REPORTS

OF THE

Inspector of Mines

AND

DEPUTY INSPECTORS OF MINES

FOR THE

YEAR ENDING

November 30th, 1890

BY

G. C. SWALLOW Inspector

AND

J. B. TREVARTHEN AND JACOB OLIVER, Deputy Inspectors

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His Excellency,

JOSEPH K. TOOLE,

Governor of Montana:

I have the honor herewith to transmit my report as Inspector of Mines and the reports of J. B, Trevarthen and Jacob Oliver, Deputy Inspectors of Mines.

When Mr. Oliver was appointed Deputy Inspector of Mines the mines of Silver Bow county were placed under his care, as his residence in Butte could save traveling expenses, and as the miners of Silver Bow desired his appointment. When I was in other parts of the State Mr. Oliver examined the causes of an accident in the Drum Lummon, one in the Alta and one at Heckla.

The mines in all the counties but Silver Bow, were retained under my own care, and I have in person examined into the causes of all the accidents of which I had any notice and of all which came to my knowledge indirectly and long after they occurred as far as circumstances would permit. Whenever it was possible, I have met with the coroner's jury.

I have found Mr. Trevarthen and Mr. Oliver earnest and efficient co-workers in the important duties devolved upon us.

I must also mention with gratitude the willing aid so many of our fellow citizens have rendered me in the prosecution of my examinations and in gathering data for my report. As a list of those, who have thus, aided would be too long for publication, and as a selection of a few would be invidious and unjust, I hope all of them will find their reward in the increased value their assistance has given my report.

Hoping that our reports will meet your approval and the approbation of our fellow citizens, I remain,

Your Obedient Servant,

G. C. SWALLOW,

Inspector of Mines.

HELENA, Dec. 15, 1890.

Condition of Montana Mines

Although the unprecedented drought of the last year greatly diminished the work in the most of our placers and entirely stopped it in others; and although our largest reduction works were partially destroyed and the operations of others were irregular; and although our two most productive mines were closed for months; and although the wide-spread financial troubles checked investments in mines and mining enterprises; still by far more development work has been done and more good ore has been placed on the dumps than in any previous year; and a very large number of new discoveries have been recorded.

It is estimated from all the facts I could obtain, that the output of our mines in gold, silver, copper and lead for the year 1890, will be fully $49,000,000, or $7,000,000 greater than the estimates for 1889, which, by the way, were several millions too low.

NUMBER OF MINING CLAIMS.

My last report stated there were more than twelve thousand mining claims located and recorded in Montana; but now I can safely say there are more than twice that number.

The Clerks and Recorders of different counties have sent me the following numbers of claims recorded in their books between December 1st, 1889, and December 1st, 1890:

COUNTIES.	Quartz Claims	Placer Claims	Coal Claims	Iron Claims	Build'g Stone	Fire Clay	Total
Beaverhead	250	58	4	.....	.....	.....	312
Cascade	344	106	7	2	.....	.....	459
Choteau	6	1	2	.....	.....	.....	9
*Custer	.....	.....	.....	.....	.....	.....	.....
*Dawson	.....	.....	.....	.....	.....	.....	.....
Deer Lodge	1184	147	.....	.....	.....	.....	1331
Fergus	115	13	.....	.....	.....	.....	128
Gallatin	66	27	11	.....	.....	.....	104
Jefferson	1466	194	.....	.....	.....	.....	1660
Lewis and Clarke	338	142	.....	.....	.....	.....	480
Madison	607	90	.....	.....	.....	.....	697
Meagher	1301	141	2	.....	.....	.....	1444
Missoula	599	190	31	.....	.....	.....	820
Park	259	39	12	.....	4	22	336
Silver Bow	825	140	.....	.....	.....	.....	965
*Yellowstone	.....	.....	.....	.....	.....	.....	.....
Total number of claims recorded in 13 counties							8745

* No returns.

These returns show the total number of claims recorded in 13 counties during the last year alone to be 8,745. Some of these are doubtless old claims recorded under new names; but the larger part of them are new discoveries. This certainly is a good showing for a state which has had thousands of sharp-eyed prospectors searching every ravine, foot-hill and mountain side for quartz veins during the last quarter of a century. It also shows there is still a calling for the prospector, and that he will still make many discoveries, some of which may prove as valuable as the Granite Mountain, the Anaconda or the Drum-Lummon.

All the facts developed in the last quarter of a century by prospectors, miners and by scientific men, show most conclusively that all the mountains of Montana save the Crazy Mountains and that part of the main range of the Rocky Mountains north of Sun River, are intersected with metalic veins, and the probabilities are that there is not a section of land in them all save those named above, which has not some mineral veins. No intelligent man, who has followed the discoveries already made, will doubt that the future will prove the above prediction true.

CAUSES OF FAILURE IN MINING.

In very many of our mines the surface ore was a hydrated oxide of iron containing free gold. A stamp mill with amalgamating tables would save a part of the gold. Many mills were

erected to work these ores, which they did with variable success. But these ores of oxide of iron containing free gold or "*free-milling ores*," were once sulphuret of iron which has been changed to oxide of iron by the action of water and air; hence, just as soon as the water-level is reached in the mines, the oxides of iron change to sulphurets of iron and the stamping mill with an amalgamating table, will no longer save the gold.

In other cases mills have been erected on prospects which contained but little ore, or which contained ores not suited to the mill. Hence the enterprise was a failure.

All other departments of business show the same evidences of individual failure though the business still prospers.

While our mines have yielded enough to make our own people rich and to aid in stimulating the prosperity of the whole country, some have failed for reasons that would cause failure in every department of business.

First. Mining requires more science, skill and experience than any other business. And yet men who had no science, no skill and experience in mining, came to Montana, bought a prospect, erected a mill, dug out some ore and pounded out a part of the gold. But the bullion could not meet the expenses and it soon appeared they did not know a mine from a badger's hole, knew nothing about taking out ore and nothing about running a quartz mill.

Second. Men who furnished the money often gave such instructions to their superintendents as to embarass their operations or make them a total failure.

They most usually urge the erection of a mill or furnace before they have discovered enough ore to run it, and have so tested its qualities as to determine what kind of a mill or furnace is needed for working it.

Third. They send out a mill which is not at all the kind needed for the ore.

Fourth. They order shafts sunk and tunnels run where the work will be a dead loss.

Fifth. They have a propensity to change their superintendent every year, especially when the dividends are uot satisfac-

'tory. In this way they get bad managers, and even if they get good ones, their instructions often prevent the success they most desire.

In short the failures in mining in Montana were the result of causes which would have produced failures in any department of business.

RESULTS PROVE THE SUCCESS.

Our mines have furnished the gold to fill the vaults of our own and many Eastern banks, to build many a mile of railroad, to buy the fine horses, cattle and sheep which stock many of our ranches and wide prairie ranges, to pay for the merchandise which fills our towns with busy life, and to erect the palaces in which our pioneer miners live and do business.

That general success has attended our mining operations is also fully proved by the fact that our mines have contributed some $400,000,000 to stimulate the business of the world and are now producing every year nearly $50,000,000 in gold, silver, copper and lead, to say nothing of the vast quantities of coal and coke produced in our boundaries.

The prosperity of our mines is also shown by the millions paid in dividends each year.

ACCIDENTS IN OUR MINES.

During the year past I have been notified of seven accidents in the mines of Montana.

On January 11th, 1890, Mr. Edward Foy was injured by a falling rock in the Agua Frio mine near Placer. No one was in fault. It was one of those accidents which appear inevitable in mining. Mr. Foy recovered in St. Peter's hospital in Helena.

On February 13th, 1890, Mr. John Powell was injured by falling timbers in the Copper Belle mine. I received no notice of the accident, but saw Mr. Powell in the Sister's hospital in Helena. He said it was an accident for which blame could be attached to no one.

On February 20th, 1890, Mr. W. C. Bell died at Timberline from injuries received from a falling mass of coal in the mine on February 11th. Those at work with Mr. Bell at the

time of the accident testify that he went under the mass of coal against their protests and remonstrances and was killed by his own want of caution; that no one but himself was in fault.

On March 30th, 1890, a man was killed in the Alta mine, near Wickes. Mr. Jacob Oliver, Deputy Inspector, attended to this case. (See his report.)

On April 16th, 1890, T. H. Jenkins had a leg broken in the Drum Lummon mine at Marysville. I visited the mine and examined the case and found by the testimony of Mr. Ole Anderson who was at work with Mr. Jenkins that the accident was caused by a falling rock in a stope. Both Mr. Jenkins and Mr. Anderson had tried to loosen and remove the fragment of rock with drills and picks but without success, and both concluded that it was so fast it could not fall. It afterwards fell and caused the injury. No one was in fault for the accident. Mr. Jenkins himself confirmed this testimony.

On May 30th, 1890, I visited the Drum Lummon mine at Marysville, Montana, to examine into the causes of the accident by which Mr. Thos. Henry Jenkins had a leg broken.

Mr. Jenkins testified that on April 16th, 1890, he was at work in the second stope above the 600-foot level. The work was in hard solid quartz, but a large mass appeared to be broken from the rest, and he and his companion tried to loosen it and get it out by the use of picks and drills but could not move it. They then drilled two holes through the mass without appearing to loosen it. They then commenced drilling four feet on one side of the mass when it fell and crushed my leg. It was afterwards amputated by the company's surgeon and in twelve days I was up and walking with the aid of crutches. Nobody was to blame. The superintendent gives all miners employed positive instructions to take special care against all possible accidents. I have received the best care and attention since I was injured. I have worked for the company since January 1890.

I also saw Mr. Ole Anderson who was at work with Mr. Jenkins when the accident happened.

Mr. Anderson confirmed in every particular the statements of Mr. Jenkins respecting the accident by which Mr. Jenkins' leg was crushed.

These and other facts which I learned convinced me that no one was to blame for the accident, and that the company is un-

usually careful to secure the safety, health and comfort of the many men it employs.

After a somewhat careful examination of the extensive works, and observing the completeness of the outfit to work the mine and reduce the ore, and the numerous arrangements to secure the safety and efficiency of the workmen and the perfect system everywhere observed, and the regulations to guard against accidents or loss, I am fully satisfied the Montana Company Limited is managed and worked according to the latest and most approved methods to secure the safety of the workmen and the most profitable results.

The arrangements and rules relating to blasting and keeping and handling powder, fuse and caps should prevent all accidents from blasting, the most fruitful source of mining disasters.

The precautions against fires and the perfect and complete arrangements for extinguishing such as may occur, must cause all employed in this mine and its mills and workshops to feel perfectly secure from all personal injury from this fell enemy of the miner.

One of the most interesting departments was the room where the electricity is generated for lighting the mine, the mills, the workshops and the town of Marysville. The room and all it contained was as nice as my lady's parlor, and all known appliances were the most perfect to secure instant communication with and perfect control over all the men and machinery employed in the mine and in all the departments of the work.

The arrangements for keeping dynamite at the proper temperature by self-regulating steam heat and for handling the explosive is as nearly perfect as our present knowledge will permit.

On July 18th, 1890, Luke Farley was killed by falling down a manway in the Iron Mountain mine at Pardee. It appeared from the testimony that Mr. Farley fell while going down the ladder in the manway, that he was alone and no one could tell the cause of his fall, that the ladder was perfect and safe. No blame could be attached to any one.

On August 5th, 1890, Mr. Jacob Hultz was killed in the Silver Hill mine, five miles west of Helena. Mr. Hultz was descending the shaft in a bucket and Mr. Hugh McLain was

lowering him by the aid of a whim known as the "Common-sense whim." The friction band slipped from its place and the "automatic grip" broke on the rope and left the bucket and its human freight to descend some 50 feet with such force as to produce a fatal injury. The testimony before the coroner's jury and an examination of the whim clearly showed the accident was due to the defect in the structure of the whim. Poor iron was used in making the whim and the work was not done in accordance with good mechanics. This so-called "Common-sense whim" might be made a safe whim for small loads by the use of good iron, first-class bolts and by countersinking the heads of the rivets which hold the guides to the friction band on the inner or friction side.

On October 7th, 1890, Mr. Frank Day was injured in the Timberline mine by the falling of a mass of rock while he was passing under it. Mr. Day was badly crushed but will doubtless recover. According to the affidavits of Mr. Herbert Hall and Mr. Henry Merrick who were partners of Mr. Day, and of Mr. Day himself, he was warned not to go under the mass of rock which fell and injured him and no one but himself was to blame. Every care is taken for the safety of the men working in these mines.

On November 25th, 1890, Mr. John Meyer was killed in the Granite Mountain while at work in stope G over level No. 7 from the Ruby shaft by a mass of ore falling from the face of the stope. Mr. Hugh M. Bluett who was at work with Mr. Meyer at the time, testifies that the face of stope appeared safe at the time of the accident; and Mr. Robert Oldham who was at work on the next floor in the same stope, also testifies to the apparent safety of the place where Mr. Meyer was killed. It appeared perfectly safe when I saw it. and the workmen said there had been no change after the accident till I saw it. I should have worked there without fear of danger. No management can be more careful of the safety, health and comfort of its workmen than that of the Granite Mountain.

Mr. Gasper Spangler was killed in his own mine near Placer. I was not notified and know nothing of the circumstances of the accident.

In June last Mr. Ed. Chenowith was injured by a fall from a ladder in the Combination mine at Black Pine. Mr. Chenowith was alone. He says he was carrying two picks in his right

hand, missed his hold, and fell. He soon recovered and resumed work in the mine.

OTHER VALUABLE MINERALS.

In addition to the gold, silver, copper, lead, zinc and iron produced by our mines, other minerals are found in Montana.

Tin ores have been found in cleaning up the sluice boxes of our placers in various parts of the State. This stream and wood tin in our placers prove that there must be veins of it in the mountains above them.

These veins have not yet been found, unless the reported discoveries in Madison county prove true.

Bismuth has been found in the St. Julian mine in Emigrant gulch. Men are now at work to show up the extent and value of these ores.

Tellurides of gold have been found in the mines of Tucker gulch, in one or more mines near Butte, and in the Mill Creek mines. This ore is very rich in gold, sometimes assaying as high as $325,000 per ton.

Antimony as a sulphide is found in a group of mines about fifteen miles from Thompson Falls. The ore is very rich and is shipped East.

Cobalt and Nickel occur in the Belle-Stowe mine on Thompson river.

The black sand so abundant and troublesome in our placer mining, is a magnetic oxide of iron, which often contains $200 in gold to the ton.

Beautiful crystals of corundan are abundant in some of our placers. These crystals form beautiful gems of the varieties known as Oriental Ruby and Oriental Topaz, Oriental Emerald and Oriental Amethyst. They are harder and more brilliant than any other gems, save the diamond. A company is now working or preparing to work Eldorado bar and other placers near Helena for these precious stones.

There is what may be called a copper placer in a small stream in Jefferson county, between Jefferson City and the

Beaver station, as it was called in the old times. Our attention was called to it by the bright copper which coated the tires of the buggy and the horses' shoes when we drove through the stream. It was found that the water of the stream was strongly impregnated with a solution of copper, and the sands in the bed of it were full of bright crystals of metalic copper. It may be possible to work out those crystals from the sands and to precipitate the copper from the waters with profit.

As might be expected Montana has in its numerous mountains a great variety of as good building stones as any on the continent. We have granites and syenites as good as any in Maine and Massachusetts; sandstones and freestones equal to that used in "the brown stone fronts on Fifth avenue;" trachytes as good as any used in Imperial Rome, and basalt as strong and tough as that used in the pavements of Broadway, New York, and many beds of marble,—some of them show medium qualities. Flag stones and slates are abundant, and there are some extensive deposits of good fire-clays.

Montana ought to have anthracite coal where the coal beds run into the mountains as in Pennsylvania, Colorado and British Columbia.

Montana doubtless has beds of hydraulic limestone. Some one should make a fortune by discovering the rock and manufacturing the cement. Transportation from the Eastern States is a sufficient protection, which will always remain to make the business very remunerative.

CHANGES IN THE LAW.

The law providing for Mine Inspectors has some defects which ought to be corrected. The Deputy Inspector is paid $6 a day and can work but 100 days in the year. There is more work than the Inspector and Deputy Inspector can do in the 365 days of the year and the Deputy Inspector should be paid for the year.

Nearly all the States have deemed it wise to have geological surveys. No State could be so much benefitted by such a survey as Montana. By combining in one commission the geological survey and the Mine Inspector, the expenses would be much less. While the Mine Inspector is traveling over the State inspecting the mines, he could with very little extra expense collect and record the geological features of the country. The

mines are the best places to observe the rocks and their structure. Hence, one making the geological survey would necessarily enter the mines to learn the structure of the earth and the character of the rocks which contain the mineral veins, and the nature of the veins themselves. It is, therefore, evident that the combination of the two works in the same commission would be a matter of economy.

Some think the Inspector of Mines should have power to compel the superintendent or owners of mines to make such improvements and changes in the mine as the Inspector may deem necessary. But so far as my experience such power has been wholly unnecessary. For all superintendents have been more than willing to make all the changes I have advised. If the Inspector goes to a mine with power to take the management into his own hands, that very fact would create a jealousy and antagonism, which would prevent the easy and perfect inspection of the mine and its management and wholly banish that confidential interchange of views necessary to secure the greatest safety. The superintendents of our mines are a superior class of men, who understand their business and are sufficiently intelligent to know that safe mining is the most profitable mining; and who are glad to receive any suggestions which would promote the safety of themselves and their men. But send to them a master and they will be on the defensive, in a state of rebellion, or at least "armed neutrality."

And besides, Inspectors of Mines are not free from that weakness common to all men—a capacity to abuse "any little brief authority" conferred upon them. The best power the Inspector of Mines can be clothed with, over and above the wholesome penalties attached to the present law, is the high character for integrity and the extensive knowledge of mining, both practical and theoretical, which shall best fit him for the high duties of his responsible office.

BEAVERHEAD.

The first mining in Montana was done on the Grasshopper in Beaverhead county. A mining community soon gathered around these mines, whose conflicts with the Bannack Indians were decisive, and whose sufferings from robbers and road agents led to the extermination of the Palmer band by the Vigilantes. Bannack became famous, and has gone down to history as a vindicator of pioneer rights against the Indians and road agents, as the first county seat of Beaverhead, and as the pioneer capital of Montana.

The pioneer citizens of Bannack still point with pride to the humble capitol of the budding mountain State, and to the more commodious and substantial pioneer court house erected by Beaverhead county. But for once, eastward was the march of empire; and Virginia City became the capital of Montana, and Dillon the seat of Beaverhead county.

But Bannack is none the less historical, and her reviving mining industries will restore and keep up her early prosperity.

The placers of the Grasshopper at Bannack, once so productive, are still worked. Pioneer, Excelsior, South Side, Golden Leaf, and other placers still have rich gravels. Productive placers also exist high up the Grasshopper, on Dice Creek and at French Bar.

The Pioneer placer is now worked at the rate of 1,000 cubic yards a day by water pumped from the Grasshopper to the height of 75 feet.

The gold in this placer came in part, at least, from a rich quartz vein in the hillside just above it; and the free gold in the Golden Leaf doubtless furnished the precious metal in the rich placer a little below that mine, on the same hillside.

Quartz mining followed close upon the heels of the placers. Gold, silver, copper and lead veins were discovered and recorded in large numbers and at various points in Beaverhead county, and the pioneer mill was erected on the Grasshopper near Bannack, and the pioneer smelter on the Rattlesnake at Argenta. This mill, with its wooden stamps shod with wagon tires, worked the free gold quartz from the mines in the Bannack district, and the St. Louis smelting furnace run out the argentiferous galena at Argenta into base bullion, which their cupel furnace reduced to disks of pure silver as large as new moons. As these broad disks of the white metal were displayed in the bank windows of eastern cities, the fame of Golconda and Eldorado paled before the rising glories of Argenta.

Still this successful mining did not pay. The high price of labor and all needed supplies, the cost of separating the worthless lead, and the enormous expense of shipping the silver by the overland coaches, beset, as they were, by road agents and hostile Indians, largely overbalanced the value of the silver produced.

