chief on the same creek, the Bitter Root Mining Company, who own the old Italian mine, have erected a hoist and have done considerable development work, and a strike of rich ore has recently been reported from the Bringham mine adjoining the property of the Bitter Root Company.

One of the best developed quartz veins of this basin is the Gold Flint, near the town of Leesburg. The development of this property has been handled for several years by Hon. O. E. Kirkpatrick, a member of the present Idaho legislature, from Lemhi County, who reports the recent

discovery of a body of ore, four and a half feet wide, from which a careful average sample returned gold at the rate of \$15.70 per ton.

The Gold Flint has adit tunnels, shafts and cross-cuts, totaling 2,000 feet in length, and exposing a well-defined contact vein in walls of granite and syenite that is twenty-five feet wide and carries a strata of high-grade ore traversing the center of the vein that is five feet wide. There is a big tonnage of pay ore blocked out in this property, and it warrants a mill equipment of considerable capacity.

Six miles below Salmon City, the Queen of the Hills mine is undergoing an extensive plan of development in the shape of a deep cross-cut tunnel that is to be 900 feet long, and has already been driven 600 feet, and is designed to tap the main vein of this property at considerable depth below some extensive shaft development work.

This tunnel will drain the mine, dispense with the cost of pumping and hoisting, and greatly facilitate the operation and further development of the mine in every way. This mine is opened on a powerful fissure vein in granite; it has large reserves of ore in sight, has been reported on by several well-known experts, and is considered to have a very promising future. Hon. R. W. McBride, representing Lemhi County in the upper house of the present Idaho legislature, is one of the principal owners of this property.

Oneida County.

The sum of Oneida County's mining production reported during the year 1904, was gold to the amount of 261 fine ounces and was probably all derived from the fine gold diggings of the Snake River.

Owyhee County.

Owyhee County continues to lead every county in the State in the matter of gold production and its two reliable old bonanzas, the Trade Dollar Consolidated and Delamar mines, while not saying much, continue to grind out gold and silver in a manner quite gratifying to their stockholders, and persistently refuses to die the death of exhaustion so freely predicted for them two or three years ago. Not only that, but under capable, up-to-date management, they have both been made to yield a far better grade of ore and larger profits during 1904 than for several years previous, and their present extensive plans of development that are being carried on, together with the great output they are making, are revealing indications of other ore bodies that may lead to the discovery of the same bonanza values that characterized their early history.

The persistent staying qualities of the Trade Dollar and Delmar mines have greatly revived faith in the many other unproven mining possibilities of rich promise for which the old district is noted, and this revival of interest is reflected in the improved business tone of Silver City.

Silver City, the county seat of Owyhee County, is situated on Jordan creek, immediately surrounded by the rugged peaks of the Owyhee range, and within gunshot of half a dozen old veins whose combined production has enriched the commerce of the world with precious bullion to the gross value of \$40,000,000.

Silver City is an old, established town well built up, contains two good hotels, a bank, several well-stocked general stores, schools and churches, etc. It enjoys a good trade from and is the natural business center for the extensive and rich mineral territory that immediately surrounds it. A well managed daily stage and mail service connects this place with Murphy, the terminus of the Boise, Nampa and Owyhee Railway, which make the town and district easily accessible all the year around and not an undesirable place to live.

The most important mining revival of the year is that

in connection with the further extension of the Sinker tunnel and development of the War Eagle Mountain mines immediately adjacent to Silver City.

This deep tunnel enterprise suspended operation over two years ago on account of financial difficulties after the great bore had been driven in under War Eagle Mountain nearly a mile and a quarter, where the main vein of the War Eagle fissure system was tapped at a depth of over 2,100 feet, and over 800 feet below the lowest point of development on the noted old mines that have been worked by shafts from above, and have a record of bullion production, chiefly gold, amounting to \$20,000,000.

When this big tunnel struck this main vein it was found to contain bunches of very rich gold ore, but the operation was suspended before connection had been made with the bottom of the works above, and before this deep horizon had been given half a chance to prove its ore-bearing possibilities.

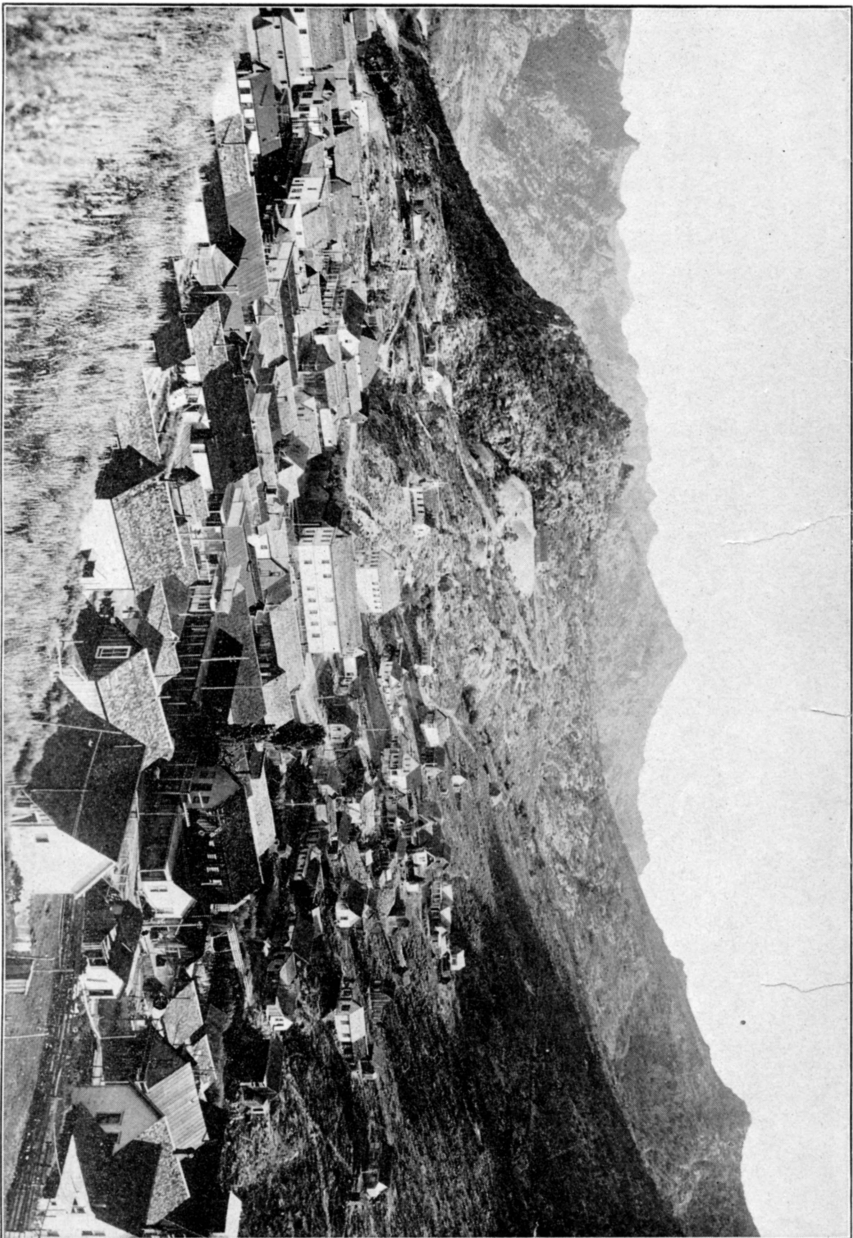
The old bonanzas above, whose operation ceased years ago, are known to contain extensive reserves of ore that may be drained and made available by the completion of this work and should yield very handsome profits under modern methods of treatment.

Old-time miners of the district, familiar with the lower workings of the old mines, are enthusiastic over the resumption of this great enterprise and the mining and business revival it is likely to bring to Silver City and Owyhee County.

Work was resumed last September on the Cumberland mine on War Eagle Mountain. This property changed hands during the summer, and was taken over by the Pioneer Mines Company of Cohoes, New York.

The Cumberland is a well-known property. It is located close in and adjoining some of the richest producers on the mountain; it has been idle for about three years and was formerly over-capitalized, equipped and handled in a very extravagant manner, all out of proportion to its size; it has now passed into the hands of a capable and conservative management, and is likely to prove a winner, as it already has considerable development and a good mill.

Twenty men were put to work on this property last



SILVER CITY, COUNTY SEAT OF OWYHEE COUNTY.