But numerous mines have been discovered at Argenta. Some have furnished large quantities of good ores; three smelters have followed the pioneer smelting and cupel furnaces, and yet the heavy freight on fuel and base bullion consumes too much of the profits. But still the owners of the hundred mines in this old camp are hopefully working and waiting for the locomotive to bring them cheap coke and coal and take away the train-loads of bullion they could easily produce every week. Meanwhile the miners delve and rest. The furnaces and mill have a sort of spasmodic life; sometimes they glow with melting ores,—sometimes they take a long, hopeless sleep.

The following is a partial list of the mines at Argenta:—Golden Era, 300 Foot Shaft, Rena, Carbonate, Anderson, Last Chance, Paymaster, Dexter, Snowdrift, Modoc, Snowflake, Good Friday, Cleveland, Clipper, Keystone, Big Windy, Mountain Maid, Leap Year, Emma, Nevada, Big Four, Lower Mash, Widow Davis, Golden Arrow, Ram's Horn, Cornucopia, Gould & Curry, Eureka, Eldorado, Fraction, Mabel Bee, Spanish, Silver Light, Legal Tender No. 2, Home Stake, Prince of the Hills, King of the Hill, Queen of the Hills, Gladstone, Perview Stapleton, Arlington, Nelly Bell, Climax, Revenue, St. Jo, Fraction, Woolly, Tilden, Barley, Spring, Tuscarora, Goldsmith, Oregon, Elli, Cape Ann, Iron Mountain, Clara, Daylight, Anaconda, Rittenhouse, Phillippia, Louis Phillippe, Zero, Le Crock, Bobtail, Little Whale, Big Whale, Manhattan, Little Darling, Man-Trap, Wolverine, Crown Point, Phœnix, Chinaman, Ferdinand, Argentiferous, Phillip, Rainbow, Beebee, Broad-gauge, Perview No. 2, Copper, Northern Pacific, Union Pacific, Montana, Argenta, Jumbo, Carmina, White.Bank, Iron-Age and many others whose names could not be obtained.

Bannack is surrounded by numerous mines. On the Grasshopper near the city are the Golden-Leaf, Washington, Pioneer, Wallace, French, Empire, Montana, Excelsior, Junction, Silver-Arrow and many others.

The Wight mill was erected long ago to work the ores of this district. This mill is now silent and the Golden-Leaf mill is busy with its ten stamps and two amalgamating pans on the ores of the Golden-Leaf.

The Golden-Leaf is a rich mine, well worked for profit and safety. Every part is dry and well supplied with pure air. The wall-rock is limestone intersected with syenite and traprock, and the ore is rich and abundant.

In the Silver Spring district is an interesting group of mines. The New Departure, Cliff, Signal Guardian, Iron-Age and Qui-sabe.

The New Departure is a remarkable mine in a ridge of limestone in which the vein with its angles and curves, dips and spurs exhibits many remarkable facts very instructive to miners. The mine is well worked. Its shafts, tunnels, levels, stopes, winzes and uprises are safe, dry and well supplied with pure air and a pleasant temperature. Everything is done on a liberal scale and the miners are as safe and healthful and comfortable as they could be in any employment above the ground in-doors or out. Good workmen like such mines; and their superintendents can choose their men and the best of them will stay. Hence there are men in this mine who have been there for many years.

Proprietor and workmen appear to be delighted with the mine and pleased with each other, as well they may be.

Without betraying secrets, every one must know that no common mine could furnish money to do all the work shown in the New Departure and still leave much more "in sight." It is rumored that some of this ore in sight is to be taken out and worked to the amount of several hundred thousand dollars.

Blue-Cloud Camp is on the other side of the mountain. Its most noted mines are the Delmonte, Huron, Silver-Ore, Bismark, and Brick-Pomeroy. A large amount of work has been done on the mines at Blue-Cloud; but work was suspended on the principal mines when the camp was visited. It has a good reputation among miners.

Elkhorn District has a goodly number of mines so developed as to prove their great value.

The Elkhorn shows much high grade ore of silver and copper glance; the Storm has a 250-foot shaft on a large vein of quartz bearing gold and silver; the Navajo has a 14-inch vein of rich copper and silver ore; the Critic and Fraction are on the same vein as the Mono and have a ten-stamp mill to work them; the Good-Enough is shipping ore; the Park looks well; the Red Sky, Hamburg, Washington, Carbonate, Guy, Last-Chance, Cleopatra, Mascott, Mossback, Cleveland, Simpson and many other mines are at Elkhorn.

Magnet Group on Bailey mountain contains the San Francisco and the mines of Simon and Tembly and the McConnell and Wilmott group. These mines are so developed as to show a large amount of high grade silver ore. Some of the Magnet mines have shipped their ores and obtained satisfactory returns.

Lake Creek Group included the Cumberland which has considerable development and its ores have been shipped and thus proved. The Polaris has a good hoist, is well opened, has shipped ores yielding large sums, has 3000 tons on the dump and a large amount in sight in the mine.

Lost Cloud district has the Lost Cloud, Silver King and Mono, all carrying good milling silver ores. In this district are the Storm Cloud, Hidden Treasure, Pirate, Sunny Side, Bonanza, Highland Chief, Green and Nettie.

Bald Mountain district contains the Grundy, Demerit, Bell, Grizzly Bear, and other mines proved to be rich in gold and silver by ores shipped. The Faithful is worked by an arastra.

On *Comet Mountain* are the Magnet, Magnitude, Comet, Chinaman, Perhaps, and Arthur. Some of these are well developed and show excellent veins of good ores.

Dice Creek district has several mines carrying large quantities of iron ores rich in free gold. The Bull and other mines here are worked in an arastra whose amalgam and tailings show fine prospects of gold. Another arastra is running on the rich float found in Dice creek and the near foot hills.

Conner's ten-stamp mill on the east fork of Dice creek is run on the Bull and Dillon mines.

Hecla is the largest mining camp in Beaverhead. The plant of mining machinery is large and complete. The camp contains numerous mines and mining claims. Some twenty-five belong to the Hecla company, of these the Cleopatra, Ariadne, Hecla, Lion, Trappa, Mountain Sheep, and Cleve are on Lion Mountain and are worked as one mine. The shafts, inclines, tunnels, levels, and stopes made in extracting the ores are very extensive, making miles of underground work. The incline on the Cleopatra is down over 3000 feet and the tunnel to this lode is 3200 feet long. These items will give some idea of the work in this mine.

The ores are crushed and separated in the 150-ton concentrator near the mines and smelted at the reduction works at Glendale.

The Hecla Reduction Works at Glendale have produced $808,251 worth of bullion for the last year.

The concentrator near the mines at Hecla has been doing good work through the season. It is reported that this company has paid regular monthly dividends of $15,000 each, and that the whole amount thus paid is $1,620,000, more than the capital stock.

Dewey's Flat and the Lone Pine mines are becoming a very important factor in the mining businsss of Beaverhead county. The Lone Pine mill is running ten stamps and crushing some twenty-five tons of ore per diem. The ore yields about fifty ounces of silver per ton. A large amount of development work has been done in this district and the mines promise very good returns.

Vipond Group has some important mines rich in silver. The most noted mines of this group are the Brittle Silver, Pettingill, Ingersoll, Gray Jockey, Forest, Eldorado, Black Manganese, and Mewonotoc. The last of these has a large vein of rich ore. The forty-six tons worked lately gave $6,832.

Several of the mines in the Pettingill group are well proved up by a large amount of work and a ten-stamp mill has been erected to work their ores.

A mica mine has been discovered and in part developed in the Ruby mountains some twelve miles southeast of Dillon. The mica is good but so far the crystals and plates are too small to be very valuable. The vein is reported to be from 20 to 60 feet wide. Thirty feet down an ore like tripoli was found which carries silver and gold. The appearance of this ore is a very remarkable fact, provided there was no mistake about the specimen shown.

The output of Beaverhead mines for 1890 was not less than $2,000,000.

The Clerk of Beaverhead county reports 312 mineral claims recorded during 1890, of these 250 were quartz claims, 58 placer claims, and 4 coal claims.

CASCADE COUNTY.

Cascade County has reaped large advantage from its coal beds at Sand Coulee, Belt Creek and Smith's River, by the erection of the Great Falls Reduction Works, and by the location at Great Falls of the large plant of the Boston & Montana Reduction Works. The opening of the new coal field at Armington and the working test of the Sand Coulee coal will give Cascade County a still greater importance as a mining center and Great Falls as an eligible locality for mills and reduction works. The output of the Sand Coulee coal mines for 1890 was 194,505 tons.

The Clerk of Cascade reports 459 mineral claims recorded in that county during the last year. Of these 344 are quartz, 106 placers, 7 coal and 2 iron.

CHOTEAU COUNTY.

The Little Rockies will probably be reckoned among the rich mining regions of Montana. New discoveries of rich quartz veins have been made. The quartz taken out and shipped to reduction works have given such results as will secure the further prospecting of these mountains and the development of the veins already discovered.

Sweet Grass Hills have many mining claims which have been represented and considerably developed the past year. The results of this work show that the gold, silver, copper, lead and coal mines of the Sweet Grass Hills are extensive and will prove very valuable.

Bear Paw Mountains are kept in the list of mining regions by new and important discoveries. These and those heretofore made result in making these mountains one of the rich mining regions of Montana.

The Clerk of Choteau reported nine new claims recorded in that county in 1890. Of these, six are quartz, one placer and two coal.

CUSTER COUNTY.

Custer county has large areas underlaid with coal, near Miles City, on Pumpkin Creek, on Little Pumpkin Creek, Powder River and several other localities in the county. Enough is known to say that some of these coals are extensive and good in quality.

But the cattle kings of Custer are too prosperous with their vast herds in the broad plains and rich valleys to think much of mining, save to provide their own fuel. But they have the satisfaction of knowing that they have vast deposits of fuel for the supply of all future demands.

DAWSON COUNTY

Has large areas of coal not yet developed and proved up so as to enable me to give them special mention in these pages. But it is safe to say that the geological structure of Dawson County is such that we can predict an abundant supply of mineral fuel to meet all the future wants of a great grazing and agricultural population.

DEER LODGE COUNTY.

The first known discovery of gold in Montana was on Gold creek in Deer Lodge county, by an enterprising trapper; and Gold Creek, Pioneer, Little Blackfoot, Snowshoe, Washington Gulch, Elk Creek and Bear Gulch, Lincoln, Jefferson and Henderson contained many of the very early placers which made Montana so famous for gold mining in the sixties.

Deer Lodge had the first silver mill in Montana, the Hope at Phillipsburg; and one of the first gold mills, the Cable; and has one of the largest reduction works in the country at Anaconda.

Deer Lodge has two of the most productive silver mines of the world, the Granite and Bi-Metallic at Granite.

Deer Lodge produces more silver than any county in the State.

Deer Lodge has a very large number of placers still productive in gold.

Deer Lodge has twenty-five mills, some of which have continued to give their regular quota of gold and silver bullion from the early sixties to the nineties, as the Hope at Phillipsburg and the Cable at Cable.

Every mountain range which helps to inclose the beautiful Deer Lodge valley, and almost every stream and gulch in those mountains have furnished placers and veins of gold, silver, copper and lead. New discoveries of placers or veins of gold and silver and copper have been made every year for more than a quarter of a century, and even during the last year, 1,184 new quartz claims and 147 placers have been discovered and recorded by the clerk and recorder of this county.

Deer Lodge has more than fifty gulches and creeks containing placers and quartz mines, and nearly all of them are more or less productive. She has twenty-five quartz mills, fifty placers, and many thousand quartz claims, and her mines are yielding not less than $8,000,000 a year.

THE PLACERS OF DEER LODGE COUNTY.

On the Big Blackfoot and its tributaries are many productive placers. The most of them were discovered and worked early in the history of Montana mining, and they have continued producers to the present time.

Bear creek placers are still productive and a company has commenced to buy up all the claims and unite the waters and work the continuous ground by giants and bed-rock flumes.

On McLellan, a tributary of Bear, are good placers, still worked successfully as well as those on First Chance and Bearmouth. Williams Gulch and Monkey Canyon and Poorman placers are still productive, as are the Palmer placers.

The placers at Elk creek are still paying well.

Nevada creek has very extensive and rich gold-bearing gravel beds not yet disturbed, though pipe and giant have been washing out the yellow nuggets of these placers for some twenty years.

The individual gulches between Big Blackfoot and Little Cottonwood are McLellan, Lincoln, American, Wasson creek, Shores creek, Buffalo gulch, California gulch and Deer creek, Madison, Chicken gulch, Chimney, Jefferson, Clear creek, Chinamans, Nugget, Ophir, Mexican, Carpenter and Snowshoe, Henderson, Illinois, Warm Spring and Hopkins.

In these gulches are a great multitude of individual placer claims and water rights. They have produced millions during the last twenty-five years and will produce millions more in the next quarter of a century, when the waters are concentrated and giants and bed-rock flumes are used to work out the united claims in each gulch. Over three thousand acres are still held as placers in Carpenter, Ophir and Snowshoe gulches alone.

Flint creek placers, Gold creek placers, Pioneer, Yam Hill and Boulder, all are still worked for their gold deposits. The placers on Pioneer are still very prodctive, though discovered and worked among the first.

Many others might be mentioned, but enough have been named to show something of their number and their products.

QUARTZ MINING.

While in the early days of Montana mining, placers alone were sought and worked, quartz mining has gradually come to the front and is now commanding the attention of all mining men.

It may be said that Deer Lodge quartz mining began in earnest with the erection of the Hope mill at Phillipsburg to work the rich silver ores of that camp, and the Cable mill to work the rich gold ores of the Cable mine.

The Hope mill was run for years and produced tons of bullion before its managers experienced the difference between paying assessments and receiving dividends. This mill is still working away on the mines of Hope Hill, which are abundant and rich in the white metal.

The Granite Mountain, some three miles from the Hope, is probably the best silver mine in Montana. The output in silver and gold for the last year will not fall below $4,000,000.

This property is founded on a large fissure vein in granite filled with ores rich in brittle silver, ruby silver and some native silver. The amount of underground workings is very great. The map of them looks like the plot of a city. The Ruby shaft commenced 300 feet below the upper stopes, was down some 1200 feet at the close of last year and is expected to reach a depth of 2000 feet in the near future.

There are three first-class mills on the property, two at the mine and one at Rumsey, connected with the mine by a wire tramway.

Mill A has 30 stamps and 10 pans.

Mill B has 50 stamps and 16 pans.

Mill C has 90 stamps and 32 pans.

The mine employs from 510 to 530 men. They mined and worked last year 53,529,053 tons of ore, which yielded in silver 3,930,329.69 ounces and 8,583.48 ounces of pure gold; and the mine will work more ore this year than last and will produce more bullion. The Granite Mountain has declared $10,200,000 in dividends.

All the work is first-class; the mine is kept dry and well-ventilated. The company provides a reading room, commodious and well-supplied with the periodical literature of the day, a plunge bath and a good hospital with medical attendance and nurses, free to all sick and disabled miners, who pay only $1.25 a month for its support. Everything is done to secure the safety and health and comfort and intelligence of the workmen. As might be expected the miners appeared to be picked men from all the nationalities which produce experts in mining.

Besides the Granite Mountain mine the company owns a hundred or more outside mines and claims.

BI-METALIC MINE.

The Bi-Metallic is adjacent to the Granite, on a crevice vein in granite varying in thickness from 4 feet to 20. The main shaft is down 800 feet, and is cut by six levels. Down 200 feet, levels are run 950 feet west and 350 feet east to the Granite mine. The other five levels are about the same length.

The mill has 60 stamps and 16 pans, and works 80 tons a day, which yields from 50 to 75 ounces of silver and some gold. The mill is in the valley, and connected by a wire tramway one

and a half miles long. The ore is broken by two Blake's crushers, and sent to mill in 500 pound bucket loads. This company takes good care of the safety, health and comfort of its workmen. It furnishes free baths, and has a partnership with the Granite in the hospital.

The output of the Bi-Metallic must be over $2,000,000 per year.

Other mines in and around Granite Moutain and Bi-Metallic are the Blaine, Boston, New Departure, Montreal, Elizabeth, Zeus, Black Rock, Fanny Parnell, Altoona, Chalcedony, Bi-Metallic Extension, East Granite, Metallic, Metallic Fraction, Tyson, Maggie C., Rainbow, Young America, Lord Nelson. Near Hasmark are the Gold Coin, Union, Michael, Devitt and Sunshine. It is said that six companies own more than 1,000 claims on and around Granite Mountain.

Near Philipsburg are Two-per-Cent (rich in silver), Mystery, Sweet Home, Silver Chief and many others.

In Spring Gulch are the Hawkeye and Wenger No. 2.

At Black Pine the Combination mill and mine, Mountain Boy, Durango, Sunrise and Midnight are located.

On Dunkleberry Creek, eight miles south of New Chicago, the Hatta, Forest Rose, Stonewall, Pioneer, Little Jo, Mountain Chief and Little Mack are found. Some of them have been opened, and the ores shipped, and such returns obtained as to induce the purchase of a good plant of mining machinery.

Gold Creek Mountains contain many quartz claims. Some of them have been opened, and the ores shipped have given favorable returns. Good veins have been opened on Pioneer Gulch. The Potosi and other mines are large and rich in gold.

Boulder Creek has a group of very promising prospects, which have attracted the attention of the mining community.

On Rock Creek, twenty miles from Philipsburg, we have the Great Republic and many other good claims.

The Algonquin mill with twenty stamps was erected to run on the ores of Speckled Trout and Salmon mines, near Philips-

burg. The old Northwest mill in the same neighborhood has passed its days of usefulness.

Nelson Gulch, on the north of Flint Creek, has a group of promising quartz claims.

The Cable mill was erected in the early sixties to work the gold ores of the Cable mine, and has been doing good work up to the present time.

The ten-stamp mill on the Poorman, near the Pyrinees, is now reported idle.

The ten-stamp mill on the Southern Cross has lately made an excellent run.

The Red Lion mill is running its ten stamps on the Red Lion mine, six miles north of Georgetown.

A group of rich gold mines has been discovered in the Eddy district, south of Pioneer.

Ontario, Red Nell, Crapps and other good prospects are located between Georgetown and Philipsburg.

There are several mines near Anaconda. A good mining plant has been obtained for the Silver Crown, on Foster Creek.

The whole western slope of the main range of the Rocky Mountains, from the Big Blackfoot on the north to the Dry Cottonwood on the south, is intersected with veins rich in gold, silver, copper and lead. Nearly every creek and gulch has its groups of quartz claims, some of which have been developed into productive mines.

The Oro Fino District, on Gospel Mountain, has a large group of mines which in many particulars resemble the mines on Granite Mountain above described. The mines are in veins in granite, and the ores are brittle silver, ruby silver and native silver, as at Granite Mountain.

The Champion, American Ruby, New State, Silver Crown and Mountain Lion are the most noted mines in this new camp. These have steam hoists and pumps, and are developed by shafts down 200, 300 and 400 feet, with crosscuts and levels enough to

prove them valuable mines. The ores shipped and worked have made good returns.

A twenty-stamp mill to work the ores of the Champion was erected at Deer Lodge.

The Phœnix, Oro Fino, Keystone and Silver Coin have steam hoists and good working plants.

Forest City, Banker, Princess, Queen, and many others are promising claims but partially opened. The Ohio, Morning Star, Potawatimie, Ticondaroga, Magnolia, Keystone, Lily, High Tariff, and one hundred and thirty other lode claims have been located and represented on Gospel Mountain.

Silver State is a good mine on Dry Cottonwood, and there are forty other claims on this creek, many of them very bright prospects.

Leadville District is situated between Oro Fino and the Zosel District. The Humming-Bird and other mines containing galena rich in silver are in this camp.

The Zosel District, six miles east of Deer Lodge, contains the Carbonate Hill, Carbonate Extension, Bonanza, Mountain Chief, Emery, Castle Garden, Hidden Hand, Bridge St., Emma Darling, and other claims of good showing. The mines of Zosel will have full development in the near future.

On Bison Mountain, sixteen miles south of Elliston, is a copper group of which the Monarch claims to be the principal mine. The country will hear of this camp in more emphatic terms than can now be used.

The Walker Creek group includes the Lucky Baldwin, Lady Fischer, Mint and Mystery, which are reported as looking well.

On Nigger Hill, eight miles southeast of Elliston, we find the Veracious, Ontario, Lily, Comstock, Big Dick and Bunker Hill worked by an arastra. These claims and mines are held in high estimation.

On Little Blackfoot are located Wall Street, Fairview, Big Dick and numerous other claims, many of them proved to be very valuable. Some have paid from the grass-roots down.

On the divide between Ophir and Carpenter are the Mountain Queen and other claims, and between the Mexican and Nugget gulches is the Armilda; and at the head of the Ophir are the Roaring Mountain and several other mines.

The Poorman District has several good mines and many bright prospects. Among them are the Rochester, North Star, Snowflake, and the mines of the Silver Bell Mining Company. Some of these mines are well developed, and show large quantities of milling gold ores.

In Washington Gulch are a good number of quartz claims and mines, and the Michigan mill was erected to work them. The Jefferson, American, Chimney, Buffalo, California, Deer Creek and McLellan Gulches are rich in quartz claims and mines. On the mountains back of the Nevada Creek placers are numerous small veins of quartz, rich in free gold.

California Gulch has the Jim Crow, Eclipse, Etta, and other claims.

Lincoln Gulch has numerous quartz claims and mines, and the Leiser mill.

Deer Creek has the North Star and other good quartz lodes.

Jefferson Gulch has many quartz mines, and McCloud's mill to work them.

On the Big Blackfoot are the Trappa and a number of other excellent mines.

On the mountains east of the Nevada Creek placer mines, some thirty claims have been located on the small rich veins of free gold in those mountains. Some of them have been worked for many years.

Bear Gulch has a good show of rich quartz claims and mines well proved up. It has the Homestake, Climantha, Sierra, Forest, and an arastra and the Fifer stamp mill.

On Williams Gulch, a tributary of Bear, is found a group of excellent mines. Among them are the McDermot, Minnie Palmer, and a number of others.

On Elk Creek are the Aparandy and a ten stamp gold mill.

The Penobscot mines and ten-stamp mill will doubtless come to the front before long as continued producers.

The Brooke mill and Bald Butte mill at Bald Butte have made money on the mines of Bald Butte.

At the head of Clear Creek is a rich group of mines—among them are the Spring, Deer Lodge, Highland Chief, White Pine, Wilson and Sullivan.

On Harvey Creek we find the Fraud, What-is-It, and other mines.

In Monkey Gulch there is a strong vein rich in silver, gold, copper and lead. It has been traced for miles.

On the North Fork of Big Blackfoot is located a group of copper claims but little worked. They look well.

On Big Blackfoot there are some mines of gold and silver which have been worked to some considerable extent, and the ores shipped with profit.

Coal is reported in Deer Lodge County, near Stone Station, on the Flint Creek branch of the Northern Pacific Railroad.

MILLS IN DEER LODGE COUNTY.

NAME AND LOCALITY OF MILLS.	Number		Kinds of Ore	Cap'c'y per d'm
	Stamps	Pans		
Hope Mill, at Phillipsburg	10	6	Silver	.....
Granite Mountain Mill A, at Granite	30	10	"	.....
Granite Mountain Mill B, at Granite	50	16	"	.....
Granite Mountain Mill C, at Rumsey	90	32	"	.....
Bi-Metalic Mill, at Granite	60	16	"	.....
Combination Mill, at Black Pine	.....	.....	.....	.....
Black-Pine Mill, at Black Pine	10	.....	Silver	.....
Algonguin Mill, near Philipsburg	20	.....	G. S. C.	.....
Old Northwestern Mill, near Philipsburg	15	.....	Silver	.....
Cable Mill, at Cable	20	.....	Gold	.....
Red Lion Mill, at Red Lion	10	.....	"	.....
Southern-Cross Mill	10	.....	"	.....
Pyrinees Mill, at Pyrinees	10	.....	"	.....
Leiser Mill, in Lincoln Gulch	10	.....	"	.....
Michigan Mill, in Washington Gulch	10	.....	"	.....
Champion Mill, at Deer Lodge	20	.....	S. & G.	.....
Brooke Mill, at Bald Butte	5	.....	Gold	.....
Bald-Butte Mill, at Bald Butte	10	.....	"	.....
Penobscot Mill, at Penobscot	10	.....	"	.....
Huntington Mill, at Harvey Creek	Roller	.....	"	.....
Lehman & Lucas Mill, at Little Blackfoot	.....	Pans	"	.....
Sutton & Cameron Mill, at Georgetown	10	.....	"	.....
McCleod Mill, in Jefferson Gulch	.....	.....	"	.....
Bean Mill, at Little Blackfoot	10	.....	"	.....
Elk-Creek Mill, on Elk Creek	10	.....	"	15 tons

The Reduction Works at Anaconda are the largest in the country, and have a capacity of 3,000 tons per diem. The amount of coal, coke, wood and ores shipped into this place, and the amount of matte shipped out, is simply enormous. These works were erected primarily to work the ores of the Anaconda, St. Lawrence, and other mines at Butte.

It is estimated that the Anaconda smelters have produced the present year 88,000,000 pounds of copper, valued at $10,560,000.

Although this copper is run out in Deer Lodge county, it is largely the product of Silver Bow, and must be credited to that county.

The foregoing is an imperfect view of the mining interest of Deer Lodge County, which is now in its infancy, and yet produces $8,000,000 per annum, and will increase with future development. There are hundreds of mines in the county now idle. which might be worked with profit; and 1,831 mining claims were recorded in the year 1890.

FERGUS COUNTY.

With a few noted exceptions the mines of Fergus county produce smelting ores, and the expense of transporting fuel and base bullion by wagon one hundred miles to a railroad, would consume all the profits even on the high grade ores of this class. So that the most of the mines at Maiden must wait the advent of some cheaper mode of transportation before the most of their abundant and rich ores can be made available for profitable mining. It is yet true that some of the very rich smelting ores may be shipped or smelted at Maiden; and the milling ores like those of the Spotted Horse, can be worked with profit on the ground.

The work on the Spotted Horse has been continued through the year with marked success. A late run of the mill for forty days produced $50,000 in bullion. Several runs have been made during the year yielding from $25,000 to $50,000 each.

Many have continued the work of development and ore has been shipped from some of the mines. On the whole the Maiden mines look better now than they did one year ago when my last report was made.

When the whistle of the locomotive is heard in the Judith mountains, Maiden will become one of the best mining camps in Montana.

There have been 128 mining claims, 115 quartz lodes and 13 placer claims, discovered and recorded during the last year in Fergus county.

The Coal in Fergus county remains about the same as represented in my last report.

The beds on Sage Creek have been so developed and opened as to show one bed containing four feet of coal, then eight and one-half feet of slate, then eight feet of coal with some thin slate partings. The coal is good in quality.

The output of the Fergus county mines for the year 1890 was some $250,000.

GALLATIN COUNTY.

While the rich valleys of Gallatin county have produced more to feed our people when thousands of miles away from other sources of supply, than any other part of the State, her prosperous people have discovered and opened up vast beds of coal to run our railroads and mines, smelt their ores and warm our homes and business houses and light our cities. These coals speed the trains on our railroads and keep the streams of gold and copper and lead flowing from our glowing furnaces.

As if this was not enough for one county to do, Gallatin has during the last year opened up a mining district in which hundreds of quartz claims have been discovered and located in the mountains of west Gallatin.

But after the agricultural, the great industry of Gallatin is coal mining.

The Timberline mines are a marvel of extensive workings, abundant out-put of good coals and the safety and health and prosperity of its hundreds ot miners. Miles and miles of adits and rooms have been worked out while other miles and miles have been proved ready to yield up their rich treasures of fuel. Dry and pure air follow the miner in all his workings.

These mines are yielding many hundred tons a day to supply the locomotives of the Northern Pacific from Spokane Falls to St. Paul and are now prepared to increase their out-put.

Mountain Side has vast beds of excellent coal all opened for the pick of the miner and to be dumped into the cars of the railroad.

Chestnut, too, has the mountains full of coals. The mines of Chestnut are well worked and furnish from 50 to 100 tons daily for the Montana Union. The Chestnut mines are in the same coal field as those at Timberline.

Hudson's Coal Bed is the same bed as the Chestnut and one mile from Siding. This mine shows a bed of good coal varying from two to twelve feet in thickness.

Vogel & Burgler's mine has been opened in many places and its great extent thus proved. This mine and Hudson's are on West Trail Creek.

Thompson's coal mines are on the same coal bed and have vast quantities of of good coals. These mines are also on West Trail Creek.

The Northern Pacific coal mines are on the same bed on the same creek. These mines on West Trail creek are but little worked as yet.

On *Bridger Creek* numerous coal mines have been opened for a distance of twenty miles to the divide between Bridger and Sixteen-mile creek. Among those opened are the Davis mine, Mount's mine, Shoneberger's mine, Beasley coal, Rease coal, Swanson's coal, Speith & Krug's mine, and the mines on Schlessman's gulch.

Cockrill's coal bed is in the mountains, nine miles north of Central Park. This mine is on a regular coal vein in the rocks tipped up to a position nearly perpendicular. There are some four feet of coal. It is shown in several places along the ravine, and is an extensive bed in regular coal strata.

Sixteen-Mile Creek on the northern border of Gallatin has many coal mines partially developed. It needs the good and intelligent work of the miner to determine the extent, quality and value of the coal beds on Bridger and Sixteen-mile creeks.

In the West Gallatin District discoveries have been made during the year past which have at times created that kind of excitement so often produced in early days by the report of the discoveries of new placers. Something like a regular stampede took many to the new district where numerous placers, quartz claims and coal mines were located. Future developments only

can tell the value of these discoveries of placers, quartz claims and coal beds.

During the last year from December 1st, 1889, to December 1st, 1890, 104 mineral claims were recorded in Gallatin county. Of these 66 were quartz claims, 27 placers and 11 coal claims.

JEFFERSON COUNTY.

The mines of Jefferson, as a whole, were never in a more prosperous condition than during the present year. Though some of the old mines which have been reliable producers, have been idle, enough new ones have come to the front to more than keep up the general output of metals.

The Placers, through the scarcity of water, will come short of the usual product. Still a large number have produced gold enough to keep up the output of this metal and keep the miners on the safe side of the balance sheet.

Basin, Upper Basin, Penn Placer, Cataract, Boulder, Little Boulder, South Boulder, Holmes Gulch, Jackson Creek, Clark's Creek, Sky High, Beaver Creek, Indian Creek, Bedford, McLellan, Mitchell, Prickly Pear, Pipestone, Hot Springs Creek, Jefferson Bar and other placers have contributed more or less of their usual products of gold. All these placers still have gold for the miner, and will yield it up in proportion as the miners shall bring in the water and use the appliances necessary to make it most effective.

Jefferson offers several illustrations of the rapid changes which accompany placer mining. Productive mines gave Jefferson City an early and rapid growth, which later stage lines and railroads have scarcely been able to keep up. Montana City, rich and prosperous, once bid fair to be the metropolis of Central Montana; but with her mines the many who made fortunes in them, have long since departed.

The quartz mines of Jefferson County are very numerous, and hundreds of them are yielding their regular annual products. Every foot-hill and mountain around the above named placers is full of veins of quartz rich in gold, silver, copper, lead and iron. Thousands of discoveries and claims have been located and recorded—1,660 during this year. A few of these have been opened and made productive enough to place Jefferson in the front rank of our mining counties.

The Gregory, which in the early days attracted all by its glittering ores of argentiferous galena streaked with crystals of antimony, still produces its rich ores. The Alta, Comet, the Aqua Frio, the South Atlantic, the Emma, the Josephine, Peerless Jenny, the Crescent, Copper Bell, Ida, Elkhorn Queen, Holter, Little Emma, Amazon, Eureka, Ruby, and many others are constantly contributing their treasures to swell the general output of Montana mines.

In the Upper Basin District, though some of the best mines have temporarily suspended operations, enough new ones have joined the list of producers to keep the ore wagons running to the depot at Rimini.

The Crescent is a constant producer of its beautiful ores of iron pyrites, galena, and sulphide of copper rich in gold and silver.

The Sallie Bell, North Pacific, Eureka, Ida May, Enterprise, Buckeye, Josephine, Red Rock, Monarch and Ontario, Duluth, Emma Nevada, Morning Star, Comstock, Crœsus, Katie Leith, Little Alma, Young America and Grand Central are some of the regular producers of the Upper Basin. There are many others like the Lady Leith, Obelisk, Comstock, Aryan, awaiting development to join the great number of producing mines in the Upper Basin District.

Cataract District has a number of producing mines—Copper Bell, Boulder Chief, Ida May, Bluebird, Overland, Hiawatha, Rock of Ages, Lightning, Ontario, Mount Thompson, Redemption, Mountain Chief, Captain Cook, Atlantis, Rose, Evening Star, Bullion, Silver King, Garfield, Big Medicine, Humboldt, Nonesuch, Homestake and Lily.

Cataract District ships 50 cars a month, which yield not less than $50,000, or a total of $600,000 a year.

Near Wickes are Comet, Silver Hill, Gregory, Penn Yan, Alta, Rumley, Vista, Bluebird, Valdemere, Minah, Excelsior, Blizzard, Alpine, Harriet, Amelia, and many others, which yield large sums every year.

Amazon District has several mines which are shipping ores more or less regularly—Bambo Chief, Mono, Pilot, Amazon, Von Arnim.

Virginia Bell, Stella, East Pilot are producers.

Willow Springs District has several producing mines, as the Ida, Iliff, Fairview and Ruby. The Ruby is yielding a car-load of good ore a day, and the Ida is placing its ores on the dump for the winter and free coinage.

Bigfoot District has the Bigfoot, Dodge, Grizzly, and other promising mines.

The Elkhorn District is fully sustaining its good reputation for productive mining. The Holter is still a constant producer of bullion, and many other mines in the district ship their ores to outside reduction works. Among the producing mines in this district are the C. & D., Elkhorn, Queen, Dunstone, and others. These mines ship some twenty to twenty-five car-loads of ore each week, which do not yield less than $20,000. The Elkhorn District is now producing at the rate of $1,000,000 a year. There is a furnace at Elkhorn not now in operation.

The Elkhorn mill is yielding some $36,000 per month in bullion.

Indian Creek has the Cyclone group, Patsywatomie, Mineral Hill, Silverware, ad many others.

Crow Creek District has a group of promising copper prospects on some veins in argillaceous shales. The Cherokee, Green Copper, Silver Reef and Henry belong to this group, and will at an early day rival the best copper mines in the country. My last report shows their favorable relations.

Many claims have been located in the new White Hall District during the last year.

The Beaver Creek District has a number of mines which make regular shipments of their ores. The Aqua Frio, East Pacific, Iron Age, Little Bonanza, Ben Kimber, Park, Gold Dust, Aurora, Eclipse, McClintock, Custer and a large number not developed are in this district.

There is a ten-stamp mill on Beaver Creek, built to work the ores of the Iron Age.

Park District has long been noted for its mines. The Clipper, Gold Dust, Switzerland, Uncle Ed, Silver Bell, Jaw Bone,

Hard Cash, and others are located in Park. Dog Town has numerous good prospects; among them are the Ruby, Black Hawk, Red Wing, Elgin, Summit, Alice, Reynold, Whippoorwill, Hope and Black Prince.

Cardwell District has the Gold, Gold King, Gold Bug, White Star, Shiloh, and Ohio.

Radersburg has a number of mines. The Keating, Ringwald, Eiffel, Edith, Black Hawk, Elgin, Jo-Jo and Jewell. Regular shipments of ore are made from the mines in this mining region.

Boulder has the Virginia Bell, Louise, Mollie McGregor, Burlinggame, Bamboo Chief, Ella and Hidden Treasure.

Dog Town District has a large number of mining claims supposed to be rich in precious metals.

The mills, furnaces and concentrators of Jefferson county are very numerous.

CONCENTRATORS.

Comet concentrator at Comet.
Corbin concentrator at Corbin.
Cataract concentrator at Cataract.

FURNACES.

Gregory smelter at Gregory.
Elkhorn furnace at Elkhorn.
Reduction works at Wickes.
Amazon smelter at Amazon.
Sampling works at Boulder.

MILLS.

Elkhorn mill at Elkhorn; thirty stamps.
Bonanza Chief mill at Montana City; ten stamps.
Keating mill at Radersburg; twenty stamps.
Iron Age mill at Beaver Creek; ten stamps.
Smith mill on Indian creek; twenty stamps.
Dumphy mill in Park district; twenty stamps.
Jewell & Sage mill on McClellan; twenty stamps.
Emanuel mill in Park district; five stamps.

Prickly Pear Valley from Montana City to Jefferson City has its hills and mountain sides as checkered with quartz claims and mines as its valleys were with placers. McClellan, Mitchell, Clancy, Jackson Creek, Clark's Creek and Holme's gulch all have numerous quartz mines and claims more or less developed.

In the foot-hills opposite Montana City are a great number of mines and prospects. Among those most developed is the Bonanza Chief which has a twenty-stamp mill for working its ores. The ores in this region are free milling down to permanent water.

The Little Emma, Sterling Price, and Marietta on Jackson creek are noted for their rich ores and large returns. Harrison and Molly Hunter on Sky High gulch and Standard, Water-Witch, Rising Sun, Rainbow, Hopeful, Silver King, Little May, Rebecca, Trojan and Yellow Jacket are samples of a large number of quartz claims on Clark's creek and Holme's gulch. On Packer are Pay-up and Fine-Gold; on Big Indian are the Gold-Hill and Alabama.

At *Porter Grove Camp* north of Dog Town are the Eureka, Eureka Extension, Anna, St. Louis, Golden Crown, Travonia, Lost Horse, Potomac and Great Western.

The above are not more than a tenth of the mines and mining claims in Jefferson county. Every foot-hill and mountain seems intersected with veins of gold, silver, copper, and lead; and every gulch and creek carry gravels rich in nuggets and fine gold. During the present year 1660 mining claims have been recorded. 1466 quartz claims and 194 placers.

The mines of Jefferson county have produced fully $3,500,000 during the year 1890.

LEWIS AND CLARKE COUNTY.

Mining in Lewis and Clarke county began early in Last Chance, where the Queen City of the Mountains has laid the foundations of her palaces. Last Chance has paid miners' drafts to the amount of some $30,000,000, and is continuing to pay them with a liberal hand. All the principal buildings of Helena have their foundations in gravels that have paid, or would pay, if the miners were permitted to present their claims. Oro Fino and its tributaries, Park, Arastra, Squaw and Limekiln Gulches, were the feeders of Last Chance, and all have liberally paid the

miner for his work. In the mountains around these gulches are the hundred veins of quartz from which the Last Chance glacier ground out the gold so abundant in all these gulches.

A few hundred yards east of Last Chance is Dry Gulch, once filled with busy miners, but now a busy street of the Queen City. Above are West Dry Gulch, Tucker and Big Indian, all once rich in placers, all rich still in placers, and much richer in quartz. Here Tucker joins hands over the divide with Big Indian, and Sky High in Jefferson county. Before the water famine a bed-rock flume was working up Dry Gulch with a big giant in front cleaning up the gravels from rim-rock to rim-rock.

Three miles west of Last Chance is the Ten Mile, where the Broadwater and the great Natatorium are built in the golden sands, which extend along the bed of the creek for more than twenty miles up into the main range, where Red Mountain rears his imperial head, crowned with veins of precious ores, and where the R. E. Lee, the Peerless Jenny, the Eureka, Atlanta, and a hundred other mines attracted two railroads and fostered the young city of Rimini.

A little further west is the Helena District, and then to the northwest are the Scratch Gravel placers and veins so rich that nature must needs make them small, and veins so large the gold was not sufficient to make them rich. Then come Iowa, Butcher Knife and Spring Gulches, not so rich in placers, but the surrounding mountains are full of veins rich in silver and gold.

The north fork of Ten Mile is the Seven Mile, whose bed is a continuous placer from the Seven Mile house to the Greenhorn and the main divide on both sides of the Mullan tunnel.

Next north, we come to Silver Creek, rich in placers, which come down from the Drum Lummon and other mines, for whose treasures two railroads laid their tracks up to Marysville.

On the north of Silver Creek comes Trinity, drawing its golden sands from the Gloster and Empire mines.

North of Trinity are Canon and Lyons Creeks, leading up to the Jay Gould and Stemple.