September, the mill was run for fifteen days during November for the purpose of making some tests and produced over \$4,000 worth of bullion. It is the intention of the company to supply the plant with electric power next season, and in the meantime to keep a small force of men at work excavating ore and exploring the different ore shoots that are already proven to exist in the mine.

The Lucky Friday mine, situated 3,000 feet southwest of the Cumberland, is one of the promising properties of this part of the district and gives strong evidences of future profits for a reasonable capital investment. This property has considerable development on a strong fissure vein six to ten feet wide that contains average values of \$8 to \$12 per ton, and a class of ore that ought to yield a high percentage of its values by the cheap cyanide treatment.

The California mine on War Eagle Mountain is another proposition of much merit and has recently been equipped with a 16-horse power gasoline hoist, has a good showing of ore containing some of the characteristic, rich values of the mountain; it is being developed this winter and stands a bright chance of furnishing an interesting news item in the way of a "rich strike" in the near future.

At the Addie mine a five-stamp mill was in operation during part of the year, on ore from the company's property, and also treated some custom ore. The Addie group is being developed through a long tunnel through which several prominent veins that traverse the property can be explored to advantage.

The Dernier Resort mine, owned by Robert Southern, is opened by a tunnel 400 feet long and shows a strong vein of good milling ore.

The Sinker Tunnel Company own a string of the principal old producers on War Eagle Mountain, from which the great output of \$20,000,000 was made in the early days of this district that were developed as deep as 1,300 feet by shafts.

The character of the ores produced by these mines were simple siliceous milling ores, containing a finely disseminated native gold-silver alloy, and nearly free from the usual accessory metallic minerals.

The values of these ores ranged from \$50 to \$500 per ton for milling ore, and from 25 cents to \$5.00 a pound

for shipping ore, and a very considerable amount of the shipping class was produced.

The discovery of other bodies of this bonanza class of ore at the deep level of the Sinker tunnel is not improbable, which together with its other prospects of profit affords an attractive and justifiable speculative investment.

The ores and formations of Silver City District, and other districts in Owyhee County belong to the same geological division and mode of origin as do the noted producers of the Nevada country to the south, of which they practically form a part, and contain the elements that may at any time again, as they have in the past, lead to the same sensational disclosures of bonanza ore that are bringing such fame to the Nevada camps at the present time.

There are several places in the vicinity of Silver City and Delamar where, high up on the mountains, float ore of fabulous richness has been found, indicating other original sources of bonanza ore besides those already known and worked. These discoveries, however, are, in some instances, on old acquired territory, whose owners are not able or willing to develop them. Their position and the conditions under which they occur, however, are a practical guarantee that the rich virgin ore resources of Owyhee have by no means all been exhausted.

Shoshone County.

The year's record of mining development in the great lead-silver districts of the Coeur d'Alenes has been one of steady progression of new discoveries and expanding ore resources, and a new high record of production has been established, exceeding that of 1903 by 745,272 ounces of silver, and 3,019,000 pounds of lead, with net earnings approximating \$2,800,000.

The production of the first six months of 1904 was unprecedented, and had it not been for the unusually dry weather conditions prevailing during the second half of the year, which seriously hampered milling facilities, the

increased production would have made a most remarkable showing. Several important mines have recently advanced to a condition of profitable production, and will enter the shipping list during the coming year, and if present metal prices and favorable business conditions prevail, a very prosperous year and greatly increased metal production may be anticipated for 1905.

The monster bodies of high-grade lead ore disclosed in the lowest level of the Bunker Hill and Sullivan mine, and the magnificent dividends they are affording, and promise for the future has been one of the features of the past year. Also, a potent indicator of the prospects for deep mining in this district, and a fitting reward for the extraordinary campaign of dead work development this company undertook, which involved a two-mile tunnel through hard rock in the anticipation of these great results.

The Federal Mining Company with its aggregation of bonanzas, reached the first mile-stone of its corporate career during 1904, with results most gratifying, and fully up to the great estimate of its promoter, Mr. Charles Sweeney. This great property has a future roseate with the promise of continued success, with ore bodies blocked out or proven to exist by preliminary development that can be figured on by the millions of tons.

The consolidation of management under one head of the four great mines of the Sweeney merger, as was expected, has resulted in great economy in operation. One of the most important advances in this line has been the centralization of the mechanical plants of the Standard and Mammoth mines at the portal of the Campbell tunnel, which are now worked as one mine, all men and material being handled through this opening, and the great tonnage of ore daily hoisted from the mine is dumped automatically from heavy skips, into a big raise or rock chute, extending from the collar of the Standard shaft to the Mammoth No. 6 tunnel, 100 feet below, there to be drawn out to the surface at Mammoth by electric haulage in cars specially designed for this work and dumped into a 2,000-ton ore bin.

The Standard-Mammoth ore body has been the most productive of any ore body in the Coeur d'Alenes. It is of enormous size, more than a thousand feet in length by

ten to twenty feet wide, and contains a much higher tenor of silver value than the average of the district, and now has immense reserves of ore in sight.

It has been worked to a depth of more than 2,000 feet below its highest ore apex, by tunnels down to the level of Canyon Creek, and through a vertical shaft 1,000 feet deep below the creek level.

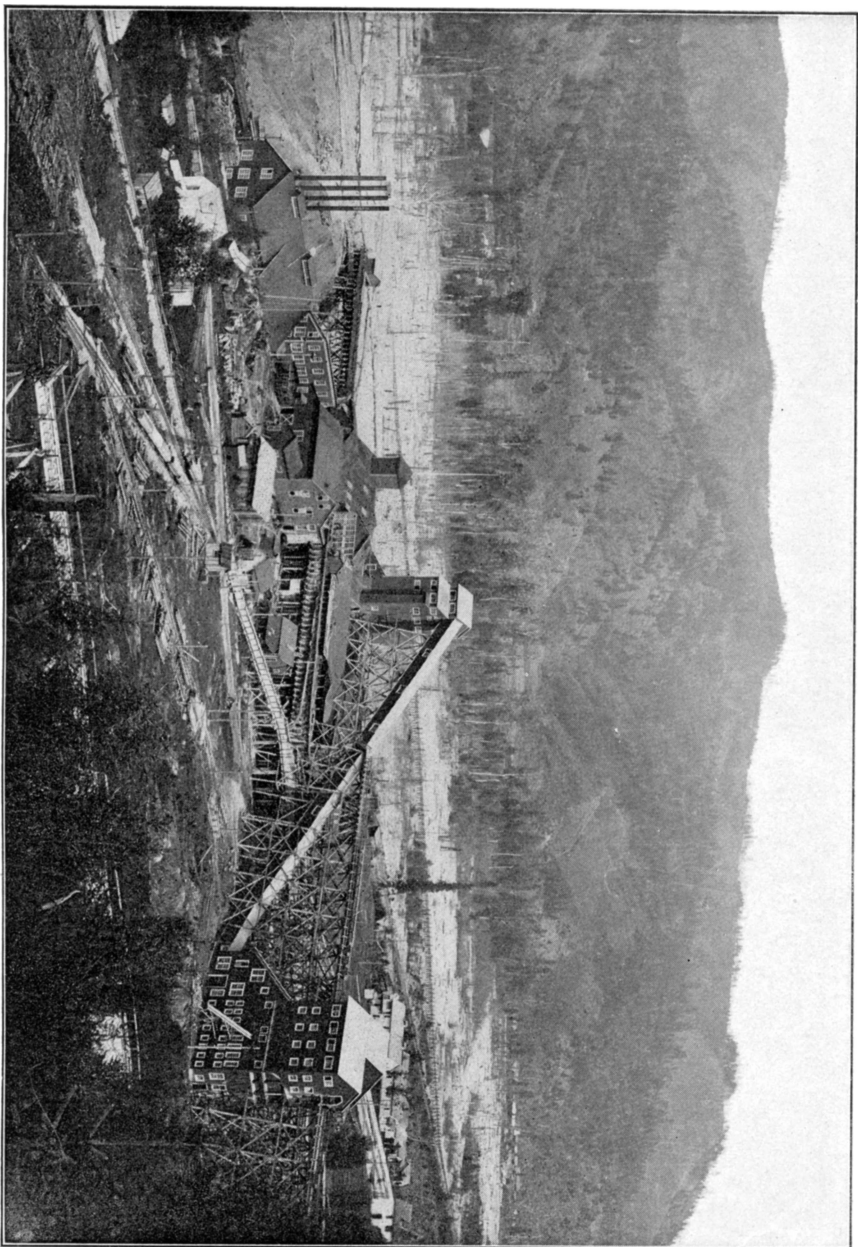
The collar of the Standard shaft is situated at the face of the Campbell tunnel, 3,000 feet in from the portal at Mace, which, together with the lineal extent of drifting and stoping on the great ore shoot combines to make an extraordinary plan of underground development to daily distribute a crew of several hundred men through, back and forth, to their working places.