From Lyons Creek north, but few veins are known till we reach the promising mines of Wolf Creek. Several quartz claims have been opened on the Dearborn and others on the head waters of Sun River.

French and Spokane Bars and their placers and other placers are on the Missouri between the Gate of the Mountain and Canon Ferry. These placers still yield gold, but they have become more noted for their sapphires than their gold. The gems gathered from them are oriental sapphires, which rival the diamond in their brilliant and varied reflections and in hardness and durability.

The mountains between the Prickly Pear Valley and the Missouri have many good prospects.

East of Helena, in the mountains between Helena and Holmes Gulch, is a group of quartz mines and prospects. Of these the Humboldt has attracted the most attention, and has been developed with satisfactory results.

Dry Gulch and all its tributaries are fringed with hundreds of good quartz mines and claims. A promising mine is opened on a regular vein of quartz in the city limits,—the Craig mine, on Rodney street. Just above town is the Ruby, opened in limestone. Still higher up and on the west fork are the Geraldine, Jumbo, None Such, Ella Heron, Ella Howard, Blackstone, Sixty-Four, Maginnis, Iron Age, Summit, Eleanor, Little Hope, Sutherlin, Clide, Little Jennie, Buckeye, Oro Cache, Conductor, Wood-Tick, Treasurer, Mayflower, Champion, J. E. Watson, Silver King, Iron, Sunset, Uncle Sam, Ben Alta, Iron King and others.

On the east fork is the Briscoe group, the Montana Gold, the Montana Silver, Iron and Holm lodes. And in Tucker and Spring Gulches and in the surrounding mountains, are numerous good mines.

On Spring Fork are the Badger, McLellan, Emma, Winscott, Montana, Fisher, and other lodes; also a first-class mill, the Winscott, to work them. In Tucker are the Cleveland, Florida, Titus, Granite, Dandy, Sunrise, Silverman, San Juan, Eclipse, County Line, Vanderbilt, Boulder Hill, and the O'Rear mill.

Some of these mines have yielded considerable quantities of telluride of gold fabulously rich, as shown by several analyses. Mr. O'Rear sent some to the Bank of England, which assayed $325,000 per ton, and the bank offered Mr. O'Rear $110 per pound for this ore. The small placers of Tucker and Spring Gulches have yielded over $2,000,000, and are still rich.

Oro Fino and its branches, Arastra, Park, Grizzly, Squaw and Limekiln gulches, are surrounded with mountains full of veins rich in gold. On the head of Oro Fino are the Whitlach Union, the Mac, Crystal, Twilight, Daylight, Big Mountain, None-Such, Park, Merrimac, and a host of other claims and mines.

At an early day the Whitlach mill was erected to work the Whitlach Union, and its success brought four other mills to work the mines on the head of Oro Fino, Park and Grizzly, and Unionville became a flourishing camp with an ambition to rival Helena. But a blight fell upon the place, the mills joined the Idler's Club, and the busy people dispersed to other camps. But this dry rot which fell upon Unionville was no fault of the mines. The Whitlach with twenty stamps, the Dumphy with fifteen stamps on Park, and the Philadelphia with thirty stamps were once at work at the head of Oro Fino; but all are now idle. The time, however, is not far distant when the music of sixty stamps will again be heard in these beautiful valleys.

Arastra Gulch has a number of good mines and prospects on veins carrying free gold. Among them are the None-Such, Buckeye, Golden Mountain, Southern, Iron King, Gem, Manhattan, Uncle Sam, Excelsior, Sunset, Ella Howard and others.

The Ten Mile is certainly one of the most promising districts in Montana. In addition to the placer mining, many good quartz veins were discovered in an early day. Some of these, as the R. E. Lee, have been worked by spasmodic efforts for twenty years and more. From the beginning it showed a vast body of ore rich in silver, lead and gold. The materials for a smelter were once shipped to Helena to be erected on this mine, but the project was abandoned and the material sold. Afterwards the concentrator was put up. This mine alone ought to yield a million a year. There are numerous other good mines around Rimini. Red Mountain is full of veins and tunnels. Peerless Jenny has an enviable record for its rich ores, and the Eureka is coming to the front as a large producer; and the Atlanta and a score of other mines are showing up rich ores enough to make the fingers of millionaires itch to handle them. And besides, the Josephine, the Crescent and other mines in the Upper Basin and its fire-clays all are and will be tributary to Rimini and Helena.

The numerous masses of rich tin ore found in the placers of Upper Ten Mile prove beyond all doubt the existence of those

ores in the mountains above these placers. Stream tin and float tin follow the same laws as stream gold and quartz float, and thus prove the presence of veins above.

Several branches of Ten Mile are rich in quartz veins.

Blue Cloud Gulch had some promising mines, and a ten-stamp mill was erected to work the ores of the Blue Cloud. The War Eagle, Golden Eagle, Sucker, Lincoln, and other good prospects are in this gulch.

Nelson Gulch, once famous for its rich placers, has several good quartz mines,—the Shober, Manassas, Sagamore, Robedeaux and Yellow Boy. Opposite Nelson is the Old Battle Ground, and in the foot-hills above are the Humboldt, Claggett, Old Dominion, Morning Star, Carrie, Flora, and several other prospects rich in copper and silver and gold.

Colorado Gulch has a large number of quartz claims, some of them partially developed. The King David, Hopewell, Ingersol, Baby, Trustful, Champlain, Banner, Princess, Sunnyside, Florence, B. & R., Cambria, Wanderer and Gold Flake may be named as showing good ores.

Red Mountain has a large number of mines, and a large amount of work has been done to develop them. Among them are the Legal Tender, Garfield, Gregory, Silver Reef, Saratoga, Emma, Granite Mountain, Iron Cap, Iron Dollar, Ontario, Snowdrift, Alcada, Mizpah, and many others. Reed's Tunnel, Russell's Tunnel, Merrill's Tunnel, and a large number of other claims are in Red Mountain.

Above Red Mountain are the Peerless Jennie, Little Jennie, Eureka, North Pacific, Retta, Midnight and Sallie Bell.

On the mountain east of Rimini are the Atlanta, Gum-Boot Jim, Hunter and General Shields.

Below Rimini are the Capitol, Yellow Boy, Orphan Boy, Bonanza, Little Bonanza, Sterling Price, Mac, Enterprise, Knickerbocker, Tin Horn, Morning Star, April Fool, Stonewall Jackson and Washington.

Such are some of the mines and mining claims on the Ten-Mile and its tributaries. Many of them are producing mines

and are now shipping some 400 tons per week, while others show a large amount of ores which may be taken out and shipped with profit.

The Helena District, just west of the Broadwater, has many claims partially developed which promise well. The Helena, Christmas Gift, Grass Valley, Syndicate, Consolidation, Hazle Dell, Cross Fire, Security, Sterling, Silver Hill, Good Luck, Diamond R, Good Faith, Rising Sun, Bonanza, Nora Darling, South Helena, Quincy, Jennette and Norma.

In the mountains above Scratch Gravel, Iowa and Butcher Knife Gulches a very large number of rich claims have been located, and many of them have proved productive; as the Golden Crown, Bradford, Eclipse, Wild Cat, Gen. Harrison, Gen. Sherman, Crown Point, Ruby, Jumper, Marat, Fraction, Lone Tree, White Swan, Dandy, Sacramento, Silver Drip, Blue Ridge, Baker, Virginia Bell, Humming Bird, Carter, Elizabeth, Leader, Pine Tree, Montana, Climax, Mineral Point, May, Plattsburg, Black Diamond, Badger, Jumper, Viola, Valentine, Gold Finch, Beneta, Dexter, Ontario, Gold Bug, M. A. P., Lexington, Summit, Grand View, Morton, Quincy, Ironclad, Iron Lode, Great Western, Dolly, Black Duncan, Embody.

In the mountains between North Prickly Pear Valley and the Missouri River are found the Silver King, Silver Brick, Deer Trail, Silver Cap and Golden Messenger; these and other prospects show the evidence of rich veins in these mountains.

Seven Mile, the western fork of Ten Mile, has the War Eagle, San Jose, Gem, Jennie Lind, Cheyenne Bill, Francis, Spring, and many other good mines and prospects. On Greenhorn, a fork of Seven Mile, placer mining is still prosperous, and several promising quartz claims are located, such as the North Pacific.

Marysville District is well known for the Drum Lummon, St. Louis, May, Pittsburg, Gold Hill, Louisiana, Bald Butte group, Big Ox group, Carbonate, Gen. Jackson, Empire, Rose Denmore, Mayflower, Uncle Ben, North Star, South Montana, Peggy Ann, Champion, Vanderbilt, Coyota, Florence, Irish Girl, Bell, Last Hope, Bull and Bear, Johnson, Richmond, Wood-Chopper, Frankia.

South and west of Drum Lummon are the T. H. Meagher, Bon Mahon, Star of the West, K. of S., Lewis, Montana, St.

Louis, Prospect, Marble Heart, Killy, Jeannette, Holland, Robert Emmett, Black Diamond, Marble, Little Phil, Louisiana, May, Pittsburg, Grey Eagle, Summit, Rose Cleveland, Intimidation, Atwood, Emma Muller, Hickey, Bluebird, Sanford and White Boy.

The Drum Lummon is one of the best mines in America. It has three mills running 120 stamps, which crush from 6,000 to 7,000 tons per month, and yield some $100,000 per month—sometimes as much as $112,000. No mine is better equipped with all modern appliances, and none is better managed for profitable results and for the safety and health of its employes. The output of this mine since the present company took it, is something over $8,000,000.

The Penobscot, with its forty stamp mill, was once a famous producer of bullion. Around the Penobscot are the Snowdrift, Black Hawk, Leopard, and other lodes.

The Belmont also had a thirty-stamp mill which gave abundant returns. But when the music of thirty stamps will once more awaken Belmont no one knows.

There is a fine group of mines on Lost Horse Creek called Tousley Gulch. The Consort, Earthquake, General Grant, Tousley and Cement are promising claims. These mines show large quantities of ores rich in silver, gold, lead and copper. Some of them have shipped large quantities of rich ores. Here we also find the Summit, Bell Boy, Gleason, Nile, Republic, Jerusha, R. E. Lee, Gold Leaf, Cleveland, Tom Moran and St. Patrick.

The Gloster and its sixty-stamp mill are idle for no good reason. There are the Ophir, Regan and East Regan.

The Empire and its sixty-stamp mill are still idle. There is no want of ore in the mine, and in the Whippoorwill, M. & L., Smithville, Homestake, American Flag, Lost Whippoorwill, Puritan, Cornucopia, St. Lawrence, Triumph, Bronca, E. L. F. and Blackbird.

In the Stemple District, on the waters of Canon and Lyon Creeks, are a great number of quartz claims and quite a show of paying mines.

The Jay Gould and its mill have done good steady work for many years, much to the satisfaction of its owners.

The Hubbard is a new mill on a group of claims producing free gold in oxide of iron. When permanent water is reached the gold will be locked up in sulphuret of iron. These mines are Grab-All, Black Iron and Hubbard.

The Stemple five-stamp mill and Homestake mine have had a history rich in the memory of old-timers. The Hidden Treasure, Columbia, Alpha and Omega are among the many mines around Stemple.

The Bachelor is a promising mine near Stemple, and the North Star is one of the many good prospects east of the Jay Gould. The Bachelor ten-stamp mill is located near Stemple.

On Wolf Creek, a fork of the Prickly Pear, are quite a number of fine claims rich in gold, silver, copper and lead. Of these the Sunflower, Copper Queen, Copper King, Tiger, Champion, Liberty and Mountain View have been developed enough to show they have large quantities of rich ores of the above named metals.

On the Dearborn are the Sweetheart, Sweetheart Extension, Fairview, Fulton, Free Coinage, Specie Payment, and other claims which show goodly quantities of fine ores.

At Galena Camp, on the Smith's Fork of Sun River, there are many quartz locations which carry argentiferous lead ores in encouraging quantities. More development is necessary to prove up their values.

These facts show that nearly every stream and ravine which comes down the eastern slope of the main range of the Rocky Mountains in Lewis & Clarke County from Holmes, Gulch on the northern border of Jefferson to Sun River, every adjacent foot-hill and mountain is full of hundreds and hundreds of rich placers and quartz veins filled with ores rich in gold, silver, lead and copper.

The Clerk and Recorder of Lewis & Clarke County reports 338 mineral entries recorded in 1890 in this county.

The output of the mines of Lewis & Clarke has been fully $3,000,000 during the year 1890.

MILLS AND FURNACES IN LEWIS & CLARKE COUNTY.

Name of Mill.	Stamps.	Location.	Remarks.
Cruse Mill	10	Marysville	Running
Drum Lummon Fifty-Stamp Mill	50	Marysville	Running
Drum Lummon Sixty-Stamp Mill	60	Marysville	Running
Gloster	60	Gloster	
Empire	60	Empire	
Penobscot	40	Penobscot	
Belmont	30	Belmont	
Mount Pleasant	10		
Jay Gould Mill	10	Stemple	Running
Hubbard Mill	10	Stemple	Running
Homestake Mill	5	Stemple	
Colliston Mill	5	Helena Dis.	Idle
Hicky & Crocker Mill	10	Sugar Creek	
Winscott Mill	10	Spring Gulch.	Idle
O'Rear's Mill	5	Tucker Gulch.	Running
Shaffer Mill	5	Oro Fino	Running
Whitlach Mill	20	Unionville	Idle
Columbia Mill	30	Unionville	Idle
Hendry Mill	20	Park City	Idle
Constance Mill	10	Nelson Gulch.	
Dumphy Mill	15	Park Gulch	Idle

SMELTERS.

Name.	Stacks.	Location.	Remarks.
Helena Reduction Works	4	East Helena	Running

SAMPLING WORKS.

Name.		Location.	Remarks.
U. S. Sampling Works		Helena.	Running

CONCENTRATOR.

Name.		Location.	Remarks.
R. E. Lee		Rimini	

MADISON COUNTY.

In the early history of Montana mining, Alder Gulch followed close upon the heels of Grasshopper, while Virginia City and Madison were second in chronological order to Bannackand Beaverhead, the vast yield of gold from Alder soon attracted the people of the mountain regions to the camps on that gulch and Virginia City was built up by a prosperous people and soon became the emporium of trade, the capital of the Territory and the centre of social and refined life in the new mountain country which soon became Montana.

Alder Gulch for sixteen miles from the summit down was as full of men and active life as an ant hill is full of ants in a warm June morning.

Hundreds, yea, thousands filled their purses and belts and secret pockets and grips with the shining dust and took their way by frail boats down the Missouri river and by the Overland coaches via Ogden and Omaha to make glad their loved ones in their eastern homes. Though many a one fell on the way by rifle of road agents and the hostile Indians, enough remained attracted by the golden sands, the glorious climate, the vast rich pastures and the abundant harvest of garden and field to lay broad aud deep the foundations of a great commonwealth.

Many of our citizens who were then wielding the pick and shovel and rolling the wheel-barrow and piling away the troublesome boulders are now wielding vast fortunes in other departments of business.

From Alder the miners swarmed out into scores of neighboring gulches whose golden sands rewarded their unwearied labors with rich harvests of the precious metal.

Oro Cache, Bachelor's, Brown, Spratt, Mill, William's, Business, Harrison, Ramshorn, California, Granite, Nevada and scores of other gulches gave our pioneer miuers rich returns for their untiring labors; and the placers on the Ruby, Stinking Water, Washington Bar, Spring Creek and Pole Creek, Hedge's placer, Jackson's placer, Parkinson's placer, Richmond Flat placer, Housell placer, and Clark placer in Norwegian gulch and Jefferson Bar and many other streams and gulches in Madison furnished "rich diggings" for the pioneer miners.

In these placer mines were found nuggets of gold which contained more or less of quartz and masses of quartz which contained particles and nuggets of gold. And, besides, when bed rock was cleaned off there were veins of quartz runniug through the country rock which contained particles of gold. This led to the conclusion that the gold in the placers came from quartz veins in, around and above the gulches containing placers. This conclusion caused an examination of the country around the gulches which were rich in placer deposits. Many veins of quartz containing gold and silver were discovered and mills were erected to extract the precious metals.

The news of these discoveries and rich specimens of the veins soon spread over all parts of the country. Men who had pluck and energy and money, sent mills and agents to crush these ores and extract the gold and silver.

In a few years the Oro-Cache mill, the St. Louis mill, the Illinois mill, McClure mill, Postlewaite mill, Scranton mill, Nelson mill, Christenot mill, John-Howe mill, Branham's mill, Ward's mill, Rochester mill, Silver Star mill, Green-Campbell mill, Kennet mill and a score of arastras were erected and were pounding, crushing and grinding the ores of the many rich veins of Madison county.

Some of these mining enterprises live only in the memory of those who saw their operations and in the ruins of the mills, arastras and other works. Some have continued to the present time and some of the mills have been moved away and are now working out fortunes for their owners in other localities.

These early mining enterprises in Madison had, as such enterprises generally do, varied results.

A vast majority of the placer miners in Alder and the other gulches took out gold enough to make themselves and their families comfortable for life. Many made independent fortunes and some squandered the gold that came day by day in gambling and riotous living.

These placers have been worked for a quarter of a century and they are still giving up their golden treasures to those who continue to work them. Companies are still working all along the sixteen miles of Alder Gulch and hundreds of thousands of dollars are taken out every year. But the small supply of water limits the production of gold, and the great fortunes from Alder

are yet to come. When some enterprising company shall buy the sixteen miles of this historical placer and shall bring in several thousand inches of water and wash out its golden sands from rim-rock to rim-rock, many millions will be the reward.

Alder has doubtless yielded $100,000,000. It is now yielding some $250,000 a year and will under future improvements yield millions a year.

There are many gulches tributary to Alder which are still paying those who work them. Oro-Cache, Brown, Harrison, Spratt, Granite, Harris, Business, William and Mill gulches all contain placers not yet worked out.

The Stinking Water and its tributaries, the Ruby, Bevins, Wisconsin, Ramshorn, Sheridan, (Mill creek), Goodrich, Georgia and Indian, have extensive placers still awaiting that enterprise and skill which brings improved methods of extracting the gold.

The Jefferson is just coming to the front with its extensive placers and bars and vast quantities of river-bed gravels, all proved to be rich in gold. Work has been commenced on Jefferson Bar with courage enough to bring in distant waters and with skill enough to introduce the most approved methods and appliances for profitable mining. Vast areas of placer ground on the Jefferson are now challenging the attention of miners.

Old river-channels have been the Eldorados hunted by gold seekers in all ages and in all placer countries, and thousands have spent fortunes and their lives in seeking and exploring such channels, covered up by the deposits of more recent geological periods. But the Jefferson offers a river channel all exposed beneath its clear waters with immense quantities of golden sands and gravels free to all. Rich returns await those who shall raise these gravels from the bed of the Jefferson and the Missouri and utilize their waters in washing out their gold. Here is gold enovgh and water enough for the miners of the next century.

The Jefferson has many tributaries which contains productive placers. Rochester, Iron-Rod, Cherry, Fish, Percy, Pipestone, Hot Springs, Box-Elder, Antelope, Willow, Pony, and Norwegian all still have productive placers.

The Madison also and its many tributaries have extensive areas of productive placer ground. Meadow creek has the

famous Washington Bar, Hedges placer, Parkinson and Placer ravine, Red Bluff and Pole-Creek. Pole-Creek placers and Washington Bar have been worked for years, but their vast beds of gravels have been scarcely reduced. At the present rate of working these beds will last for many years.

On the Norwegian Creek, Jackson's placer, Howell placer and Clarke placer are still worked with fair results.

While it is true that the richest part of many of these Madison placers have been "worked out" as the expression is; (it would be better to say worked over); it is also true that the primitive methods used and the wasteful haste to get rich indulged in, left much of the gold in the ground, so that improved methods and accumulated waters will give even better results than those at first obtained.

But notwithstanding all the vicissitudes that must attend a new and untried business, quartz mining has continued in Madison. Old mills have been worn out, new ones have been erected and the music of many stamps has been continuous for a quarter of a century.

Meanwhile many thousand quartz deposits have been discovered and recorded. Hundreds of these have been so developed as to prove they contain vast quantities of valuable ores, but of such a character that they require very extensive reduction works for their successful treatment. For such mines cheap transportation is necessary to secure immediate profits. Railroads have been built to some districts and thus secured the successful working of their mines.