During the past year a remarkable feat of practical mining work was accomplished on this property, which consisted of completely retimbering 180 feet of the Standard shaft, at about its middle horizon, which was accomplished while the normal great tonnage of ore was being hoisted and without stopping the hoist a single shift or without hurting a man. The writer passed through the shaft after this job was completed, and the cage was found to ride as true and smoothly through the new work as an hotel elevator. The job was designed by Mr. W. Clayton Miller, resident manager of the Federal Company, and executed by Captain Pasco and a picked crew of his men.

The Couer d'Alene mines call for massive and elaborate methods of timbering. That they received them is evidenced by the record of fatal accidents. "Fall of rock" is almost uniformly the chief cause of fatal accidents in big mining operations; in this district, however, this cause takes second place. The district contains many fine mechanics in this line of work, and to have successfully held down a timbering job in the Couer d'Alene mines is all the indorsement a man needs to fill a position of the same kind anywhere on earth.

Electric motive power has been made to supplant steam at every possible point in all the underground machinery of the Federal mines, which has not only reduced cost of operation but at the same time reduced underground temperatures and resulted in greatly improved ventilation.

The Hercules.—This famous silver-lead bonanza has been energetically developed during 1904 and enjoyed a



BUNKER HILL, AND SULLIVAN CONCENTRATOR. 1000 TONS DAILY CAPACITY. KELLOGG, IDAHO.

most prosperous year of increased mineral production. Its No. 2 tunnel was carried entirely through the mountain to an outlet on the Nine-mile slope, in a forest of fine mining timber, where a sawmill has been put in operation, affording a cheap extensive supply of material for all purposes of the mine's rapidly expanding operation.

In March connection was made by a 540-foot raise from No. 3 to No. 2 level. Stations have been cut in this raise at regular intervals for intermediate levels, which have since been driven out east and west on the ore shoot. No stoping has been done on this great block of ground, as No. 2 still continues to produce the great tonnage of ore turned out by the mine.

A system of electric haulage has been installed on the No. 3 adit level during the year, also a complete system of surface and underground telephones and electric lights. Power for operating these systems, as well as furnishing compressed air is derived from the company's power plant, about three-quarters of a mile south of the mine, using the waters of No. 3 tunnel and Gore Gulch.

A line of new development on this property is to be carried forward on the same broad plan as in the past. Ground will be broken during the year for a No. 4 tunnel to be driven from the power house, approximately 4,000 feet, to the ore shoot, and which will give an additional vertical depth of 700 feet below No. 3 level.

Plans are being drawn for a 200-ton concentrator to be erected early in the year with which to work the immense reserves of high-grade concentrating ore that has accumulated at the No. 2 level; during the extraction of shipping ore, so far, the only kind marketed. The mine is employing 100 men underground, and continues to be the most profitable producer in the district for the number of men employed.

Hecla.—The operation of this steady producer has been successfully carried on through the past year under very able management and returned a net profit to its stockholders closely approximating \$150,000. A large amount of new development work has been accomplished and many economies of operation instituted. Electric power has replaced steam in the whole plant, at mine and mill, including the big hoist, and is working very satisfactorily.

New crushing machinery has been added to the mill,

and an addition to the slime plant is now in course of construction. The 600-foot level in the mine has been greatly extended during the year with gratifying results, and the main working shaft to the 900-foot level is in progress.

The canyon mines generally have enjoyed a successful and prosperous year, and several important new ore discoveries have been made in its great fissure system, and they give promise of continuing to be the chief center and source of profit in the Couer d'Alenes for some time into the future.

Morning.—This great property at Mullen, while making a large output of mineral on the whole experienced a year of rather hard luck, and suffered more from the short water supply than any of the other big properties, which resulted in shutting off the progress of its big tunnel undertaking, and reduced the capacity of its 1,000-ton milling plant more than half during the last four months of the year. The great water power plant with which this immense mining and milling operation is kept in motion, has recently been enforced by electric power from Spokane Falls. Work is again in progress on the two-mile drain tunnel, and it is anticipated that the big milling plant will again shortly be brought up to its normal capacity.

The transmission of electric power from Spokane Falls by the Washington Water Power Company has proven quite a boon to the Couer d'Alene operators.

The power is generated at the plant of the company, and is transmitted through a line 100 miles long, three phase, sixty cycles, 45,000 or 60,000 volts.

This company is at the present time supplying in the neighborhood of 3,000 horse power to the mining companies at a price of \$50 per horse power per annum.

The power is used for almost every possible mining purpose, operating concentrators, crushers, sawmills, hoists, compressors, blowers and almost every conceivable application of electric power for such an enterprise, and has proven very efficient, steady and reliable.

Other lead-silver mines. The Gold Hunter property at Mullen has been undergoing extensive improvements in both mine and mill, and will doubtless enter the list as an important shipper during the coming year.

The Sixteen-to-One mine at Nine-mile is another well-

known property that has been undergoing extensive development, showing up fine ore reserves and getting in shape for production during 1905. Several important new discoveries of rich ore have been made in the territory adjacent to this Nine-mile property, and the future prospects for that part of the Coeur d'Alenes are very promising indeed.

Negotiations were under way during the year for the consolidation of the Frisco mine, with the Bernier and Flynn groups, adjoining it, and to which the extensive development of the Frisco could be extended advantageously, and would doubtless result in putting the splendid mining and milling equipment of this old producer again, in active and profitable operation. The Frisco group shipped several hundred tons of high-grade mineral during the year from leasing operations.

Important developments and ore shipments have been made at the mines of Big Creek, Government Gulch and Pine Creek, the rich lead-silver districts tributary to Wardner, where a number of very important and extensive bodies of rich lead-silver ore are in evidence.

The north side mines near Murray, especially the Monarch and Bear Top, shipped several cars of crude, high-grade, lead-silver ore during the year. Both of these properties have considerable development, fine ore bodies shown up, and are each installing a concentrating mill at the present time and are likely to furnish an important tonnage of mineral during 1905.

The Paragon mine is another north side lead-silver property of great promise, with a big ore shoot exposed, well equipped with a substantial hoisting plant and undergoing steady development with quite a force of men. Evidences of other extensive and important lead-ore sources are manifested at a number of places in this part of the Coeur d'Alenes, occurring in practically the same series of altered sedimentary formations, and under the same strong physical conditions and evidences of extent and permanency that characterizes the lead-ore occurrence of the south side bonanzas only ten to fifteen miles away.

Gold Mines of Murray.

Murray, the birthplace of the present great mineral development of the Couer d'Alenes, is beautifully situated

in the narrow valley of Pritchard Creek, surrounded by the same bold, evergreen-clad landscapes so common to this part of Idaho. It is of considerable size, and in point of compactness and number of buildings is probably the third largest town in the mining districts of Shoshone County. It has several large and well-stocked business houses, a good-sized, well-conducted hotel, fine water-works system and a responsible local newspaper.

The town is connected with Wallace, twenty miles distant, by one of the best equipped and most efficient daily stage and mail lines in the State, which makes close connections with the train, over well-graded mountain roads and grand country, affording a most delightful ride during good weather.

Since the early gold-mining excitement of 1883, the north fork tributaries around Murray have continued to contribute an important annual output of gold, both from quartz and placer mines. Most of the placer deposits proved deep and hard to work. They contained remarkable values in some instances, and produced some of the largest nuggets ever found in the State.