On all the streams and gulches above named as containing placers, quartz veins have been discovered from which the ancient glaciers ground the gold deposited by the waters in the placers of bench, bar and river channel. The prospector's pick and shovel have revealed quartz veins on nearly every hill-side and mountain slope bordering Old Alder and all its tributaries.

Many of these discoveries have been so opened up and developed as to show they are very valuable mines. Mills are running on some of them, but a great majority of these mines show ores best adapted to smelting works.

As might be expected many veins of quartz have been discovered at the summit or head of Alder. Some of them have

been worked and milled for free gold. When the ores changed to sulphurets another process was required and the old mills could not extract the gold. The early mines at the summit were the Steele, Oro-Cache, Lucas, Apex, Scranton, Keystone, Kearsage and Snow-Cap. The ores of the Oro-Cache yielded up at least $1,250,000 and the other mines smaller sums in the mills which worked their ores.

On Alder, between the summit and Virginia City, many quartz mines have been opened. Among the good prospects may be named the U. S. Grant, Bell, Montana-State and Prospect mines.

The Alameda and Alfreda are now worked by the N. York and Montana mill at Virginia City.

In Brown's gulch, mines were worked in the sixties by the Connor mill and the Howe mill and three arastras. These early works built up the town of Bullion City at the head of this gulch. Many veins have been discovered here and a large part of them developed so far as to show they have vast bodies of rich ores. Among them are the Pacific, Utah and Northern, Grubstake, Eastern-Sun, Black-Lode, Brown, Brown-Extension, and True-Blue.

On the ridge between Brown gulch and Williams are the Highland Chief and Mountain Flower mines.

In Spratt gulch is another group of good mines. One of them the Spratt mine is well proved by underground work and by the ores extracted.

On the divide between Alder and Williams gulches are the Wisconsin, Sailor-Boy, Last Chance and other mines.

In Mill gulch are the Loam and Jesse-Morgan mines.

Granite has many promising mines and the Plattner mill was erected to work the ores of this rich region.

Ramshorn is another gulch rich in quartz claims, some of which have been proved to be permanent mines. The Bedford, Melrose, Inca, Flagstaff, and Mountain-Boy all have large bodies of ore rich in lead and silver. The Fairview, Pedro and Myrtle mines are in this gulch. There is a stamp mill in Ramshorn.

Over the ridge from Virginia City are the old Kennett mine and what remains of the Kennett mill. A new mill has been erected for working the ores of the Bertha some of which are very rich in free gold.

California gulch also has many good prospects and promising mines carrying lead, copper, silver and gold. The Wisconsin, Head-Center, Louisa, American-Flag, Winfield and many others might be named as giving promise of good mines.

Harrison gulch has many claims shown to contain much rich ore.

On Granite gulch are the Granite and other mines of reported richness and value.

Business gulch has claims reputed rich.

These various mining camps near Virginia City and in gulches tributary to Alder have enough good quartz veins to make this region as famous for its quartz mines as it once was for its placers.

A railroad only is needed to carry to the smelters the thousands and thousands of tons of good ores now on the dumps of a hundred claims to furnish money enough to make these mines the pride and boast of the country and make Virginia City a great and permanent mining centre.

The streams tributary to the Stinking-Water have a large number of quartz claims, many of them are bright prospects and many of them have been developed into paying mines.

Bevins gulch, a tributary of Ruby, has rich placers and productive quartz mines. The Poole mine has been worked on an arastra. The Oro-Bell is rich in silver ores. Other claims show good prospects.

The Mill Creek (now Sheridan) mines have long been known as producers. More than twenty years ago the Branham mill was pounding out the free gold from the surface ores and now the new mill is concentrating the sulphides from the deeper diggings. The Toledo, Toledo-Extension, Henry-Nigger and Keystone are a few of the numerous mines in this old camp. The foot-hills on Sheridan Creek appear to be full of quartz

veins. At Brandon still higher up the creek is the Brandon mill and concentrator.

In Wisconsin gulch is Cranor's ten-stamp mill running on the Champion, Sheridan, Grey-Eagle and Damsel.

The Noble ten-stamp mill is on the Wisconsin and mines have been worked here for twenty years. They are rich in gold, silver and copper. There is a furnace on Wisconsin creek which was idle in October.

On Rochester Creek, a tributary of Big-Hole, quartz and placer mining have been carried on for the last quarter of a century. Numerous productive mines have been opened and worked with varied success. Among the mines are the May-Flower, Never-Sweet, War-Eagle, Bobtail, Elgin, Buffalo, Watseka, New-Years-Gift, Shoemaker, Lucky-Boy, Longfellow, Golden-Brown, Flora and many others.

Several arastras have worked the ores of these mines. Some have disappeared, but White's and Ward's arastras are still grinding out the free gold of these mines.

The Rochester mill and the Allen mill were worn out on the quartz of this camp, and their decaying skeletons only remain. The Mueller mill stands well prepared to continue the good work on the mines of Rochester.

On Nez-Perce gulch, six miles from Twin Bridges, is a group of copper mines which promise to rival the best in the country. Of these mines the Ellen-Marshall, Laura-Marshall and Mountain Chief show wonderful masses of good ore for the work done.

Nez-Perce and Big-Hole are gold mines four miles from Big-Hole and sixteen miles from Melrose.

At the old and faithful Iron-Rod Camp we have the evidence of a modest outfit which has been doing a paying business for these many years. The fifteen-stamp mill is running right-along on the ores while new developments are made on the mines. This is a water mill and is run with little expense and constant profits.

The Silver-Star has attracted more attention and more varied fortunes have attended the enterprise. The old ten-stamp

mill was moved away and the Broadway with forty stamps was erected and worked the ore of the Broadway mine. The Mark Ensly mill with six stamps was run on the Aurora-Borealis and other mines. The battery is still standing.

The Merk is a new first-class ten-stamp mill and is running on the Victoria mine.

A new five-stamp water mill is now crushing the Green-Campbell ore with good results.

An arastra is grinding good pay out of the Governor Hayes mine.

There is a group of silver mines south of the Silver Star gold group and another a short distance on the north.

The Tobacco Root or South Boulder mountains appear to be absolutely full of mineral veins. In addition to the camps above named on the west side, the Georgia gulch, Indian Creek, Sterling, Richmond Flat and Ward's Mountain districts are on the north and east sides of these mineral mountains.

Georgia gulch has a group of many mines rich in gold, silver and lead. The High Ridge, Tidal Wave, Vanmeter, Keynote and Fusilade, Empire State, Bay State, Saturday Night, Eureka, Magnolia, and a dozen others have been opened.

On Indian Creek several claims have been partially developed with good results, and many more await the drill and pick of the miner to show up their prospective values,

At Pony, on Willow Creek, is an important camp fast growing into a prosperous town by the constant products of its placers and quartz mines. Six mills have been erected to work the quartz of the many rich mines of Mineral Hill and other mountains around Pony.

The Malory mill, 10 stamps run by water;

The Morlan mill, 15 stamps run by steam;

The Lehman mill, 10 stamps run by steam;

The Getchel mill, 10 stamps run by water;

The Morris mill, 20 stamps run by water;

And three arastras run by water.

A large new mill is on the ground to be used in concentrating the ores of Mineral-Hill.

These arastras and some of these mills have been worn out on the ores of the neighboring mountains. The Morris and Elling mill is still engaged in the good work.

The mines about Pony are remarkable for their very large crevice veins filled with quartz. Some of the larger veins have runs and pockets of rich ores in the great bodies of lower grade quartz.

A large amount of development work has been done, sufficient to prove these mines inexhaustible. There will be no failure of ores, which will continue as rich as they have so far shown themselves.

Some of the leading mines of Pony are the Elephant, Nos. 1 & 2, Strawberry, Strawberry Extension, Keystone, Rustler, Policy, Ned, Willow Creek, Summit, Boss-Tweed, Clipper, Pony, North-Star, Atlantic and Pacific, Gilded-Edge, Golden-Chariot, Old-Joe, White-Pine, Emmet, Belknap Barker, Last-Chance, Hancock, Taft, Iron, Lena and Rhoda, Mountain-Chief, Clara-Bell, Gates, Gladstone, Agitator, Union, Jumbo, Long-Branch, Saturday-Night, Welcome, Stranger, Bell, Texas, Amazon, Eclipse, Pat-O'Hara and Galena, Cornucopia, Gracewood, Sunny-Side. Stanley, Davy-Crocket, Creole, Pratt, Ellen-Douglass, Royal-Charley and Cortez.

The mines of Pony are rich enough, large enough and numerous enough in themselves to make Madison a great mining country.

Potosi is a new mining camp high up in the mountains whose veins rich in shining ores have attracted many prospectors. The Southern-Girl, Yankee-Girl, Stephanite, Ruby, Silver, Banker, Clarke, Raleigh, Volunteer, Crown-Point, Dictator, Green-Jacket, Bullion, Clara, Hathaway, Keystone, Logan, Old Jim, Cumberland, Garfield, Prime, Jim-How, and others have been recorded.

A twelve-mile trail is the only connection this rich camp has with the outside world. A good wagon or railroad would open up the vast bodies of silver and lead in these mines to the uses of the business world.

Norwegian Creek has rich placers which do yearly pay the labors of the miners. But little is yet said of the quartz veins from which this gold was crushed by glacial action.

On South Boulder, on the north side of the Tobacco-Root mountains, good mines have been discovered and partly developed.

On the headwaters of Meadow Creek, above Washington Bar, are quite a number of quartz discoveries.

In the mountains extending from Ward's Peak and forming a grand amphitheater are several mines of great promise. The Eureka is a large vein cutting the mountains at right angles and the Little Kid skirts the range on the opposite side of the beautiful valley. These mines have been so opened as to show vast bodies of good ore. There are many other veins of quartz in these ranges of mountains which show large quantities of free gold.

In Baldy and adjacent ridges are also found the Three-Ply, Pinnacle, Champion, Grand-Central, Mineral-King, Bell, Rocky, Washington, Mastodon, Chance, Lake-Side, Hog-Back, Home-Stake, Shoo-Fly, Great-Bear, Mohican, Tip-Top, Climax, Bonanza-Chief, Golden-Fleece, Packer, Golden-Brown, Black-Hawk, Jupiter, Juno and others.

There are numerous claims at Richmond Flat. Some of them have been developed enough to prove them permanent mines. The Revenue mill was erected to work their ores. The Revenue, Arkansas, Monitor, None-Such, D. M. G., Richmond, American-Girl, Idaho, New York Bell, Golden-Wonder, North Pacific, Columbus, Tennessee, Empire, Brooklyn, Veto and other mines are to be found at Richmond Flat.

On north Meadow Creek the Sure-Shot, Home-Ticket and several other good claims have been located and partly developed.

The mines at Sterling were discovered at an early day and the Ward mill with ten stamps was erected to work their ores. The Pratt mill with ten stamps and the Hobert mill with five stamps followed in the same locality. The Ward mill has lost its machinery, the Pratt mill has been despoiled, the Hobert mill has disappeared and the silence of dead works now reigns at Sterling where in the olden times the steam whistle aroused the

miner to his daily toil or called him from labor to refreshment. The following mines have been opened in Sterling Range: Rough and Ready, Willie-Red, Chico, Juniper, Atlas, Mariposa, Chinook, Fairview, Beck, Mammoth, Chihuahua, Sugar-Lake, Horseshoe, Double Header, Clifton, Jim Blaine, Cleveland, North-Meadow, Creek-Chief and many others.

Red Bluff has also passed through the various vicissitudes of primitive mining. A large number of claims have been recorded, many of them partially developed and some have been worked from time to time for many years.

Three mills have been erected to work the ores of these mines; the Hickman and Old's, the Wellington and the Carter mills. The latter has a capacity of 25 tons per diem by the Carter and Russell process.

The following mines are near these mills:

In Grubstake gulch are the Grubstake, Richfield, Greaser, Boquet, No. 3, Belmont, Golconda, Surprise, Bessy, May Queen, Snapping Andy, Red Chief, 76, Homestake, Puritan, Water, Fraction, Red Bluff, Red Bluff East, and Red Chief.

In Tippecanoe gulch are the Tippecanoe, Tippecanoe No. 2, Ruby, Buffalo, Perhaps, Mohegan and Jumbo.

In Hot Spring gulch are the Cedar Point, Arbana, Cordwainer, Great Expectation, Jack Rabbit, Michigan, Home, Boy's Bank, Railroad, and Meadow Lark.

On Silver Shower Hill are the Normahaul, Blue-eyed Nell, Blizzard Point, Bald Eagle, Curlew, Zero, Silver King, Porphyry, Topaz, Topaz East, Lone Star, Tilden, White Rock, Jessie, Jennie Hays, Francis, Morning Star, Ramshorn, Zero No. 2.

In Boaz gulch are the Lady, Apalachian, Bell-of-the-Woods, Sooner, Blue Bird, Keystone, New Years Call, Electric, Red Cloud, Storm, Red Rock, Red Branch, West Branch, White Eagle, Comstock, Jim, Conway, Capital Prize, Snow Flake, Risen Sun, and Alabama.

In Cottonwood Creek are the Monitor, Tiger, Kalamazoo, Cottonwood, Silver Crown, Elkhorn, Morning Star, Alleghany, Madison River and Silver Tip.

On Pole Creek are the Iron Knight, Iron Age, Cynthia, Michigander, Galena and several other mining claims.

On the Madison, below, Cherry Creek, are a group of mines and above Cherry Creek the Red Jacket, Yellow Jacket, Summit, and Local Option have been located on the same vein of argentiferous galena.

There is a group of twelve mineral claims on Washington Bar.

On the Madison, thirteen miles east of Virginia City, is a group of copper mines carrying good proportions of gold and silver.

About thirty-five miles above the last named mines and on the other side of the Madison, another group of mines has been discovered and in part developed. The mines make a good showing in both of these camps on the Upper Madison.

During the last year 607 quartz claims and 90 placer claims have been recorded in Madison County.

The output of the Madison County mines for the year 1890 has been estimated at $2,500,000 which is probably too low. It has been difficult to get facts on which to base a full estimate.

These facts which do not record half the mines and mining claims in Madison show that the miners of this county will have mines and prospects enough to last them the next hundred years.

COAL.

Has been discovered on Jack Creek, a tributary of the Gallatin, and some twenty miles from Red Bluff, which is said to extend across the Madison and 35 miles up that river.

Coal has been discovered on Spring Creek above Pullen Springs. The vein is reported as small; but the coal is good and cokes well.

ASBESTOS

Has been found in a large vein said to be 40 feet thick, four miles from Henry Lake, by T. J. McKee of Red Bluff. The specimens I saw contained the best quality of this useful mineral.

TIN

Has been reported in large quantities and extending over a large area on the Madison; but the specimens I saw promised no better than the specimens often found in the sluice boxes in several placers in the State.

TELLURIUM

Telluride of gold has been found in the mines on Sheridan or Mill Creek.

MEAGHER COUNTY MINES.

The railroad from Great Falls to Monarch has greatly stimulated the mining operations at Neihart, Barker and all the other mining camps in the Little Belt Mountains.

At Barker a new furnace has been erected, a large amount of development work has been done and the ores in large quantities have been shipped and proved rich from many of the mines; and a large number of new discoveries have been made and recorded.

Neihart has passed through a year of great activity in mining circles. New mines have been located, old claims opened up and a vast amount of work done in sinking shafts, running tunnels and levels and shipping ores. After discounting for the enthusiasm of miners, if half the reports are true, this is one of the richest camps in Montana. Quite a number of the mines have changed hands and capital and enterprise have gravitated towards the many rich mines of Neihart. This activity has been stimulated at least by the approach of the railroad from Great Falls, though it has made a temporary halt short of its legitimate and proposed termini.

The Castle Mines have more than sustained the predictions made a year since of their vast deposits of rich ores. The Cumberland, Yellowstone, Great Eastern, California, Legal Tender, Judge and others have been developed into great mines. The hopes of railroads from Helena and Livingston and Great Falls have filled this ever active camp with new life. Discoveries have been developed into bright prospects, bright prospects into paying mines, and paying mines into bonanzas.

Castle is to be a great mining camp and railroads will want to get there as much as the people now want them.

The *Alabama* is the pioneer discovery in a new camp some three miles from White Sulpher Springs. A little development work has shown a large body of good ore. The Cleveland is in the same camp. The ore is galena, rich in silver.

Copperopolis has been somewhat roused from its long sleep by the rumors of railroads and the Bigger District can boast of some new discoveries.

Yogo has had many new discoveries and old ones have been developed into very bright prospects and mines. The Gold Belt, Morning Star and Last Chance appear well. Yogo, always awake, has more activity now than ever since the seventies.

Running Wolf District has made great progress during the year past. The Mortson and Woodhurst, Red Oxide, Noxall, Sir-Walter-Scott and Castle, Emma, Mountain-Side, Ada and others have improved under the process of developement, which is the touch-stone that reveals the real value of all prospects. A large amount of ore has been shipped and smelted with very satisfactory results—an average yield of some $67 per ton.

Dry Wolf District has also had its year of encouraging development. The Gold Dust, Dry Wolf, Manitoba, Pierre and Higby, Susquehana and other mines have been improved by the work during the year. Many tons of the ores of this camp have been shipped and smelted at Great Falls with very encouraging results.

Spring Coulee has at least one good mine and others will probably be found in that camp.

Logging-Creek-Camp is coming out with a group of mines rich in silver and lead. Arrangements have been made to thoroughly investigate and develope the discoveries made on Logging-Creek and to open a road for the transportation of its ores to the railroad.

As prospecting is continued in the Little Belt Mountains it becomes more and more evident that the whole range of these

mountains from the copper and silver mines of the Bigger and Yogo to the silver and gold mines of Neihart and Barker are full of veins charged with gold, silver, lead, copper and iron.

The Belt Mountains, famous in early days for the placers found in its gulches from the Gate of the Mountains south to Confederate, are still furnishing gold from its old placers. But meanwhile quartz veins filled with gold and silver, copper and lead, have been discovered in all the gulches and on all the foot-hills from the Gate of the Mountains to Sixteen-Mile-Creek.

The following quartz claims are on the West side of the Belt range between Confederate and the Gate of the Mountains: Little Dandy, Golden Messenger, Assayers Delight, Ann-Eliza, Florence, Home Guard on Kelly Gulch; on Trout Creek above the Dandy mill the Mountain, Copper Glance and many others. Friday and Ox Eye are on Carter Gulch and Scotum, Lyre and others on Clark's Gulch. The J. Y. Johnson, Morning Star, Morning Dawn, Last Rose of Summer, Agnes, Molly Muck-Chuck, Keystone, Joe Dandy and Jim Dandy, Wild Bill and Court, are between Little Dandy on Kelly Gulch and Soup Creek; and the Wonder and Gold Hill are between Little Dandy and Trout Creek; Crown Point Golden Brown, Maud M, Golden Rule on Crown Gulch south of Little Dandy mill; in New York Gulch are Friday, Royal Flush, Grace and Daisy and Little Daisy; in Rattle-Snake Gulch are Stone and Benson; in Cave Gulch are Sunny Side, Eclipse, French, Surprise, Howitzer and Ready; on Bear Gulch are Lady Alice and others; on Magpie Gulch, the Bob Ingersol and Copper.

This list of the promising claims in the Belt mountains might be indefinitely extended; but these are enough with the descriptions in my last report to show that the quartz veins of the Belt mountains are fast proving themselves as rich and much more valuable than the placers of this same range.

Several mills have been erected at various times during the last twenty-five years for working the mines on Trout Creek and in Confederate Gulch. Some of them are still doing good work.

The Iron Veins of the Little Belt mountains are represented as "larger than any on the Continent," and as filled with pure ores of the specular oxide, magnetic oxide and limonites. A number of claims have been taken up and should they prove as good and extensive as reported, they will in the near future sur-

pass in value most of the gold and silver mines of these wonderful mountains.

Analysis of these ores made by competent authorities show all the injurious and good qualities as follows:

ASSAY NO. 1.

Silicia	2.98
Phosphorus	.009
Metallic Iron	.66.60

ASSAY NO. 2.