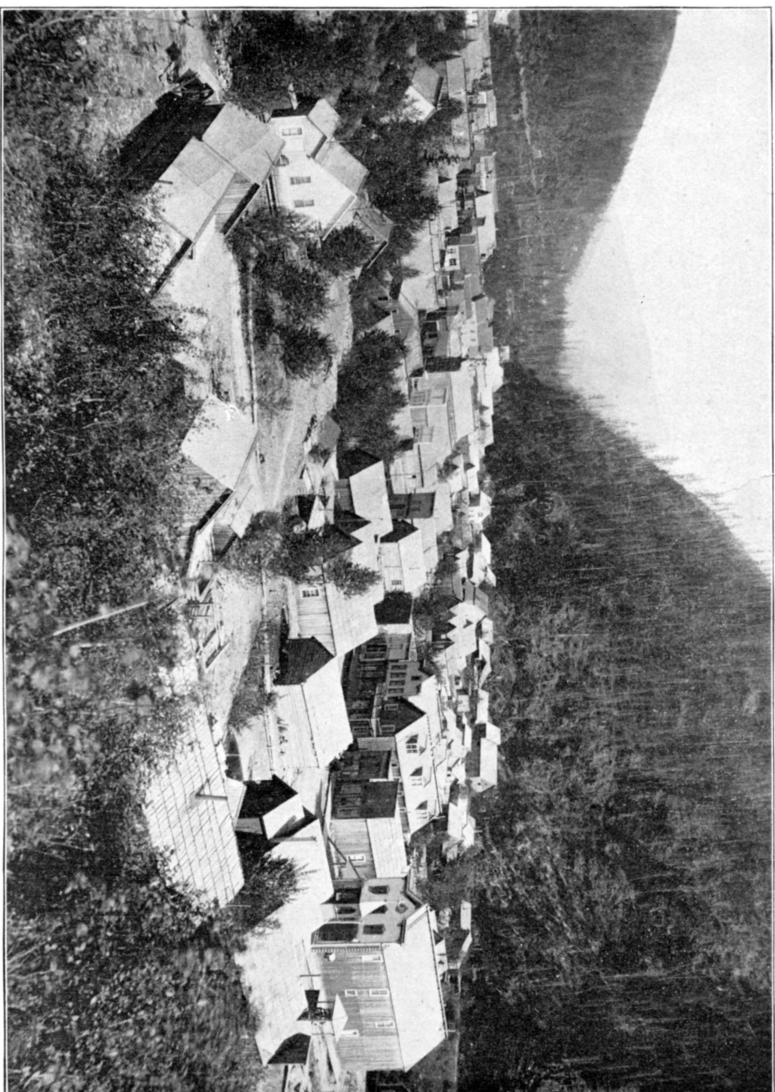
Only two years ago, one of the Trail Creek drift mines, five miles west of Murray, produced a single nugget of native gold weighing eighty-four Troy ounces.

Extensive tracts of deep gulch gravels and high bar old-channel diggings that contain an immense store of gold still remain unworked. These, however, require extensive equipment for their successful operation.

Some very promising gold quartz deposits occur in the vicinity of Murray. The most important of these in point of production and present ore reserves, is the Golden Chest mine, which has been worked intermittently for twenty years, and has a record of gold bullion produced amounting to \$1,000,000 in value.

This mine is situated on the north slope of Pritchard Creek, about a mile above town, and has been quite extensively developed on a remarkably strong fissure that has shown almost continuous ore through the 2,000 feet of connected development along the vein.

The vein occurs at a contact of quartzite and schistose slate, has rather a flat dip of about forty degrees, and is conformable to the inclosing formations, but a fissure, nevertheless, as it carries a persistent gouge of talcy breccia.



MURRAY, THE SCENE OF THE ORIGINAL GOLD DISCOVERIES IN THE COUER D'ALENES.

cia on one wall, indicating a distinct plane of movement.

The size of the vein varies from three to ten feet and will probably average six feet of clean-banded white quartz, containing a thin sprinkling of fine-grained iron pyrites. The average gold contents of the different ore shoots exposed, range from \$4 to \$10 per ton, of which a large percentage yields to plate amalgamation. Occasional lens-shaped areas have been found, of considerable extent, that have milled \$30 to \$60 per ton in free gold.

The chief feature of present development on the property is an adit tunnel, 1,100 feet long, driven in on the vein all the way, at a horizon several hundred feet below some extensive workings on the mountain side above, and undercutting a very large reserve of good milling ore.

There is a twenty-stamp mill on the property, just below the mouth of this big tunnel, and a water power is available near by.

This mine compares somewhat with some of the dividend paying California shaft developed veins of about the same size and grade in gold, and under such natural advantages in the hands of a competent California operator, could doubtless be made an important and reliable source of profit.

On the opposite side of Pritchard Creek Canyon, from the Golden Chest, The Mother Lode, Daddy and Yosemite mines are located. The thin-bedded, siliceous, sedimentary formations forming the mountain slope on this side of the canyon lie nearly horizontal at this point, but rapidly rise to the east and are tilted up into vertical lines within a mile or so.

The Mother Lode and other veins at this point, conform to the flat bedding of the formation, have been followed in by drifts for hundreds of feet, and found to develop a succession of short step faults, by which the veins would shift from one bed to another, a few feet above in driving in on them, which made development plans hard to follow.

These veins were small, two inches to two or three feet, but continuous for hundreds of feet, and contained some very high values in free gold near the surface. One slab of quartz at the outcrop of the Mother Lode 10x5x3 feet was found all splattered with coarse native gold, and was kept for a long time as a "show place" during the early

excitement, but was afterwards worked in an arastra, and yielded \$1,300 worth of bullion. These veins turned base at a short distance in underground, where they yielded very rich iron concentrates that are probably associated with a little telluride of lead, and contain high values in gold, but proved difficult to treat and their operation has been discontinued for some time.

A mile below Murray, a short, side-tributary called Dream Gulch was a noted producer of high-grade, coarse, placer gold, among which many nuggets were taken out that ranged in weight from one to twenty-five ounces.

A feature of the placer values of this little draw was the fact that associated with them were found a remarkable array of boulder, float quartz, often thickly splattered with coarse, native gold.

This ground is now covered with a large group of lode claims, known as the Buckeye Boy group, on which several good veins have been proven to exist, which are unquestionably the immediate source of the rich placer values of the Gulch.

A lens of specimen quartz was found in one of these veins, from which three tons of selected ore was worked that yielded gold bullion to the amount of \$17,000 by a spring-pole mortar and pan process.

The development of these veins are very shallow as yet, and in the further extensive development of the property similar rich pockets of bonanza ore would doubtless be encountered. One of the veins opened in this group is of good size, six or seven feet wide, and carries good values, but hard to save, on account of the combination of high-grade concentrates it contains.

There are a number of good gold quartz properties throughout the district, and with its very important lead ore bodies opening up so well and being equipped with mills, the outlook for this section of the Couer d'Alenes is anything but dull.

Copper.

In the variety of its metal resources, the Couer d'Alene District as a whole compares quite favorably with Colorado's peerless camp of Leadville.

The variety of metal resources that have contributed to

Leadville's greatness, and its \$300,000,000 production are gold, silver, lead, zinc and manganese.

The metal resources of the Couer d'Alenes, with one hundred million dollars of production already to their credit, not only embrace all the above, but we are also able to add the important item of copper to the list.

The probable magnitude of the copper resources of the Couer d'Alenes is not half appreciated, and their importance has been overshadowed by the great success in lead mining.

Copper is a very soluble metal, readily susceptible to change by moisture and surface influences. The great copper deposits of the world have shown a close uniformity of action in their process of development, in the impoverishment of their surface horizons re-precipitation, and secondary enrichment at deeper levels than have any other class of metallic mineral.

The vein croppings of the Couer d'Alene copper belt, consisting of siliceous, rusty breccia, and massive bodies of heavy gossen iron ore, saturated with copper carbonates, indicate much stronger evidence of extensive copper ore deposits at depth than do the surface showings of the great lead ore shoots indicate their presence; and if the normal rule of secondary enrichment at depth holds good here, and the physical and geological conditions are all very favorable for its doing so, the extensive development of this great copper belt is likely to bring the Couer d'Alenes more fame than its lead-silver resources have done, and to justify a much more important and profitable resource of mineral traffic eventually.

The Snowstorm mine at Larson Siding, three miles above Mullen, has been undergoing development for several years on capital derived from the sale of low-priced treasury shares, and has developed in a manner to fully justify all the airy anticipations of its nervy promoters. Its shares were selling recently at 20 cents, and in the opinion of the writer, considering the possibilities of the mine from its present great showing of ore, they are worth several times that much as a mining gamble or speculative investment.

The Snowstorm mine is opened on a steep pitching, powerful fissure vein, in thin, bedded quartzite, that strikes in an easterly and westerly direction across the

high mountain ridge that divides the South Fork River and Canyon Creek.

The croppings of the vein are located high up on the mountain, 2,000 feet vertically above the Northern Pacific railway track, in the canyon at Larson Siding. The vein, however, dips towards the canyon, which in connection with the erosion of a deep gulch in the hanging wall country at this point right opposite the main ore body, presents a splendid opportunity for cross-cut tunnel work, which has been taken advantage of.