Silica	1.44
Phosphorus	a trace
Metallic Iron	.66.60

These discoveries of iron ores are in four important localities. The first extends from Riceville across Logging Creek, Surprise Creek and Tillinghouse Creek; the second location is on the east side of the Park and within three miles of the railroad to Monarch; this same vein extends south across Carpenter Creek; the third locality extends from near Barker towards Neihart; the fourth crosses Wolf Creek and Yogo.

The Coal Beds of Meagher County remain as last year, save that some new discoveries and further devlopments prove their greater extent and value.

During the past year 1444 claims have been recorded in Meagher County. Of this large number 1301 were quartz lcaims, 141 were placers and two were coal.

These facts show that Meagher County is fast coming to the front as a vast rich mining country. The Belt mountains and Little Belt mountains are absolutely full of veins of gold, silver, copper, lead and iron and its valleys are underlaid with coal beds.

The output of the mines of Meagher County for 1890 has been over $300,000.

MISSOULA COUNTY.

Missoula, and especially the Bitter Root valley has been known as an agricultural paradise ever since its early settlement. The early explorer, as he decended the Deer Lodge, the Hell Gate, and the Missoula, soon saw the forests creeping down the mountain sides, over the foot hills and into the broad valleys, where, under the influences of the moist, warm, Pacific winds, the spruce, and fir, and pine, and cedars, and hackmatack begin to assume the gigantic proportions so notorious on the Pacific slope.

But in the early days, when the gold seeker, the prospector, explored the grand beds of every mountain stream from the Rio Grande to the Frazer river, the tributaries of the Missoula and Clark's Fork could no longer conceal their golden sands. Rich placers were discovered; wild reports of rich "diggings," sometimes true and sometimes false, caused stampedes to barren and secluded regions which resulted in untold sufferings, fatal diseases and even death.

After some of the rich finds were worked out, the miners, as a class, left Missoula to the plow and reaper of the farmer, the shorthorn and thoroughbred of the ranchman, the Cotswold and Fairdowns of the wool-grower, the pruning-knife of the horticulturalist, and the axe and saw of the lumberman. But a few continued to work their claims, and in the last few years old placers have been reopened with such improved appliances that gravels, which would no longer pay with rocker, wheelbarrow, and sluice box in the sixties, are now yielding rich rewards to the hydraulic force of the giant, and the saving power of the bed rock flume.

The pick and shovel of the prospector have shown the presence of numerous veins of iron, and lead and, copper, and zinc, and antimony, carrying the more precious silver and gold in numerous localities throughout the mountain regions of the western and northern portions of the country.

And besides it has been shown there are vast beds of coal in various parts of this beautiful country.

There are also large deposits of granite, syenite, freestone, limestone, marble, and fire clay, which will supply all demands for these materials for domestic uses and for transportation.

The number of quartz veins rich in gold, silver, copper and lead, which have been discovered in Missoula county and there recorded, is very great, running up into the thousands. According to the county records as furnished by the public-spirited Clerk and Recorder D. D. Bogart, Esq., 820 claims have been recorded in the past year.

The partial development and systematic and rich returns from a few of these numerous discoveries have greatly stimulated the mining industry of Missoula in the last few years. The increased railroad facilities have enabled owners to work many mines which would not pay without them.

The systematic and very successful work on the Curlew mine, the vast quantities of ores taken out, and the yield of what has been shipped, (sometimes $250 per ton), sufficient to pay for an excellent plant for extensive mining, a first class mill and concentrator with a capacity for 120 tons per diem, has inspired the Bitter-Root miners with great confidence in their mines and undeveloyed discoveries and prospects.

The O. R. &. N., located a few miles from Carter, on the St. Regis railroad or the N. P. cut off, has been worked for the last few years with unusual success. The numerous workings on this mine in shafts, levels and crosscuts, have exposed large quantities of rich ores of silver, copper and lead, which have paid well for mining and shipping.

The successful working of the O. R. & N. has inspired the owners of the neighboring claims to make needed developments and show the real value of their discoveries, which has resulted in the opening up of good mines and the shipment of ores from many of them.

The Iron Mountain, in Spring Gulch district, seven miles from the Iron Mountain station on the St. Regis road or the N. P. cut-off, and six miles from the lively little city of Superior on the other side of the Missoula, has been worked with an abiding faith in a continued success.

The vast system of shafts, tunnels,l evels, cross-cuts, winzes, uprises and drifts, the many tons of first-class ore which leave the mine daily, and the immense dumps of second grade ore awaiting the concentrator, show the quantities of ore taken out,

This mine has built up the picturesque little town of Pardee, at the head of the wild canyon of Flat Creek, where the mine is located.

In this Spring Gulch District, the Little Anaconda, Little Pittsburg, Iron King and Iron Queen, Keystone and other mines, are shipping rich ores and showing promise of permanent success.

The Talcose slates of this region are in all mining countries deemed a good rock for rich and permanent mines.

Some nine miles from Thompson Falls, on the river, is a large group of mines, some of which have been worked with very promising results.

The Belle Stowe is working a large force of men and shipping ore which is rich in silver, copper and lead, and it contains some nickel and cobalt. This ore yields from $900 to $1000 per car load. The Buckeye, near the Belle Stowe, is a mine whose ores yield from $1,500 to $2,500 per car load. The Ohio, Climax, Pay-Master and Treasury have been considerably developed. The ores shipped gave good returns.

On the opposite side of Thompson river from the Buckeye, is a group of copper mines which is employing some 30 men, and shipping copper ore to Butte. This also is a busy and promising camp.

The Fisher Creek mines, some 14 miles from Vermillion Station, on the N. P., have gained a high reputation for their abundant ores of rich sulphides and carbonates of lead carrying silver. A ten-stamp mill has been erected in this district.

The Silver Bow is perhaps most esteemed in this camp. The Monarch and Pan-Handle and Lucky Boy show good veins of ores rich in silver and lead. There is at present great activity in the mines around Silver Butte.

The Kootenai country is now attracting much attention from the numerous veins of gold, silver, copper and lead lately discovered and in part developed. With the completion of the Great Northern railroad into this country we may expect such a development of these discoveries as will make this one of the most productive mining regions of Montana.

On Bass Creek, on the west side of the Bitter Root valley and 15 miles northwest of Stevensville, are located the Domingo, the Renegade and other mines, which have attracted much attention, and have been put into condition to be thoroughly explored and their hidden treasures taken out for man's use.

On the Three-Mile, a branch of the Bitter Root, there are several quartz locations, and some good placer mines.

At the head of Burnt Fork there are several bright prospects partially developed.

Some eight miles east of Corvallis, in the mountains, several quartz veins have been discovered and numerous claims recorded. All these mountain ranges between Bitter Root and Rock Creek and Flint Creek seem to be full of mineral veins.

On Quartz Creek and other tributaries of the St. Regis are several paying placers, and a large number of gold-bearing quartz veins have been located. Mr. Marsh mentions the fact that the galena of this region sometimes contains considerable gold.

On the Windfall, a tributary of Trout Creek, and about sixty miles from Missoula, is the Landowner mine, which gives such promise of golden returns that a company has been formed to erect a mill for working the quartz.

Important discoveries of quartz veins are reported on Rocker Creek.

Cedar Creek placers are again coming to the front and its group of copper claims are said to be very bright prospects.

At Wallace, some five miles from the Northern Pacific, and east of Missoula, there is another group of mines which are now attracting the attention of mining men. The West Point, Hidden Treasure, Eagle and Wallace are mentioned with favor.

Mineral Hill district, in the mountains, at the head of the Bitter Root country, has a large group of mines partially developed. which only wait for means of transportation to become a prosperous mining center. The Lent, Mossback and Merrill are among the best known claims.

The Eight Mile district has a number of mines showing large bodies of gold-bearing quartz. Mr. Marsh mentions the White Cloud, the L. R. and the Annie Bell among the mines of this camp, sixteen miles from Missoula.

Among the other quartz claims of Missoula County the following have been deemed worthy of mention:

Abraham Lincoln, Alhambra, Alps, American Girl, Argentine, Argo, Aspen, Augusta, Badger, Bay Hoss, Bell-of-the-Hill, Big Pittsburg, Bill Nye, Black Drake, Blaine, Blue Dick, Brooklyn, Bullion, Cashier, Carlton, Chicago, Chieftain, Cinnamon Bear, Clan-na-Gael, Clear Grit, Climax, Clubb, Comstock, Contention, Copper Queen, Copper Trust, George Crane, Crown Point, Crystal, Daisy Dandy, Dearborn, Dick & Joe, Dutchman, Echo, Eclipse, Elephant, Elkhorn, Half Moon, Harrison, Hatch, Home, Montana, Pardee and Pleasant View.

The old discoveries on Wolf Creek, south of Demersville, are once more attracting the attention of miners and capitalists.

COAL DEPOSITS OF MISSOULA.

Deposits of coal were long since discovered in the Missoula Valley, and later in the Bitter Root country; but since it was known that the Great Northern Railroad would be extended through the northern part of this county, extensive areas of coal have been examined, and large tracts have been taken up in the Flathead country.

Some of these beds are reported to be from six feet to twelve feet thick, and that the coals represent the Rocky Fork and Lethbridge coals in quality.

There are coal beds two and one-half miles north of Missoula, on which considerable development work has been done, showing a good deal of coal and fire-clay.

Coal beds are also found in the Bitter Root, some three miles below Stevensville, and others still in the foot-hills to the east of this locality.

As time would not permit me to examine all the mining camps in Missoula County, I have availed myself of such other sources of information as appear absolutely reliable.

Mr. Richard Marsh, who has given the mines of Missoula much of his personal attention, by my request, kindly furnished the following details for this report.

I am also much indebted to Mrs. J. E. Allison, of Riverside, for important information about Missoula mines.

The Clerk of Missoula County has recorded 820 mining claims, 599 quartz, 190 placers, and 31 coal.

The output of the Missoula mines has been fully $300,000 during 1890.

MISSOULA, MONT.,
Dec. 15, 1890.

DR. G. C. SWALLOW,

Inspector of Mines:

By your request I submit the following facts respecting the mines of Missoula County:

In many mining camps of Missoula County the development has not yet reached a stage beyond prospect holes a few feet in depth, and the sole means of transportation is by pack animals over rough trails.

In those districts that have had the advantage of railway facilities, the productive power of the mines have been amply demonstrated by cash returns from marketed ores.

Most of the mineral veins are found in the granites and micaceous slates.

Coal of the lignite variety and fire-clay of fair quality have been found in the immediate vicinity of the city of Missoula, in formations of sandstone, slates and limestones. The coal has been burned to a limited extent in the grates of that city; but sufficient development has not been done on these lignite deposits to demonstrate their commercial value.

At Wallace, seventeen miles east of Missoula, are located quarries of excellent granite. It has been used with success in several of the best business blocks of Missoula.

At Frenchtown are the lime quarries and kilns that produce much of the quicklime used along the line of the Northern Pacific for one hundred miles east and west.

Marble, that has been pronounced equal to the best Italian stone, has been found within the county limits.

The history of mining in this county is similar in most respects to that of several of the mining counties of the State. A few rich gulches were discovered in the sixties that occasioned much excitement, and the placers were worked with varied successes.

After the exhaustion of the richest portions of the placers, came a lengthy cessation of mining that has been but recently dispelled by the successful working of the mines which were so near the railroad as to permit shipment of the ores.

The Paying-Teller mine is located three miles from Missoula, on the east side of Rattle-snake Creek. The ledge is in slate, is from two to four feet in width, carries copper sulphides, copper carbonates, galena and free gold. The gangue is a fine white quartz without clay or talc.

The developments consist of a tunnel tapping the vein at a depth of seventy-five feet, two lateral drafts fifty feet each, and a shaft in the floor of the tunnel one hundred feet deep.

The mines of Mineral-Hill District are located in the extreme south west corner of the county. They are seventy-five miles from the terminus of Bitter Root Railroad. Over most of this distance no wagon road has yet been made. These facts render the exportation of ores too expensive to be practical.

The formation is granite, the ores are galena with zinc and iron sulphides, which run well in gold and silver.

The present developments are on the Lent, a 250-foot tunnel; on the Merrill, a 90-foot tunnel, on the Moss-back, 50-foot shaft; on the Arkansas Traveler, a 40-foot shaft; and on numerous other properties shafts and tunnels of less extent.

The profitable working of the mines of this camp is a question of transportation, which will, without doubt, be settled in the near future by concentration.

Eight Mile District is on the north side of the Bitter Root Valley, sixteen miles from Missoula. Most of the ledges of

this district follow the line of contact between porphyry and granite.

Of these the White Cloud has received the greatest amount of work. A tunnel has been driven two hundred and twenty-five feet on the ledge, a shaft sunk in that thirty-five feet, and a cross-cut of forty-seven feet. There is also a shaft one hundred and twenty-five feet deep.

A large body of iron sulphurets carrying gold is exposed.

On the L. R. a tunnel has been run one hundred feet, but has not yet cut the ledge.

The Annie Bell has a shaft on it eighty feet in depth. At a depth of fifty feet a cross-cut is driven, which exposed a large body of free milling gold ore.

Wallace Camp is located seventeen miles east of Missoula. The mines are from two to five miles from the Northern Pacific.

The ledges are large and the ores is generally low grade. More activity prevails here at present than for the several years past.

The following claims have received the most attention:

The Treasurer has a 75-foot shaft and 100-foot tunnel, showing a strong ledge of galena and copper sulphides.

The West Point has a 50-foot shaft and a 50-foot tunnel, showing galena and copper sulphides.

The Eagle has one hundred and seventy feet of shaft and tunnel.

The Anchor, a 50-foot shaft and 65-foot tunnel.

The Hidden Treasure, a 110-foot shaft.

The Kenebec, an 85-foot shaft.

The Wallace, eighty feet of work in shaft and tunnel; and the Southern Cross one hundred feet in shaft and tunnel.

The mines of Thompson River are located nine miles to the north east of Thompson Falls.

The formation is quartzite, which extends easterly and westerly through the country in a belt from three to four miles wide.

Up to the present the heaviest producing mine of the camp has been the Silver King, or, as it is better known by its old name, the Belle Stowe. In this the ledge cuts the formation at right angles to the Strata, and has most of the characteristics of a true fissure vein.

The present development consists principally of two tunnels perpendicularly, one hundred feet apart, the lower one, one hundred and eighty feet long. The upper tunnel has been driven on the ledge three hundred and fifty feet, and has encountered five distinct ore chutes, each of which shows in the level a distance of from thirty to forty feet. The ore is mostly copper glance, running well in silver. There is a small amount of nickel and cobalt, though not in sufficient quantities to justify extraction.

This mine has shipped during the year an average of about twenty tons of ore per week. This has melted from $900 to $1,000 per carload. The mine is in good condition and substantial shape. Thirty men are employed.

Excepting the Belle Stowe, the Buckeye has been the most productive mine of this camp. This mine has been opened by several tunnels in the vein. The ore is principally of an unusually high grade galena, which nets, clear of freight and smelting charges, from $1,500 to $2,400 per car. Ten miners are employed. Small quantities of ore have been shipped from other claims of this district, and in all cases the grade has been high.

Including Thompson River the ore shipped from the vicinity of Thompson Falls now aggregate about three hundred tons per month. Of this a considerable portion comes from the Antimony mine, located fifteen miles out on the old Mullan road. The ore from this mine is a nearly pure sulphide of antimony and averages 50 per cent. in that metal.

There are several other mines of that section carrying a similar ore which will be worked during the coming year. This

district is, I believe, the only one in the State at present producing ores of this description sufficiently pure to be marketed at a profit.

The mines of Vermillion Creek are in Granite. The ledges contain a free-gold quartz. A ten-stamp mill has been erected on one of these by the Missoula Mining Company. Two short runs have been made with this mill, but the exact results have not been made public. This district is 20 miles to the west of Thompson Falls.

Fisher Creek is 15 miles from the Vermillion Station of the Northern Pacific; and most of this distance is by trail only.

Of the several properties of the camp more development has been done on the Silver Bow than on any of the others and better opportunity is presented to study the general characteristics which appear to be common to the several mines of this district. A series of veins run in a zone at and near a contact between quartzite and slate. Below the contact and running parallel in the strata of the slate are several veins carrying galena in a quartz gangue. The mineralized zone on the Silver Bow is over 100 feet wide.

The Monarch is the adjoining claim on the east and on the same ledge.

On the West of the Silver Bow is the Panhandle mine.

The Tender-foot is a property in this same belt which carries essentially a free milling gold ore.

Fisher Creek is a most promising camp and with the completion of a wagon road will immediately become a producer of no small importance.

On Quartz Creek the placers are profitably worked by the improved hydraulic appliances. With the adoption of these methods for cheaply handling the large deposits of auriferous gravel in this section a largely increased yield may be looked for in the future.

Several promising gold quartz ledges have also been discovered of which the L. B. on Quartz Creek, the Land Owner

on Windfall and the Maud S. on Trout, have had considerable work done on them.

On Cedar Creek ore running high in both gold and silver has been found. A peculiar feature is that much of the galena found carries large quantities of gold.

In working the bed of the creek which was one of the richest gulches of the State the early placer miners found much galena in the wash, sometimes finding large boulders of this mineral weighing from 200 to 300 pounds.

The Pioneer is the oldest quartz location in the camp. The ledge is 5 feet between walls and crosses the gulch under some of the richest of the old placer workings. Assays are obtained from this, running from $60 to $350 in gold and silver. There is considerable galena in the ore.

The Red Jacket is four and one-half feet between walls. The development consists of a 30-foot shaft and a 300-foot tunnel. The ore assays from $25 to $100.

The Mary Ann has a 14-foot ledge and carries considerable copper carbonates which run from $50 to $2,000 in gold and silver.

The Amador is a copper property on which a 100-foot tunnel has been driven which has exposed a large body of ore.

The Garfield and Dundas are promising mines.

The Emma and Enterprise are good prospects showing high grade ore.

At present this district is reached only by trail and the construction of extensive wagon roads must precede the shipment of ore.

Perhaps no portion of the county has received more attention from the mining public than that surrrounding Spring Gulch. This district is located seventy miles to the west of Missoula. The formation of the camp is a talcose schist. The ore bearing veins following the strata of this rock.

The O. R. & N. mine is located on the northwest side of the gulch about a mile from the little town of Carter. About seventy tons of ore was extracted and shipped to the smelter.

On the west of the O. R. & N. is the Keystone. A shaft has been sunk on this to a depth of 125 feet. About fifty tons of good ore are on the dump.

Half a mile to the southwest is the King mine. A shaft on this has reached a depth of 300 feet.

A mile to the southwest of this is the Little Pittsburg mine. Ten tons of ore shipped from thts property yielded $175 to the ton.

On the Robert Elsmere a great deal of very rich float has been found.

On the head of Deep Creek to the east of Spring Gulch is the Little Anaconda. Some high grade ore has been shipped.

The ore of Spring Gulch is remarkable for its high grade. Nearly all the mineral found in the belt, as a prospector would say, looks well and runs high in silver.

Transportation heretofore has been the main difficulty. The completion of the Cœur d'Alene branch of the N. P. will assist materially in this direction.

That this section will ultimately be one of the great silver and lead producing districts of the United States there can be no doubt.

Missoula County has a large extent of coal lands which are commencing to receive the attention of capitalists and have been examined by experts. Favorable reports have been made and considerable property of this description has changed hands. With the completion of the Great Northern this coal will be an important item in the long list of exported products of this county.

PARK COUNTY.

The mining interests of Park County have steadily progressed during the past year. Many prospectors have successfully explored the mining regions of the county, and recorded

many new discoveries. Old claims have been developed into mines, and not a few have passed into the hands of owners with courage and money to carry on the good work. Two new mills have been erected to crush the ores proved so abundant and rich.

The placers of Emigrant Gulch were among the early discoveries and made many a pioneer gold-seeker glad with a "pocket full" to make the loved ones at home comfortable and happy. The placers of this gulch are still furnishing pay, and millions will repay those who shall unite the claims and furnish the water to wash out all its golden sands accumulated by the ages.

The miners of the New World District have the courage and perseverance so necessary to make mining profitable. Though the expected railroad is needlessly delayed by the tardy action of Congress and the unreasonable opposition of a few interested parties, they have done much work in their mines and taken out large quantities of ore in anticipation of the expected trains.