The development of the property at this date consists of a shallow shaft at the croppings, a No. 1 tunnel, 200 feet long that taps the vein at 148 feet deep, a No. 2 tunnel, 600 feet long that taps the vein 253 feet lower, and a No. 3 tunnel 1,650 feet long, that taps the vein 670 feet still lower, making a total drop on the dip of the vein of 1,200 feet below the apex.

A limited amount of drifting along the vein from these cross-cuts has exposed a clearly defined ore shoot 430 feet long by from ten to thirty-five feet wide at and above the No. 2 tunnel, containing an average value closely approximating 5 per cent or 100 pounds of copper bullion and ten ounces silver per ton of ore throughout its entire length and width.

At the point where the No. 3 tunnel had cut the vein, it had apparently just caught the west end of the shoot, which evidently has a strong rake to the east, as indicated by the pitch of some deep, roll-shaped grooves or channels in the hanging wall of the ore shoot at the No. 2 level.

Where the ore shoot was cut by the No. 3 cross-cut, it was found to be over fifty feet wide, carrying 1 per cent or twenty pounds of copper bullion per ton, and a pay-streak seven feet wide of 6 per cent copper and eleven ounces silver. When the writer was at the mine in November a drift had been run to the east on this streak, over 100 feet, and was making a fine showing with the prospect that the same or a greater body of the better grade ore exposed at No. 2 would be opened up, in addition to the great width of low grade stuff.

When the No. 3 tunnel struck the vein it tapped a remarkable flow of water which is now spurting out in jets under pressure, as thick as a man's wrist, in places, from the crevices in the vein.

This water is of such volume (between 700 and 800 gallons a minute) that it is conducted through pipes from the mouth of the tunnel to a point 500 feet vertically lower down the mountain side, where it is now being used to run the air compressor, and can develop 150 horse power when needed.

This immense flow of water indicates a profound fissure and accounts for the altered condition of the ore to such a great depth, which is practically all in the form of green carbonate of copper.

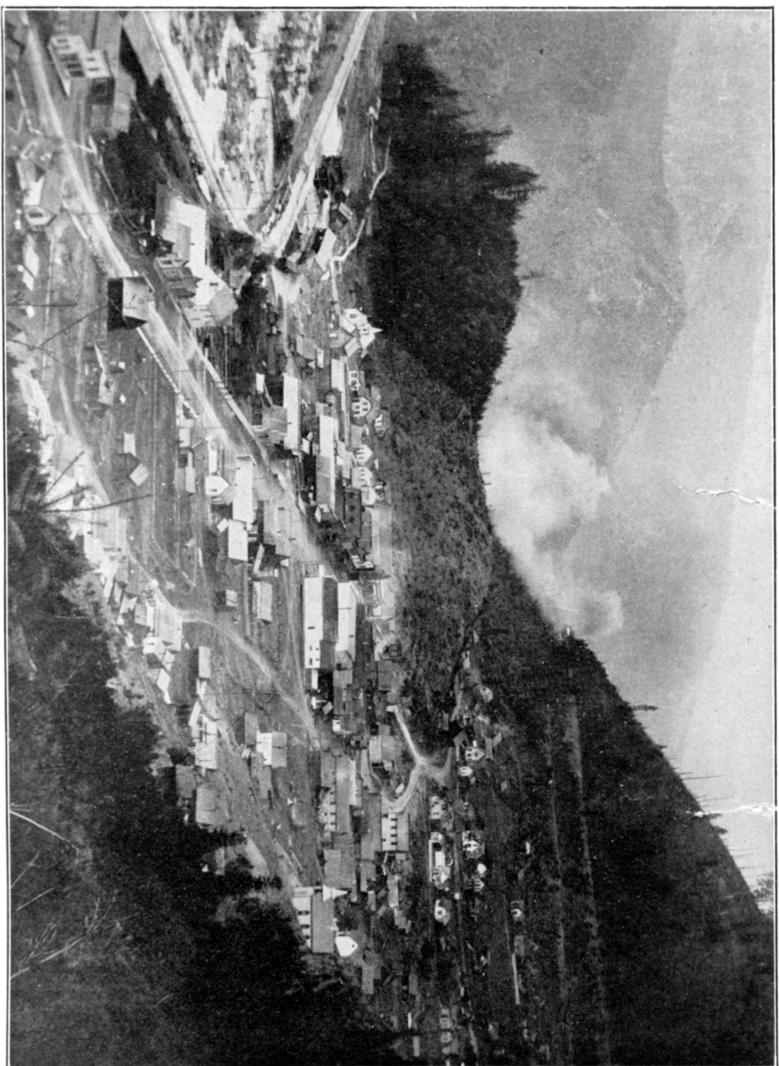
The property is being developed at this lower level at present by the company on money derived as royalty from a leasing company who are handling the upper part of the mine above No. 2.

The leasing company was organized by some wide-awake mining and business men of Mullen, under the firm name of J. H. Heward & Co., who discovered that the peculiar properties of the Snowstorm ore, particularly its high silicia contents and freedom from objectionable impurities, made it especially desirable for certain processes of copper metallurgy, and developed a limited market for the ore at the different copper converter plants of Butte, Anaconda and Tacoma, with the result that they took a lease on the upper part of the mine, and built a Ribblet aerial tram, at a cost of \$30,000, from the railway track to the upper works, a mile and a quarter long, to convey the ore off the mountain.

This tramway was completed in April, and during the remaining eight months of 1904 J. H. Heward & Co. demonstrated the probable importance of the copper resources of the Couer d'Alenes by shipping and marketing at a fair profit 28,000 tons of ore containing approximately 2,800,000 pounds of copper, and 280,000 ounces of silver, and could have furnished three times that amount without straining the ore bodies, which are blocked out in splendid shape if the market had been afforded.

The following results, which represent the average of a number of cars picked promiscuously from the season's shipping receipts, will be interesting as showing the purity of the ore and its freedom from objectionable minerals: Copper, 5.45 per cent; silver, 9.87 ounces; iron, 2 per cent; silica, 88 per cent, with moisture and traces of alumina.

In appearance the ore is simply a quartzose sandstone,



MULLAN, IDAHO.

intimately saturated throughout its grain with green copper carbonate. It would appear that such a simple combination of minerals ought to be successfully treated on the ground, with some cheap leaching method. Experiments are being made to that end, and if successful will mean the establishment of a very large and profitable copper-producing enterprise, for between the No. 3 tunnel and its apex this great Snowstorm ore shoot must contain a resource of copper bullion amounting to tens of millions of pounds, not to mention the proportionately high silver values associated with it.

During the stoping of the ore above No. 2, the lessees have found occasional unaltered patches of more primary and high-grade ore. A boulder of this ore weighing several hundred pounds that looks like a block of lavender-grey sandstone, is at the mouth of the tunnel. Under the glass this rock is found to be evenly permeated with very fine particles of bornite copper-sulphide, and shows under fire test: copper, 11 per cent; silver, 25 ounces, per ton.

If this splendid mineral represents one of the original phases of the great ore shoot before it was leached by water circulation to its present condition, the difference in copper and silver tenor of the two characters of ore must represent a remarkable reprecipitation in sulphide form at some lower horizon in the vein, unless it all floated off at some point to the surface, which is very unlikely.

The leaching process in this great water course fissure is still in active progress, as evidenced by the rapid precipitation of copper regulus, by the water dripping from the roof of the drift onto the air pipes in the ore shoots at No. 3 level, from which it would seem that a scrap-iron precipitating plant might pay to handle the whole tunnel flow. At this level nubbins and small kidneys of yellow and black copper sulphide ore are found, some of which have given results as high as 30 per cent copper and fifty ounces silver per ton, and extensive bodies of this class of mineral or even richer grade at greater depth where the water circulation is more quiescent in the fissure, present one of the entertaining possibilities that make the Snowstorm securities at present prices, such an enticing lottery gamble as prospective grand prize winners.

The company are figuring on extending another cross-cut into the vein from the power house, where the gulch

flattens off at a lighter grade. This tunnel should reach the ore shoot in 2,500 feet, would give an additional lift of 500 feet, and ought to tap the vein at the coveted horizon of secondary enrichment, and find the ore in a high-grade sulphide condition. This tunnel is certainly justified by the condition of the ore and the splendid reserves developed above.

Other Copper Properties.—The Snowstorm vein is right on the strike of the principal lead-silver fissure system of the Canyon Creek mines at Burke, and along its course in that direction other copper ore shoots have been discovered on the Bull Pen, Copper King and Calumet properties that show surface evidence of similar promise to that of the Snowstorm with promising evidence of developing similar importance with further work; other promising croppings are found in the vein strike to the east.

On the opposite side of the South Fork Canyon at a similar elevation to the Snowstorm, the Stevens Peak Copper Belt commences near Mullen Pass, extends west for eighteen miles, carrying a rapid succession of great gossen iron ore croppings that range in width up to thirty feet and occur in continuous shoots hundreds of feet in length in places.

These croppings carry pronounced evidences of copper and have received considerable attention and development at several points, notably on the Park, Springfield, Champion, Bullion, Comet, Wonderful and other groups, which in several instances have disclosed bodies of rich chalcopyrite ore carrying important values in both silver and gold.

In no place has the "iron hat" been definitely bottomed along this belt. The necessity for deep work on its great ore bodies is manifest, and is amply justified by the splendid surface showing they make.

This fine belt of mineral passes along the north slope of the St. Joe range within three miles of Wallace, and before it merges into the Wardner lead-silver belt at Big Creek, bodies of mineral containing high-grade dry silver ore occur in the form of chloride and tetrahedrite, from which shipments of high grade ore have been made recently.

The newspapers of Wallace, Wardner and Murray are staunch advocates of the mineral resources of the Couer

d'Alenes, and give their space freely for this purpose. They have recently been stimulating a movement for an especial effort to bring their magnificent mineral resources prominently before the public at the Portland fair.

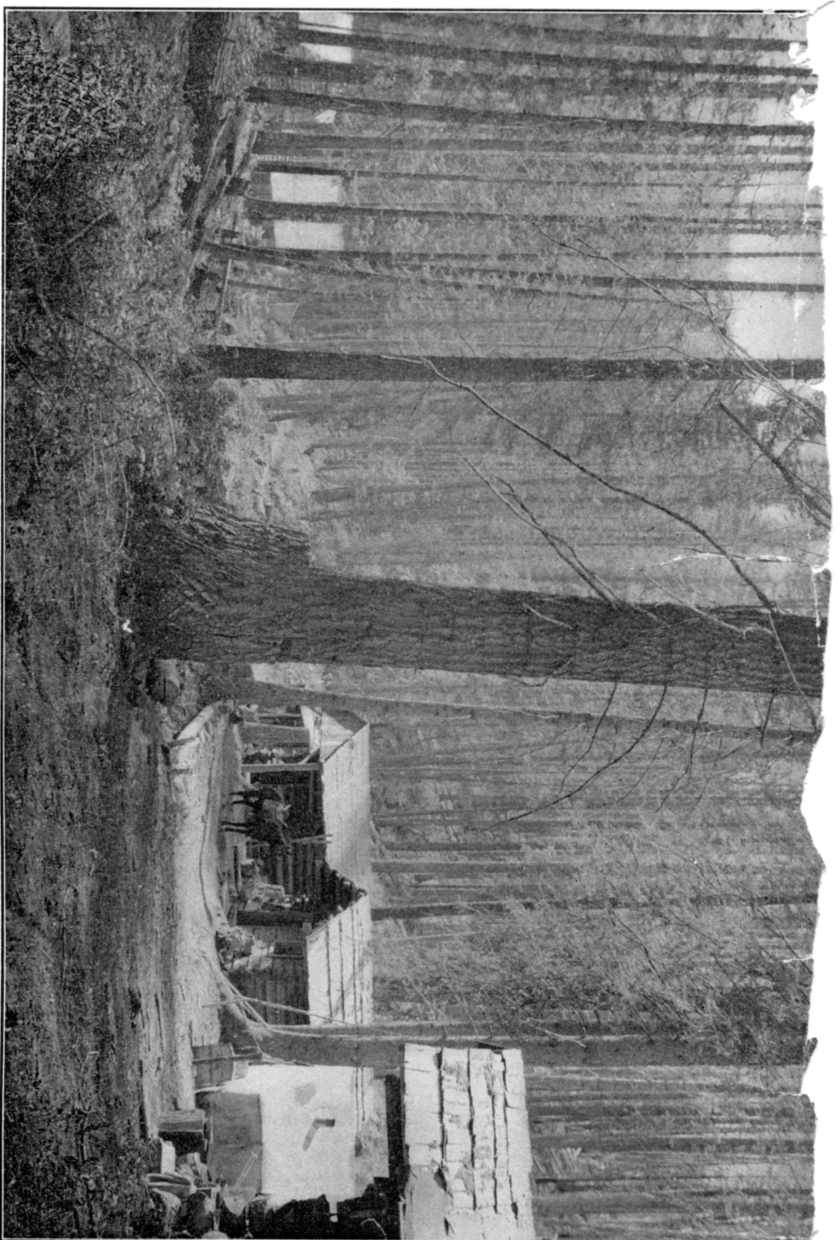
The suggestion is a good one, and there ought to be enterprise enough in the district, even if the big companies refuse to chip in, with such a wealth and variety of developed and undeveloped mineral resources to get up a pamphlet of descriptive literature that would be an edition De Luxe in its line, and should be scattered broadcast. The world wants to know what the Coeur d'Alenes have to offer in a mineral way, and has not been properly posted.

The simplicity of its geology and profound fissures with a longitudinal plan or two of their monstrous ore bodies, its eight or nine dividend producing mills and mining plants in their bold and beautiful verdure-clad settings of mountain and canyon, a touch of lake scenery and the source of their motive power at Spokane Falls would combine to make a picture story of demonstrated fact and future possibilities of successful development that is unequalled by any other mining district on earth.

This famous mining district, with all its great production, has received less consideration from the government mineral advertisers than many third rate mineral districts of the eastern State until recently.

The surface evidences of extensive resources of copper ore are just as strong in the Coeur d'Alenes copper belt as those that have led to the development of the greatest copper camp on earth. Butte, Montana, with its \$500,000,000 of production, and while we can not see into the ground an inch, the conditions that make this comparison possible, coupled with the proven great resource of a kindred metallic mineral in the same great fissure system, and the examples of efficiency in modern mining practice they afford, gives the copper feature of the Coeur d'Alenes a speculative value enjoyed by few new mining districts.

I believe in the potency of printer's ink in the promotion of new mining development. This great district, with its varied resources of lead, copper, silver, gold and zinc, presents opportunities for a hundred stock company mining development enterprises, and if the public were protected by a local ventilating committee, who could give them a run for their money, by seeing that the treasury



WAY STATION IN THE SEVEN DEVILS COPPER DISTRICT, WASHINGTON COUNTY.

stock receipts were spent in actual work, and not all diverted into the pockets of the fiscal (?) agent, these companies would be well patronized and a lot of capital would be diverted to the Couer d'Alenes that will otherwise be spent in the same line of investment during these prosperous times in less favored fields.

Washington County.

Considerable progress was made in the development of the extensive mining resources of Washington County at several of its districts during 1904, and plans now maturing warrant the anticipation of a largely increased yield of bullion, particularly of copper and gold, during 1905.

The Pacific & Idaho Northern Railway, extending from Weiser to Council, has experienced the busiest year of its history, and as an index of the nature and extent of the mining territory it serves, one item of the traffic handled was thirty cars of mining machinery, which included mine, mill and dredge machinery for the following properties: Quartz mill, Werdenhoff at Big Creek; bucket-elevator dredge plant for Bedrock Flume Company at Warren; hydraulic plant for Pittsburg and Idaho Company, operating near Riggins; mill and cyanide plant for Gold Coin Company at Black Lake, and equipment for Wyant Company at Rapid River near Pollock.

There is a very bright prospect that the P. & I. N. road will be extended during 1905 to the Big Payette lake, where one of the most beautiful summer resorts in the United States may be established.

It is surprising that capital has not improved this advantage before now, for the territory through which this branch will extend, if carried through to the lake, is not excelled in lumber traffic possibilities by any section in Idaho, and if a big Y could be included in the plan with one prong running up to the Seven Devils District, it would result in the development of a very profitable resource of mineral traffic as well.

The Ladd Metals Company have done a good deal of experimenting with Washington County copper ores and

of mining development work, and the county is extremely fortunate in getting such substantial people interested in its copper resources. Their smelter at Mineral made a good run during the year. Several shipments of gold and silver-bearing copper matt were made, and their mines at that point have been undergoing considerable development, and have shown great improvement in ore values, so much so that the company are planning to start the smelter again at an early date.

This same company stimulated quite a stir in the operation of the Seven Devils mine near Landore, where they experimented with a furnace designed to use wood gas fuel for smelting copper ore. This experiment was a failure, and the company are now hauling in coke for fuel, which will be used to treat a large amount of ore on hand at their works.