More than fifteen thousand feet of shafts, tunnels and levels have been run in exploring the 300 mining claims in the seven mineral mountains around Cook City. Rome sat on her seven hills of common dirt on the yellow Tiber, but Cook City reposes on seven mountains filled with gold, silver, copper, lead and iron. It took a thousand years for the palaces of imperial Rome to take the places of the dug-outs where Romulus and Remus were nnrsed by a Vulpine mother; but palaces will replace the log cabins of Cook City in a hundredth part of that time,

The mines of Boulder District have attracted the attention of capitalists, and many of the claims are in process of rapid development. The Hidden Treasure is having its rich deposits rapidly exposed; the Mamie is feeding a small mill with a strong diet of hard ores; the Poorman, Sadie, Yellow Jacket, Volunteer and Florence have induced new capital and fresh hands to undertake their development.

The Bear Creek mines now have a new and improved mill to work out their precious metals. The enterprise should be a prosperous one.

Quartz mining in Emigrant Gulch is in an active and prosperous condition. The bismuth ore of the St. Julian has

attracted the attention of outside parties, who are making extensive developments to prove the amount of these uncommon ores.

A company is opening the Vinnie M., on Mill Creek.

Many discoveries of quartz veins have been made on the head waters of Rock Creek. It is a promising field for the prospector.

The coal mines of Park County are giving up more of the black diamonds than in any previous year. Rock Creek mines ars sending out vast quantities of excellent coals. Cokedale has been running 80 coke ovens and producing some 50 tons of coke a day. This number of ovens has been or soon will be increased to 110.

The Cinnibar mines have increased in capacity during the year. The mines opposite Cinnibar and above on the Yellowstone and Gardiner have been partially developed. The mines of Mulherin Creek and Trail Creek and at Williams' coal banks show bodies of good coal, and parties are making arrangements to make them producers to supply the increasing demands of Montana for coal and coke. The mines on Trail Creek are Bynum's, Maxey's, Marvin, Hall & Harris, Alderson's, Magnison, Sloan and Mountain House.

The output of gold and silver in Park County for 1890 has been estimated at $50,000.

The Clerk and Recorder of Park County reports that 336 claims have been recorded in this county during the last year. Of these 259 are quartz claims, 39 placers, 12 coal, 4 building stone and 22 fire clay.

It will thus be seen that Park County has on one side of the Yellowstone mountains filled with veins of rich ores, and hills on both sides filled with abundant fuel to smelt these ores, and a surplus to run the trains of the railroads and smelt the ores of other counties.

Build the railroad up to Cook City on the Yellowstone and Soda Butte Creek, and the future greatness of Park County will be settled.

SILVER BOW COUNTY.

A description of the mines of Silver Bow County will be found in Mr. Oliver's report.

From the best information I can get from the mills and furnaces and mines of Silver Bow and Anaconda, they yielded during 1890 about $30,000,000 worth of gold, silver, copper and lead, but as part of the ores worked in these mills and furnaces did not come from the mines of Silver Bow County, I have put the output of the mines of that county at $29,000,000.

The number of mining claims recorded in Silver Bow for the year 1890 is given by the Clerk and Recorder at 965; of these 825 are quartz claims and 140 placer claims.

YELLOWSTONE.

Has vast coal beds in the Bull Mountains and other localities on which no important developments have been made since my last report.

Reports of Mines.

Walkerville, Montana,
December 1st, 1889.

Dr. G. C. Swallow,

Helena, Mont.

Sir: I herewith transmit my report of work done from Dec. 1st, 1889, to Jan. 1st, 1890, which consists almost entirely of accidents.

It will be seen that the accidents during those two months almost equal the previous six months; but when we consider the number of miners employed in the mines of Montana, the accidents are few indeed.

Silver Bow County alone employs at the minimum 5,000 miners who are digging up the precious metals, and they are without doubt the best miners upon the face of the earth, and are protected as much as the human minds can conceive of.

Hoping my report may meet with the approbation of mine owners and their employes, I remain

Your Obedient Servant,

J. B. TREVARTHEN,

Deputy Inspector of Mines.

OBJECT OF THE LAW.

Entering upon the duties of Deputy Inspector, I realized the law required that the lives of miners should be protected so far as possible, and my object has been to administer the office to that end. There is not a doubt but what the legislators of 1888 intended to improve the condition of miners in general throughout Montana, but a visit to a mine once each year does not improve the system of working an iota.

Some of our mines in Butte are producing from 500 to 1,000 tons of ore per diem, and it will be very readily seen that an annual inspection in such mines is utterly valueless to protect human life.

It is stated on moderately good authority that there are nearly 13,000 mining claims in Montana, and if only one in twenty is being worked it would be impossible for any one man to attend to inspecting that number of mines. There is work enough in Silver Bow County to require the services of the most efficient miner within the border line of Montana, and one who has not only the theoretical but the practicai knowledge of mining in general. Such persons cannot be secured unless they receive good compensation, which is not paid at present.

Out of the number of accidents which have happened, the Deputy Inspector has not been fortunate enough to attend a Coroner's inquest, and when two or three days have elapsed and the victim has been buried, the Inspector or Deputy presents himself for the purpose of making an official examination, and when it has been clearly proven by a Coroner's jury that the mining company was guiltless or otherwise, an examination so long afterward by an Inspector has been actual nonsense, and an unnecessary wasting of the State funds.

The only means that can be used to protect human life is an inspection prior to an accident, and where dangers are discovered, a law to demand the needed improvements should be behind the Inspector. In some large mines the ore is extracted and only a little timbering done to secure the hanging wall with, and the entire mine is a great open cavity. In the great tin mines of Cornwall scarcely any method is being adopted to make safe the hanging walls, as they are generally solid enough to remain without it. Such is also the case with the copper mines of Michigan. Not so in Montana. Our mines are nearly all well timbered, and then filled with waste dirt to make everything absolutely safe. Nearly all the granite in Montana contains

a quantity of lime, and this causes a natural swelling of the ground, and timbers alone in most of the mines could not retain the weight or pressure on the timbers, and particularly so when the ground contains any water. In order to make those mines safe it requires a large force of men to secure the waste with which to fill the mines, as the veins in some of our mines (especially the copper mines) vary from ten to one hundred and thirty feet in width; so that fully one-third of the men employed by some of those companies are doing nothing but securing waste dirt, to make life and limb safe. In some cases raises have been put to the surface and run the dirt from the dumps back into the stopes again, which was seemingly the cheapest method for safety.

The silver mines in general produces waste enongh to fill the mines with, and are often compelled to hoist some to the surface; and it requires much less timber and labor to develop the silver mines than it does the copper mines, owing to the width of the veins.

There are, however, several cases of neglect in some of the greatest mines in Montana, and there is practically no law to enforce a change or improvement. True, an Inspector may visit the mines and discern the existing danger or dangers and go so far as the law permits him, which is simply to notify the Superintendent of such danger; but if they are not remedied, nothing further is done in the matter.

I am persuaded that if a committee of competent men composed of superintendents, foremen and miners were to adopt a code of mining laws relative to the dangers in mines and place them before our legislators for their adoption and entered upon our statutes and then post copies of such law in each shaft-house or some other conspicuous place so that every miner would understand the methods adopted for their safety and by such a system at least $4,000 of the state funds could be saved.

The dangers mostly observed in our mines are

1. Sinking shafts without lining them.
2. Lack of ventilation.
3. Riding on buckets in incline shafts.
4. Premature explosions.
5. Riding on cages with full cars of dirt.
6. The use of crossheads.
7. Mines worked by one shaft only.
8. The caving of ground.
9. Cages without proper safety appliances.
10. Inefficient engineers.

The opinions of the most efficient miners in Montana are that every shaft should be lined as they are being sunk in order to prevent any danger from being caught in the wall plate of the shaft while ascending from the mine and also prevent timbers or lagging from striking the wall-plate while being lowered with men on the same cage.

During the past year several accidents have happened while the timbers have been sent down and caught the miners between the cage and the shaft timbers.

The greatest danger existing is while men are coming off their shift where nine men occupy the same deck and are hoisted at a very rapid speed and should one or more be so unfortunate as to get too far out on the cage and get under the timbers the chances for his life would not be worth a single dime. The cages are made to work very close to the timbers and if one gets between the cage and the timbers his body would be mangled at a moments notice and then be dashed to pieces by falling down a shaft. Lining the shafts would create an expense to a mining company of about $1,000 per annum. There is not a doubt but what this danger could be *lessened* by putting the cages in such a position so as to prevent men from falling under the wall plate which would be less expensive and less labor.

The cages in use at present have iron bars for a support while being raised or lowered, but in some cases the bar is too high for men to reach and in one mine where it was observed that men had no possible chance of protecting themselves with the bar, the mining company *would not lay out the trifling expense of a piece of iron three and one-half feet long to give protection to human beings.* Hence the propriety of a law *to enforce* such improvements.

Ventilating mines is a matter of much study and especially in *coal* mines where gases are produced. The coal mines of Montana at present are not at a very great depth, and are free from gas when compared to those in Europe and in our eastern states and need less attention. The silver and copper mines are easily ventilated and in most of our mines poor air is by no means discernable except a tunnel is being run some distance to prospect a piece of ground prior to laying out much expense for permanent improvements. One of our prominent superintendents says: "Air is elastic and can be conveyed to any point," and such a statement cannot be denied, but its conveyance is in some cases costly and every company before doing any work considers the cost and before conveying air to meet man's requirements the cost is estimated and because of the expense it is

neglected. There are, however, cases of pure neglect in ventilating some of our mines and no matter how efficient the inspector, he has no authority to improve the condition of ventilation, and since an accident is not liable to occur, the mining company who neglects such matters are beyond the law.

Riding on buckets on some of our inclines is more or less dangerous. "The miner first commences to develop a mine with a windlass, then the horse whim, then a small hoisting engine, etc.," but when a mine is so fully developed as to insure it a good and paying investment to any reasonable depth, say *400 feet*, a bucket is not a very safe piece of machinery to convey miners to and from the mine, and where the shaft has a regular grade it should be furnished with a cage, but when the shaft changes its pitch a self dumping skip with bonnet and safety appliances could be used with as much safety for transportation as with a cage in a vertical shaft, but when men have to ride on a bucket the dangers are great and many accidents have happened by men falling off and then falling down the shaft. This also means an expense, as it requires larger engines and a different method in preparing the shaft for cage or skip.

Premature explosions are not so numerous during the time that giant powder has been in use. Black powder is almost a thing of the past and as it is known by every miner, its use was more expensive and required more labor to use it. Giant powder is perfectly safe if properly handled and properly kept, for using it. In some cases the powder is not kept soft as it should be for blasting and almost any method to *thaw* it in the mine by the miner is accompanied by danger. Some men will take the giant and hold it over a burning candle, others will place a number of them in their boot legs during the time they are at work, others will take a box and cover it almost air tight and place several short ends of candle in the box which makes the powder soft in a very short time while a temperature of sixty or seventy degrees is sufficient heat to cause a natural and slow thawing and lessens the dangers of explosions. The premature explosions however, occur mostly while in the act of charging the holes. Some will use the method of tamping it very hard with a bar equal to black powder and the concussion causes an explosion and such a method is absolutely unnecessary, for when giant powder is made air tight the powder does its duty equal to being pressed or tamped tight and the miner can lessen his own danger by refusing to adopt any system of loading their holes outside of the directions given by the different powder companies. The Noble Dynamite Company encloses in each box of dynamite in-

structions for using it, bnt no practical miner need such instructions as they are fully aware of the necessary precautions in using the Hercules or giant powder.

Nothing less than fire explodes black powder, while a confinement in a very hot place or a strong concussion explodes the giant and in no case can too much precaution be used to prevent an explosion. Men's lives have been lost after a hole has exploded and was brought about, it is supposed, by an amount of glycerine having escaped from the giant and failed to explode and when the men have been working out the loose ground the explosion has occurred but such an accident apparently has no preventative and in such cases mining companies are verily free from blame. The different companies should see to it that the giant is kept in a warm place for softening and then the greatest dangers would be avoided.

Riding on full cars of dirt is another thing practised in our large mines and no superintendent should permit it to be done as it is beyond reason. Such, however, is recommended in some cases, so as to use the cage for dirt instead of men, but in most cases it requires a fatal accident and a severe censuring from a jury to cause a prohibition of the practice.

The use of crossheads in place of cages is lessened very maierially of late years and in nearly every instance its use has been abandoned so far as practicable.

The law at present prohibits their working below the 300-foot level in vertical shafts, but this even is too deep where a mine has the assurance of being worked as a permanent concern as they have neither bonnet or safety appliances of any kind and should a rope break while men are going down or coming up it would bring about an awful catastrophe and men's bodies would be mangled to an unrecognizable condition, or a man may become dizzy and fall off the crosshead with the same results.

Therefore, it cannot be done away with any too soon to insure safety while going in or coming out of the mine.

A great number of our mines are worked by a single shaft. In some cases it cannot be otherwise until the mine has been developed to find out whether it will justify an outlay for a second shaft, but it is necessary to have an egress independent of main shaft as a fire may at any time destroy the shaft house and imperil the lives of the miners while at work. A second shaft also assists to ventilate a mine.

Several serious and fatal accidents occurs from the caving of ground, but our mines are less dangerous in this respect than any I have ever seen, as most mines are filled with waste dirt to

prevent the rock from falling. In some instances small rocks have fallen and caused death but such accidents are not due to carelessness on the part of the company.

Leasers and prospectors run more risks in not timbering their ground closely than mining companies do and so long as only four men are engaged they are at liberty to use what precautions they think fit and proper.

Cages are used in all of our largest mines which is an improvement on the ancient system. A quarter of a century ago men working the deepest mines of the world were compelled to climb down and on ladders which took about one eighth of the time of a shift to accomplish.

Later on some of the richer companies erected man engines, which was also a slow way for transportation; but today a large force of men can be lowered to their different levels in a few moments, and instead of riding for thirty minutes or more on the man engine, that amount of time is devoted in extracting ore. The law demands that the cages shall be used below the 300 foot level with bonnets and safeties. The bonnet, which is made of no less than 3/8-inch iron, prevents anything from falling on the men while on the cage, and the safeties prevent the cage from falling down the shaft in case the rope breaks or becomes separated in any way from the cage. The one thing that needs sttendiug to, however, is the springs connected with the cage. If they were tested at least twice each week, it would give the miners the assurance that there would be little or no danger in case the rope broke.

I have tested some of those springs, and find that they have been absolutely valueless and would not prevent an accident. Others were only put on the cages simply to come within the limit of the law, and I regard it as eminently neeessary that the springs attached to a cage should be kept in good working order to prevent accidents.

The engineers cannot be too carefully selected, for theirs is a duty of much responsibility, and on them depend the lives of hundreds of men each day. It is probable that a man may secure of our Boiler Inspector a first, second or third class license for running an engine, and so far as a knowledge of handling machinery is concerned a man may be eminently well qualified; but he should be a man of sobriety, and with a temperament not easily excited.

He should be prevented from conversing freely with others while on duty, and also be prevented from having reading matter around, which attracts his attention (in some cases) more than his duty at the throttle. I have seen instances where accidents have occurred in such a manner, and do not think that any precautions can be enforced too strongly to save human beings.

It is estimated that 20,000 miners in Montana are daily subject to the dangers mentioned, and any method adopted by our legislators to protect life and limb would not only meet with the approbation of the miners themselves, but would also meet the approval of every individual within our border lines.

Copper and silver mining is the principal industry of Montana, and with a good price for those metals the prosperity of every man, woman and child is assured.

Since silver has advanced to a good price, thousands of men have commenced to prospect for veins, and in nearly every canyon, and upon every mountain, men are searching for mineral to assist them to become rich and to enhance the value of every product in the State.

Many men who were at work for $3.50 per day have quit day's wages and gone to prospect the mountains; but if the metal should depreciate, their labors would be abandoned.

Railroads, motors, cables, and all other classes of improvements depend upon the production of our mines for remunerative success, and business men of all grades and classes are dependent on the mining industry; therefore every individual should feel his indebtedness to the men who dig and delve beneath the surface (and who encounter tenfold more dangers) for the comfort and happiness they enjoy while breathing the pure air on the surface, unalloyed by the smoke or gases of giant powder; and they should use every legitimate and honorable means and assistance to advance not only safety for the employes, but to advance the industry in all its branches, and at the same time consider the miner who produces the metal the peer of any man, whatever his occupation or calling.

ACCIDENTS.

Names of Men Killed or Died from injuries.	Date.	Name of Mine.
Eugene McCarthy	December 18, 1889	High Ore
Hugh Hester	January 25, 1890	Mountain Consolidated

Names of Men Injured.	Date.	Name of Mine.
William Bailey	January 10, 1890	Mountain View
William Ledford	January 11, 1890	Lexington

DIED FROM INJURIES RECEIVED AT HIGH ORE.

Eugene McCarthy, an employe of the High Ore mine, in company with eight others, started to descend the shaft on the 18th day of December, and by some means unknown to himself or those he was with, came in contact with the wall plate of the shaft. Some supposed that his foot was too far out over the cage, and raised his leg so high that he was thrown against the "guard" of the cage, which cut the thigh, causing blood poisoning. Others believed that his foot caught against the wall plate, forcing his leg up rapidly, thus causing internal injuries; while others believed that the bar of the cage was too high for him to reach for support, and while going down at a rapid speed he overbalanced and was crushed between the timbers. But as each man was in the dark, no decisive account could be given. I made a thorough examination of the shaft in company with Superintendent Laird, and found everything in place, I also examined the bar with which men support themselves, and found it was within the reach of the shortest man, and how he met with the accident remains a mystery.

KILLED AT MOUNTAIN CONSOLIDATED.

Hugh Hester, an employe of the Mountain Consolidated, met with a horrible death on the night of January 25th, 1890. He came to the mine to commence work at 7 p. m., and "should have gone to the shaft house to report himself on shift to the shift boss, and then ride from the surface to the forty foot level on the cage; but as he was employed at this level as carman to run the ore from the shaft to the ore bins, he concluded it was just as well to enter the mine by the tunnel instead of going to the shaft house. After the fire at the St. Lawrence and Anaconda mines (which are owned by the same company) it was

decided to put out all lights in the mine between shifts, so that when Hester entered the tunnel there was no light, and as he approached the shaft he undoubtedly felt that he knew when he had reached the station; but he proceeded too far, and before he had reached, as he supposed, the place to lay down his dinner bucket, he walked into the shaft." falling the distance of 460 feet, severing his head from his body and breaking him literally to pieces.

A bar across the shaft would have prevented him from going into it, but as it was his duty to go to his work via the shaft house, no blame can be attached to any one but himself.

INJURED AT MOUNTAIN VIEW.

On the 10th day of January, 1890, two men were at work on the eighth floor from the 600 foot level. Shortly after dinner they charged two holes with giant powder, and when they were ready to blast they ignited the fuse and went both in the same direction, but should have gone in different directions to prevent any one from entering the stope before the holes had exploded; and while the fuse was burning, Shift Boss William Bailey entered the stope and miraculously escaped being blown to atoms. He received several injuries about the head and face, but recovered sufficiently in a few days to resume labor. This was a case of pure neglect on the part of the employes, who desired protection for themselves, and yet forgot to protect others.

INJURED AT LEXINGTON.

On the 11th of January, 1890, William Ledford in company with others was descending the Lexington mine at 6 p. m., and on reaching the 600 foot station Ledford was in the act of getting off the cage before it was brought to a standstill. He had placed one foot on the station while the other was on the cage, and the cage still lowering brought him up against the crossbar of the cage, causing severe bruises, etc., to his shoulders and body in general.

Just a few hours previous to the accident the ropes had been newly tarred and the marks to show when the cage had reached the bottom had not been placed on the rope. This was fully explained to the men and an agreement reached that the cage when near the 600 station would be lowered very slow and the men on the cage should signal the engineer when at the station but without giving the signal as per agreement Ledford attempted to get off the cage and in so doing received the injuries named.

ANOTHER UNSUCCESSFUL ATTEMPT TO OPEN THE ANACONDA AND ST. LAWRENCE MINES.