This operation created a market for quite a large output of ore, mostly mined by leasors, and contained a gross value in gold, silver and copper of over \$300,000. As an evidence of the important resources of copper, gold and silver ore this noted district contains the following detailed description of the shipments purchased by this company during the year will be of interest:

From the Peacock mine, 1,280 tons, average value, copper, 16 per cent; silver, 4 ounces; gold, \$2.70 per ton.

White Monument mine, 60 tons, copper, 26 per cent; silver, 8 ounces per ton.

Helena mine, 140 tons, copper, 25 per cent; silver, 6 ounces; gold, \$3.20 per ton.

Blue Jacket mine, 100 tons, copper, 44 per cent; silver, 8 ounces; gold, \$3.00 per ton.

Same mine, 250 tons, copper, 30 per cent; silver, 5 ounces; gold, \$2.90 per ton.

Queen mine, 300 tons, copper, 35 per cent; silver, 6 ounces; gold, \$3.00 per ton.

The Alaska mine, 100 tons, copper, 40 per cent; silver, 4 ounces; gold, \$2.90 per ton.

Crescent mine, 60 tons, copper, 40 per cent; silver, 9 ounces; gold, \$6.00 per ton.

The above are not all the shipments purchased by the company, but tend to show the remarkably fine values of copper, gold and silver contained in the Seven Devils ores in considerable quantities. The above, of course, are

sorted ores. If 5 per cent copper values, which are considered good grade in well-developed copper camps, were marketable here, the Seven Devils mines would soon become prominent producers, for they have very extensive reserves of that class of mineral in sight.

The smelter of the Ladd Metals Company, located at Landore, is a forty-ton stack, and will be used to run this ore through with coke fuel. If the fuel cost does not prove too high, the plant will probably be kept in operation and enlarged, as ore resources of a desirable matting variety are abundant in this district, and a very important output of metal would result.

Gold Mines.

At the property of the Gold Coin Mining Company at Black lake, the 100-ton capacity mill which burned down last fall, has been replaced with a new one of larger capacity that was gotten into commission and commenced to turn out gold bricks again in October. This mill is a combination amalgamating and cyanide plant and is said to save 90 per cent of the values in the ore. The mines of the company are reported to have extensive reserves of good gold ore in sight. They have been steadily developed during the reconstruction of the mill, and considerable depth has been attained on the main fissure.

The Iron Springs Mining Company, whose property is located at Iron Springs, on another tributary of Rapid River, five miles north of Black lake, have done quite a lot of development work during the past year, including a vertical three-compartment shaft 200 feet deep.

This property has recently been reorganized under the name of the Iron Springs Consolidated Mining Company, comprises a very extensive stretch of promising mining territory. The properties taken over by this new corporation include the Iron Springs, Pactolian, Holbrook and Kearns groups, embracing a total of 2,000 acres of lode and placer claims, which contain some very promising bodies of mineral and in some instances high values in gold.

The leading feature of the mineral deposits this property carries, is a wide fissure zone of siliceous, schisty formation, heavily impregnated with gold-bearing iron pyrites, in walls of greenstone and diorite. This monster

body of mineral stands nearly on end, and strikes into a steep mountain side, at the foot of which a cross-cut adit tunnel, quartering diagonally through the zone, has been extended in 500 feet, and proved the zone to have a width of something like 200 feet.

In addition to the above development, there are a number of other openings on this deposit, including a 200-foot vertical shaft, by which its continuity has been proven in the direction of its strike for several thousand feet.

During the progress of this development, extending over a period of two years, a great many samples have been taken, and I am informed by the management that they indicate an average value of \$10 gold per ton throughout the whole width of the zone. If these samples have been properly taken and represent the facts, the Iron Springs Consolidated Mining Company possesses, considering its size, one of the richest gold mines ever discovered in the mining history of the world.

The assay results obtained from this great zone have been very variable, sometimes low and again running to high figures, which may possibly be accounted for by the presence of rich tellurium minerals associated with the pyrites in the schisty gangue, for very high-grade gold-bearing tellurium ores have been found in other deposits near this property.

Numerous tests have been made on this mineral, and it is reported to be readily treated by the cyanide method, showing a high percentage of saving. The natural conditions in the way of water for power, timber and chances for gravity handling found in connection with this great zone, looking to its economical operation could hardly be improved upon, and should the \$10 values be maintained through the great width of lode matter represented, the production of gold would simply be a question of milling capacity, as the quantity of mineral available seems to be enormous. The company are planning the installation of a big cyanide plant, and intend to put in the first 100-ton unit of it as soon as spring opens.

In addition to the above the new consolidation embraces on the Kearns and Holbrook properties some defined fissure quartz veins said to carry average gold values ranging from \$10 to \$90 per ton, through widths of from two to eleven feet. These veins carry quite a lot of develop-



IN THE YELLOW PINE BELT OF WASHINGTON AND BOISE COUNTIES, NEAR BIG PAVETTE LAKE.

ment by adit and cross-cut tunnels and drifts, and during the process of their improvement occasional bunches of very rich native gold and telluride ores have been encountered.

The writer was presented with a specimen of massive white quartz from one of these fissures recently that was about the size of a goose egg, that contained flecks and patches of lead-gray to bronze-colored mineral, with films of mustard-colored native gold. This specimen was submitted to Mr. James A. Pack, the well-known Boise assayer, who found it to contain results at the following rate per ton: Gold, 75 ounces; silver, 1,061 ounces; total value, \$2,197.86, and classified the mineral as "Hessite," with some Petzite, a silver-gold telluride.

This is a very interesting discovery, for the development of any material quantity of this mineral in these veins would soon give the camp an enviable reputation, as it is very likely to be found associated more or less with the whole vein system of the Rapid River tributaries, which are extensively fissured, and afford many fine opportunities for mining development enterprises.

Situated on Goose Creek, near the northeast corner of Washington County, only four miles from the town of Meadows, there is in progress of development another gold lode mining enterprise promising similar great ore resources as those indicated at Iron Springs.

This venture is known as the Rock Flat Mining and Milling Company, and the property they own comprises about 600 acres of lode and placer claims. Part of this ground is old diggings, and 3 acres of it have been placered off that is said to have yielded gold at the rate of 60 cents per cubic yard of gravel mined, and during the progress of this work, a bedrock fissured zone of gold-bearing material, seventy-one feet wide, was discovered standing at an angle of 45 degrees, with a foot wall of granite and a hanging wall of slate or schist, that is filled with an igneous gangue resembling basaltic tuff, and reported to contain average values in free gold of \$2.80 to \$16.80 across its entire width at different places where it has been sampled. The writer has not personally examined this property, but has panned some of its odd looking mineral sent in, and found it to show a very handsome string of free gold, with no semblance of base mineral of any kind.

This mine is being developed by a 600-foot tunnel, now well under way, through which a good deal of the soft, gold-bearing gangue can be worked by hydraulicizing at a nominal cost per ton, and owing to its immense size, presents some most entertaining possibilities as a gold mining enterprise.

The extensive gold and silver-bearing copper sulphide deposits, and the great silver-bearing manganese-gossens croppings in the neighborhood of the Heath District have not received the attention their size and apparent importance warrants, as they afford some fine opportunities for exploitation.

Many of the mineral deposits of Washington County, in which copper and gold predominate, run to immense bodies, and their development is worthy of all encouragement, as their successful equipment and reduction into bullion means big mills, big pay rolls and increased population, property values and business opportunities all along the line.

CONCLUSION.

In extenuation of the optimistic strain of the foregoing report, I have to say that under the law, one of my duties is that of exhibiting the mineral resources of the State to advantage, and I try to show the goods in the most attractive manner of which I am capable of doing, at every opportunity presented and use top market figures and gross bullion contents for that purpose.

When our extensive, varied and almost virgin mineral fields are developed to a point where they can annually produce as much copper and silver bullion as the Montana mines now do, as much gold as the Colorado mines now do, and as much lead bullion as all the other States combined—a condition of aggrandizement by no means beyond the pale of probability, we hope that the legislative sentiment towards this department will be more generously inclined and provide the means for statistical exactitude that will be a model for the rest of the world.

With the largest lead ore output of any State in the Union, Idaho is not reducing a pound of ore to bullion within its borders at the present time. And every ton of lead contained in our ores pays a heavy tribute on a ton of valueless dead weight that accompanies it, to the transportation companies over enormous hauls to other States, as far east as Illinois.

The money received for the ore by the mine operator is based on the lead bullion and silver values it contains, and they are paid at a heavy discount of 50c to \$1.00 or more below New York quotations on lead to cover bullion transportation costs to extreme eastern points after the ore is smelted, as it is very probably that a large portion of the lead bullion reduced from our ores goes to the lead-consuming industries at the New York quotation and the difference goes to, the cost of labor, and transportation profits in handling it. I see no reason why our mines should not be credited with the full figures.

The 10 per cent salvage discounted for loss in smelting lead ore is, also, another item that will account for quite a discrepancy as compared to my figures. This is a doubtful loss, and if true, does not reflect much credit on American smelting methods.

We have an old fifty-ton lead stack in my home county that has a 100,000-ton slag dump, mostly made with charcoal fuel, around the banks of which it would bother any one to find an average assay of one per cent lead or one ounce of silver per ton, and it was made by a man who never saw the inside of a mining school or metallurgical laboratory before he undertook this venture.

That the smelter trust resolves into thin air a ton of lead bullion for every nine they catch, may be a metallurgical fact, but there is a well-founded suspicion among laymen that most of the supposed ten per cent loss in smelting is an extra "pound of flesh" the A. S. R. Company is able to exact, by reason of being "It" in the smelting business.

In computing the value of our silver output the Federal Government custom of giving its coinage value is followed. The average bullion price of silver for the year was 57c an ounce. All January 1st figures of metal output for the preceding year can be only "estimates," no matter who gives them, for settlement on big ore shipments to distant

states are not received for a period of one to two months after the ore is sent out and I purpose to be on the safe side and not give the mines any of the worst of it.

In the encouragement of new mining development enterprises in new districts, the writer aims not to be buncoed into leading investors into any swindling schemes but the wiles of the unscrupulous are sometimes hard to figure against.

This State is afflicted with its share of "get-rich-quick" companies, who issue stock by the bale, based on a very slim foundation of property rights, who trade on the mining reputation of the State, pay 40 or 60 per cent of receipts to questionable fiscal agents for placing their shares and pocket the balance, without giving the ground or the district in which it is situated, a chance to prove by development whether it merits the risk or not. Against such ventures the writer wants to be considered a "knocker."

Any company that is using reasonable efforts to develop its holdings by actual work in the State and district in which its claims exist, is worthy of reasonable encouragement, for surface manifestations of valuable mines in a likely mining district are sometimes very indefinite.

Two of the most important ore discoveries made in the State within the past three years, one of which paid a \$250,000 dividend during 1904, and the other a handsome margin, also, were unearthed by men who had absolutely no previous mining experience, on ground that had repeatedly been discredited by wise mining men.

Both of these great discoveries were made in old, discredited districts, and amply justify the insistent advertising of our insufficiently proven and virgin mineral resources and the apparent necessity of the accession of new blood into this line of investment.

In connection with this feature of the duties of the office the present appropriation of \$500 a year to cover the cost of office expenses, including printing, clerk hire, stationery, stamps, etc., and the compensation of deputies, is inadequate and barely enough to cover the cost of the printing item alone, and I would respectfully suggest that this branch of the department be provided for by an additional appropriation of \$1,000 a year for these purposes.

The product of our mines is second only to that of our agricultural interest, and the industry is as yet, in such a primary stage of development that almost anything may be expected of it in the way of expansion, and it is worthy of constant encouragement as every other business and industry in the State is directly benefited by its success.

As pointed out in my last report it is a physical impossibility for one man to adequately fulfill all the clerical and field duties required of this office, and the necessity of relying on other than personal sources of information is manifest. My endeavor is to cover the most important and essential requirements with the means available and to shape up and block out the department in line with the rapidly growing importance of our mining industry.

That my efforts in this respect during the past two years were appreciated is evidenced by the splendid majority vote I received for re-election last November, an honor that I gratefully acknowledge and highly appreciate, and one that I shall faithfully endeavor to continue worthy of during my present term.

Ada County.

Gold, fine ounces, 48.17.....	\$ 995.67
Silver, fine ounces, 18.14....	23.40
Total value	<u>\$ 1,019.07</u>

Bannock County.

Gold, fine ounces, 135.98..	\$ 2,810.70
Silver, fine ounces, 860.08.....	1,109.50
Copper pounds, 20,000.00.....	2,600.00
Total value	<u>\$ 6,520.20</u>

Bingham County

Gold, fine ounces, 210.95.....	\$ 4,360.00
Silver, fine ounces, 5.46.....	7.04
Total value	<u>\$ 4,367.04</u>

Blaine County.

Gold, fine ounces, 504.31..	\$ 10,424.08
Silver, fine ounces, 408,737.00.....	527,270.73
Lead, pounds, 6,200,572.....	254,885.89
Total value	<u>\$ 792,590.70</u>

Boise County.

Gold, fine ounces, 15,807.16.....	\$ 326,733.99
Silver, fine ounces, 5,072.41.....	7,317.40
Total value	<u>\$ 334,050.39</u>

Canyon County.

Gold, fine ounces, 410.62.....	\$ 8,487.51
Silver, fine ounces, 59.19.....	76.35
Total value	<u>\$ 8,563.86</u>

Cassia County.

Gold, fine ounces, 270.23.....	\$ 5,585.65
Silver, fine ounces, 27.02.....	34.85
Total value	<u>\$ 5,620.50</u>

Custer County.

Gold, fine ounces, 4,134.14.....	\$ 85,452.07
Silver, fine ounces, 220,171.67.....	284,021.45
Copper, pounds, 2,409,538.00.....	313,239.29
Lead, pounds, 392,604.00.....	16,881.97
Total value	<u>\$ 699,594.78</u>

Elmore County.

Gold, fine ounces, 4,000.72.....	\$ 82,694.88
Silver, fine ounces, 1,736.15.....	2,239.73
Total value	<u>\$ 84,934.61</u>

Fremont County.

Gold, fine ounces, 27.17.....	\$ 561.60
Silver, fine ounces, 2.80.....	3.61
Total value	<u>\$ 565.21</u>

Idaho County.

Gold, fine ounces, 12,280.46.....\$ 253,837.10
 Silver, fine ounces, 2,204.31..... 2,843.55

Total value\$ 256,680.65

Kootenai County.

Gold, fine ounces, 400.02.....\$ 8,268.41
 Silver, fine ounces, 71,042..... 91,644.18
 Lead, pounds, 1,440,000..... 62,092.00

Total value\$ 162,004.59

Latah County.

Gold, fine ounces, 304.70.....\$ 6,298.14
 Silver, fine ounces, 14.85..... 19.15

Total value\$ 6,317.29

Lemhi County.

Gold, fine ounces, 12,286.41.....\$ 253,960.09
 Silver, fine ounces, 45,741..... 59,005.89
 Lead, pounds, 1,962,000..... 84,366.00

Total value\$ 397,331.88

Lincoln County.

Gold, fine ounces, 75.40.....\$ 1,558.51
 Silver, fine ounces, 13.31..... 17.16

Total value\$ 1,575.67

Oneida County.

Gold, fine ounces, 261.....\$ 5,394.87
 Silver, fine ounces, 13..... 16.77

Total value\$ 5,411.64

Owyhee County.

Gold, fine ounces, 24,795.....\$ 512,512.65
 Silver, fine ounces, 835,087..... 1,077,262.23

Total value\$ 1,589,774.88

Shoshone County.

Gold, fine ounces, 7,116.22.....\$ 147,092.94
 Silver, fine ounces, 6,496,886..... 8,380,982.94
 Lead, pounds, 216,539,545..... 9,311,200.43
 Copper, pounds, 2,800,000..... 364,000.00

Total value\$18,203,275.31

Washington County.

Gold, fine ounces, 1,347.73.....\$ 28,799.30
 Silver, fine ounces, 96,347.73..... 124,288.57
 Copper, pounds, 192,474.05..... 25,021.62

Total value\$ 178,109.49

Totals for State of Idaho.

Gold, fine ounces, 84,461.89.....\$ 1,845,828.08
 Silver, fine ounces, 8,284,639.12..... 10,558,184.50
 Lead, pounds, 226,261,728..... 9,729,425.86
 Copper, pounds, 5,422,007.05..... 704,860.91

Total value\$22,838,299.36

Total for 1903..... 21,056,076.37

Increase\$ 1,782,222.98

Note—In the above estimate, coinage value of silver is given and average New York quotations for the base metals, \$20.67 an ounce for gold.