The great fire at the Anaconda and St. Lawrence mines which proved so disastrous, on the 23rd day of November, and the attempt to open it on the 7th day of December, is still fresh in the memory of every citizen in Montana, a report of which was made last year. On the 7th of January another attempt was made to open them with a view to securing the five dead bodies which remained in the mine. Steam from "three sets of boilers" had been forced into the mine for nearly six weeks, expecting the steam when condensed would be sufficient to quench the existing fire, although the superintendent, M. Carrol, was persuaded that fire yet remained in the mine. Shortly after the mine was opened dogs were sent down to see if they could retain life before sending down any one to remove the bulk-heads at the 400 St. Lawrence.

The dogs came up alive but much difficulty was experienced in removing the gas that had been created in the mine, and when the 400 was reached and the bulk-head removed, it soon became apparent that the fire was by no means under control and it was soon decided that steam was not sufficient to put out the fire and arrangements for securing water to fill the mine were made. The fire originated at the 500-foot level and burned down to the 600-foot level, but when opened on January 7th it had risen above the 400-foot level and the water was forced in at the 200-foot level so as to saturate the dirt and timbers as it went down on the fire. When the mine would be opened again could not be defined as it was closed for an indefinite period and while the company was anxious to secure the bodies that were in the mine, their friends saw that everything conceivable was done without success.

DEPUTY'S REPORT.

BUTTE CITY, MONTANA,
December 22, 1890.

G. C. SWALLOW, ESQ.,

Inspector of Mines, State of Montana.

SIR:—

I herewith have the honor to present my first annual report as Deputy Inspector of Mines of Montana, and doing duty in the western district of the state. During the year there have been in this district twenty-seven accidents, nine fatal and eighteen non-fatal, a large majority of which were the result of carelessness upon the part of the victims themselves. There are about 5,000 miners working in this district, 4,000 for companies and 1,000 individual owners and lessees.

This report contains a few brief notes regarding the accidents and a summary of the general conditions of the mines.

Respectfully submitted

JACOB OLIVER,
Deputy Inspector of Mines.

LIST OF ACCIDENTS—FATAL.

DATE.	NAME.	COUNTY.	MINE.
March 17.	Ole Lind	Jefferson	Alta
April 4.	John O'Neill	Silver Bow	Green Mountain
April 28.	Patrick Murphy	,, ,,	Mountain Cow
May 1.	Wm. Phillips	Beaverhead	Dexter
May 2.	John Oats	Silver Bow	Alice
May 2.	Gregory Squires	,, ,,	,,
July 16.	Thos. Wailis	Lewis & Clark	Drum Lummon
Sept. 12.	Fred. Reith	Silver Bow	Gray Rock
Oct. 18.	Dennis O'Neil	,, ,,	Anaconda

A brief note of each of the above accidents is subjoined.

Ole Lind, a miner, was instantly killed by a falling rock at the Alta mine, March 17. Before going to supper he had blasted a hole and upon returning he was engaged in working down the back when a loose rock fell, stricking him on the back and killing him. An inquest was held and a verdict of accidental death returned.

John O'Neill, a miner, was instantly killed at the Green Mountain, April 4th. O'Neill with several others were standing on the 100-foot station waiting for the cage. O'Neill becoming impatient put his head into the shaft to see where the cage was when he was immediately struck on the head by the cage and knocked over the guard into the shaft. An inquest was held and a verdict of accidental death returned.

Patrick Murphy, a miner, was instantly killed at the Mountain Cow, April 28th. Murphy with Peter Leyden and Wm. Gray, who were both injured at the same time, had loaded the two decks with pole logging and then got on the top deck. The cage was descending the shaft when one of the poles on the bottom deck got loose and struck the wall plate of the shaft thereby loosening the whole load and stopping the cage. At the time of the stoppage one of the poles struck Murphy in the groin causing death. The verdict of the coroner's jury was accidental death.

Wm. Phillips, a miner, was instantly killed by falling down a shaft at the Dexter mine, Beaverhead county, May 1. Phillips was riding on top of the bucket from the 150-foot level to the surface and when about 20 feet from the top of the shaft, the bucket suddenly stopped and began to descend. Phillips then

jumped off the bucket apparently to catch hold of the shaft timbers but missing his hold he fell to the bottom. The accident was entirely due to the carelessness of the engineer.

John Oats, a pitman, and Gregory Squires, a miner, were instantly killed at the Alice mine by being thrown out of a cage, May 2d. It appears that they had been changing the guides in the shaft, taking out the short ones that had been used in sinking and putting in long ones. This work had been finished and placing two short guides on the cage without lashing them, they rang five bells for the 1200 station. When about nine sets from the bottom one of the guides caught under the wall plate, with the above result. The verdict of the jury was accidental death.

Thomas Wallis, a miner, was instantly killed July 16 at the Drum Lummon mine, Lewis and Clarke county, by being blasted. Deceased and his partner John Gilbert, who was blinded at the same time, had blasted eleven holes in the shaft on the evening of the 15th, the men on the night shift cleaning up the shaft. Returning to their work the next morning, they rigged up their machine preparatory to drilling again, when Wallis discovered a missed hole. He was proceeding to clean the hole out with a sand gun when it exploded, causing his death and the blinding of his partner. An inquest was held, and a verdict of accidental death returned.

Fred Reith, a miner, was instantly killed, and his partner John Symons seriously injured at the Gray Rock mine Sept. 12. The men were working the mine under a lease from the Butte & Boston Co., and were working in a shaft thirty feet below the surface when a mass of ground from the hanging wall fell on them. The accident was due entirely to the carelessness of the men in not timbering the shaft.

Dennis O'Neill, a miner, was killed at the Anaconda mine October 18. It seems that O'Neill, who was working on the night shift, had been to supper, and he with eight others was on the cage returning to work. When between the 200 and 300 foot stations he fainted, and was caught between the cage and crushed to death. The verdict of the jury was accidental death.

On June 12, the bodies of Page, Dolan and Sullivan were recovered from the 800 level of the Anaconda mine, and on July 22 those of Murphy and Kelleher were taken from the dump. These men, it will be remembered, were the five victims of the great fire in the Anaconda mine, which began November 23, 1889.

LIST OF ACCIDENTS—NON-FATAL.

DATE.	NAME.	COUNTY.	MINE.
Feb. 15.....	John Oats.....	Silver Bow....	.....Alice.
March 20....	James Fitz.	„ „	.....Moose.
April 20.....	Jas. Heating.....	„ „	.....Mountain Cow.
April 28.....	Peter Leydon.....	„ „	..... „ „
„ „	Wm. Gray.....	„ „	..... „ „
June 20.....	Jos. Croseas.....	„ „	.....Lexington.
June 30.....	Robt. Thomas.....	„ „	.....Alice.
July 16.....	Jno. Gilbert.....	Lewis & Clark....	.....Drum Lummon.
Aug. 25.....	Jno. Walls.....	Silver Bow.....	..... Gray Rock.
Aug. 28.....	Jno. Watson.	„ „	.....Lexington.
Sept. 3.....	Dennis O'Neil.....	„ „	.....High Ore.
Sept. 4.....	Dan Martin.....	„ „	..... .Parrot Colusa.
Sept. 12.....	Jno. Symonds.....	„ „	.....Gray Rock.
Sept. 23.....	Mike Dolan.....	„ „	.....West Colusa.
Sept. 25.....	Jas. Mack.....	„ „	.....St. Lawrence.
Oct. 13.....	Alfred Treglown	„ „	.....Gagnon.
Oct. 19.....	Dick Dewire.....	„ „	.....High Ore.
Nov. 2.....	Wm. Kemp..... ..	„ „	..... „ „

Referring to the preceding table, a short sketch of each of the accidents is given.

John Oats, a pitman, was seriously injured in the Alice mine February 15. He with five others had given orders to be lowered to the bottom of the shaft, but when two setts below the 1,100 station he changed his mind and signaled to stop the cage in order to hang his wires. While thus engaged one of the men rang two bells to lower. The signals coming in such quick succession somewhat puzzled the engineer, and instead of lowering he raised the cage, the result being that Oats was caught between it and the shaft timbers.

James Fitz, a miner, was slightly injured at the Moose mine March 20. He had loaded a hole and fired it, the cap only exploding; but upon attempting to reload it the explosion occurred. The occurrence was purely accidental.

James Keating, a miner, was seriously injured at the Mountain Con. mine April 20 by falling down one of the chutes. Keating, who is near-sighted from having been blasted some time previously, left his place of work to ascertain the time, and while crossing one of the floors fell into the chute.

Peter Leyden and William Gray, miners, were seriously injured at the Mountain Con. mine April 28. These two men were riding on the same cage as Patrick Murphy, who was killed. Gray received a fearful cut on the head and another on the shoulder. Leyden had an arm and two ribs broken. How either escaped alive is a mystery.

Jos. Crosesas, a miner, was seriously injured at the Lexington mine June 20. He was working alone on the 600 foot level, and needing some powder to blast, he went for it. While capping the fuse, a box containing fifty caps exploded, burning him seriously. It is thought that a spark from his pipe fell into the box, as he was smoking at the time.

Robert Thomas, a timberman, was slightly injured at the Alice mine June 30. He was working on the 200 foot level, timbering one of the drifts, and while sitting down to take a rest, a rock fell from the back of the drift and struck him on the back.

John Wallis, a miner, was seriously injured at the East Gray Rock mine August 25. He was working on the 600 foot level, in a drift close to the shaft, and had blasted two holes. He had crossed the shaft to get out of the way of the shot, and when recrossing the cage came down, striking him on the shoulder. His escape from instaht death seems almost like a miracle.

John Matson, a miner, was severely injured by being blasted at the Lexington August 28. Matson is a Swede who talks but very little English. He was working in a raise between the 300 and 500 foot levels, making connections. His partner, who was working in the winze above, had drilled a hole and told Matson that he was going to blast. Matson answered "All right," but did not leave the place. The shot exploded, and part of the burden struck him on the back.

Dennis O'Neil, a miner, was seriously injured at the High Ore mine, Sept. 3, by being blasted. O'Neil was working on the 300 foot level and had fired three holes. Only hearing two reports, he waited what he considered a sufficient time for the hole to explode, when he went back and began picking the hole, when it exploded, knocking him about fifteen feet and blinding him. It was purely accidental.

Dan Martin, a station tender at the Colusa Parrot, was seriously injured by falling down the shaft September 4. Martin had been accustomed to crossing the shaft by stepping on the chair, a very dangerous practice. On the day mentioned he attempted to cross in this manner when he slipped and fell to the bottom, a distance of 108 feet.

Mike Dolan, a miner, was slightly injured at the West Colusa mine September 23. He was working in a drift on the 500 foot level when a rock fell from the back, striking him on the leg.

James Mack, a miner, was seriously injured at the St. Lawrence mine September 25. Mack was working on the 600 foot level, pouring water on a pile of ore that had been burning since

the late fire. He had already extinguished the fire in a pile close by, and not thinking the one he was attacking was so hot, he went close up to it and began pouring the water. In an instant a steam was created that enveloped him like a cloud, and he was seriously scalded.

Alfred Treglown, a miner, had his leg broken at the Gagnon October 13. He was at work helping to cut the 1,000 foot station, when a large rock fell out of the face with the above result.

Dick Dewire, a miner, was seriously injured at the High Ore mine October 19, by being blasted. It appears that Dewire and his partner were working on the 400 foot level, and had two holes ready to blast, when from some unknown cause one of the holes exploded, knocking Martin back ten feet and blinding him.

William Kemp, a miner, was seriously injured at the High Ore mine November 2. Kemp was working on the 400 foot level lagging over a set of timbers close to the breast, when a large rock fell out of the breast, knocking him down. This was followed by more ground, and he was almost buried alive.

LIST OF MINES BEING OPERATED IN SILVER BOW COUNTY, AND NUMBER OF MEN EMPLOYED.

Mine.	Foreman.	No. of Employes.
Anaconda	John Shea	350
St. Lawrence	Wm. Byrnes	300
Mountain Con.	Larry Manning	400
Green Mountain	Harry Hurley	350
High Ore	Pat O'Neil	350
Mountain View	Richard Dawe	140
Colusa, East	Josiah Gilbert	80
Colusa, West	Josiah Gilbert	100
Moose	Richard Dawe	60
Alice	Wm. Shovell	100
Magna Charta	Wm. Shovell	80
Blue Wing	Wm. Body	40
Rising Star	Wm. Body	20
Silver Bow No. 1	Jos. Hensworth	50
Silver Bow No. 2	Jos. Hensworth	30
Gray Rock	Dave Polkinhorne	80
La Platte	Thomas Helman	20
Belle of Butte	Thomas Helman	30
Tramway	Jos. Hensworth	20
Parrot	Matt Hodge	130
Lexington	G. F. Kellogg	140
Gagnon	Thos. York	80
Nettie	Thos. York	80
Star West	Thos. York	40
Moulton	Thos. E. Coleman	30
Amy Silversmith	John Morgan	20
Blue Bird	Jas. P. Williams	140
Speculator	John Duffy	20
Colusa Parrot	Herman Hesse	40
Black Rock	John Nugent	40
Original	Thomas Bryant	30

SKETCH OF THE MINES.

Anaconda.—Michael Carroll, general superintendent. This mine which was closed down the first six months of the year on account of the fire last November, resumed operations in May. The first work done was the recovery of the bodies of the victims which was accomplished with the greatest possible despatch, eight-hour shifts being employed, the men releasing each other every five minutes. The work was done under the personal supervision of Superintendent Carroll. After the bodies were taken out and the mine thoroughly drained a force of men was put at work repairing the various drifts, cross-cuts and levels that had been damaged by the fire. I visited the mine in October and found it in good condition, the ventilation being very good, although there was considerable gas emenating from the burnt ores and timbers in some of the stopes. These, however, were carried off by the great current of air that passes through the levels from the St. Lawrence, the two mines being connected at several levels. There are two shafts in the St. Lawrence and three in the Anaconda. The Anaconda is well timbered with 10x10 timbers, known as square sets. These timbers are doubled which makes the caps and girths 10x20 inches, and the posts 10x30 inches of solid timbers. Then sets are then filled up with wast rock, drifts being driven in the foot wall for that purpose, the management sparing no expense to secure the lives of the workmen.

The St. Lawrence.—This mine, like the Anaconda, was closed down on account of the fire and resumed operations last May. The surface of the St. Lawrence being lower than that of the Anaconda, and the two mines being connected. the former is necessarily the down cast and the latter the up cast. These two mines are without a doubt the best ventilated in this district. The St. Lawrence is timbered on the same principle as the Anaconda.

Chambers Syndicate Group.—Joseph Laird, Superintendent.

Mountain Consolidated.—This mine has the heaviest hanging wall of any mine in the district, the pitch of the vein being very flat and the vein being very large accounts for the weight of the wall. Under the careful superintendence of Mr. Laird it is being worked very safely. The timbers used are 10x10, the same as the Anaconda, the Syndicate Group and the Anaconda being under the same general management. The ventilation is good. The mine is now 600 feet, deep but sinking has been resumed and will be continued until the 1000 is reached.

Green Mountain.—This mine is in good condition, being well timbered with 10x10 timbers on the same principle as the Anaconda. The air in the mine is good.

Wake Up Jim.—Most of the work in this mine is done through the Green Mountain, the two being connected. It is thoroughly ventilated and timbered after the regular order of timbering used by the Anaconda company.

High Ore.—This mine like the remainder of the Chambers Group is well timbered and ventilated.

The Bell.—But little work is being done on this mine except cleaning up the old shaft and levels. What ore is taken out is hoisted through the High Ore shaft, the two mines being connected at different levels.

Boston & Montana Co.—Thos. Couch, General Manager.

Mountain View.—This mine is in splendid condition, being well timbered with 10x10 timbers, doubled when necessary. The mine is worked with square setts, a principle that has been adopted by most of the large companies of Butte. It is thoroughly ventilated.

Lloyd Tunnel.—This mine is in good condition, being well timbered with the largest class of timbers used in mines. on the 300-foot level the timbers being 14 and 16 inches, the style being square setts. Most of the work in the mine is in the 100 and 200-foot levels, the 300 being just now opened up.

West Colusa.—This mine which was almost abandoned a short time ago is now being worked in good shape. New drifts are being driven in the old workings and new bodies of ore are being discovered which make it almost a new mine. The style of timbering is square setts, 10x10 and 12x12 timbers being in use. The ventilation is very good.

East Colusa.—This mine which like the West Colusa was thought to have been worked out is now one of the large copper producers of Butte. It is connected with the West Colusa at the 500-foot level, is thoroughly ventilated and in good condition and the timbering is all that could be desired.

Lewisshon Shaft.—This shaft is being sunk between the two Colusas. It is the intention of the management to work the two mines through this shaft which when completed will be the largest in Montana. The ladder road in the shaft is the finest I have ever seen. The shaft is now 300 feet deep and sinking will be continued until 500 feet is reached.

Butte & Boston Company.—H. C. Hoatson, Superintendent.

Silver Bow No. 1.—This mine is in good condition, being timbered with 8x8 timbers in square setts. The ventilation is good. There is considerable prospecting being done in the mine mostly with the diamond drill.

Silver Bow No. 2.—In this mine the work being done, consists mostly of sinking, drifting and other development work. The air is good. The timbering is the same as in No. 1. The two mines are connected at the 300 foot level.

East and West Gray Rock.—But little work is being done on these mines and the major portion of that is on the East Gray Rock. Both are timbered with round timbers, stulls, the ledge not being large enough to require square setts. The ventilation is very good.

La Platte.—There is not much work being done on this mine at present, only about twenty men being employed. The ledge is small, and only stull timbers are used. The air is very good. During the year the surface improvements on the La Platte have been considerable, and consist of a new hoisting engine, shaft house and other needed apparatus.

The Alice Co.—W. E. Hall, Superintendent.

The Alice.—This mine is in very fair condition. Being the oldest mine in the camp, there has been a great deal of work done on it. The mine is 1,400 feet deep, but very little work is being done below the 1,200 level. The air on both the 1,000 and 1,200 is not very good, but will be better when a connection is made with the Magna Charta; W. A. Clark, the owner of Clark's Fraction, having given permission to drift through his mine in order that the connection may be made. The air above the 1,000 is very good. The timbers used are stulls, not many being required, as the stopes are filled up with waste. The Cornish pump used in this mine is the largest in Montana, and Superintendent Hall states that it is the cheapest, as it costs but little to run it.

Magna Charta.—This is the richest of the Alice group of mines. It is in good condition, well ventilated and timbered, square setts or stulls being used as occasion requires.

Blue Wing.—The principal work being done on this mine is sinking the shaft and drifting, although a few men are engaged in stoping. The air is fair, and the timbering is very good, stulls being used.

Rising Star.—This mine, which had been closed down for a long time, resumed operations last summer. The principal work at present is drifting and cross-cutting, little or no ore being taken out. The air is very fair.

The Moulton—Jos. R. Clark, Superintendent.—This mine, which is one of the oldest in the camp, is almost at a standstill, there being only a few men working in some of the old stopes. The air is very good, and the mine generally in a very fair condition.

The Lexington—C. C. Renger, Superintendent.—This is the deepest mine in Montana, being 1,450 feet deep. The mine is well developed, drifts and cross-cuts being run in every direction. It is fairly ventilated and in good condition. The timbers used are stulls and stringers.

The Parrot—Benj. Tibbey, Superintendent.—This mine is in good condition, and is well ventilated and timbered with square setts, 8x8 timbers being used.

The Colorado Co.—C. W. Goodale, Superintendent.

The Gagnon.—This mine is in good condition, well timbered with stulls and square setts as is required. It is well ventilated. The shaft, which was formerly a two compartment, has been enlarged to a three compartment. A larger hoisting engine and new shaft house have been added during the year.

Nettie.—This mine is in good condition, well ventilated and timbered, stulls being used for the timbering.

Star West.—This mine, which has been shut down for a number of years, on account of water, resumed operations during the past summer. A new shaft house has been erected, a new hoisting engine procured, and a new and larger pump with a capacity to handle the water has been put in operation. The Star West is said to be one of the richest silver mines in Butte. The only work being done upon it at present is sinking the shaft, and cleaning out the old drifts and crosscuts.

Alta.—L. D. Davis, Superintendent. This mine is located near Wickes, Jefferson County, and is worked through three tunnels. The ledge varies from 4 to 20 feet in width. The system of timbering is stulls and stringers, this style being well adapted to the mine. The property is in good condition and is well ventilated.