

THE STATE OF WYOMING.  
OFFICE OF STATE GEOLOGIST,  
CHEYENNE.

March 1st, 1910;

Hon. Bryant B. Brooks,  
Governor of Wyoming,  
Cheyenne, Wyoming.

SIR:

In obedience to Sect. 7, Chap. 45, Session Laws of Wyoming for 1901, I hand you herewith my report as State Geologist for the year 1909, giving you information as to the extent and character of work performed by this office, together with the fiscal report of all monies received and expenditures made in connection therewith, which I trust will meet your approbation.

I feel constrained to reiterate the observations made by my predecessor, Professor Henry C. Beller, which were in effect that the legislature of the State should make more adequate provisions for the support and extension of the work of this office, or else that the office be pretermitted.

The work of the office during my administration, circumscribed as it has been, by the meagre contingent of \$1000.00 per year, was devoted to what in my best judgment conduced "to encourage the growth and development of the mining industry" of the State, as has been prescribed by the lawmaking power, viz., to visit and inspect the various mining camps of the State, making either requested or voluntary examination of mines and prospects, and giving to the operators thereof my opinion as to the best methods of scientific development, and handling of the ores. In furtherance of this idea as to what was the best method of promoting the development of the mining industry in the State, about June 1st. 1909 I left Cheyenne by private

conveyance for the purpose of visiting all of the active mining camps north of the Union Pacific Railroad, in the State, which expedition occupied three months, and caused me to cover approximately seven thousand miles. The primary reason for making this trip was to bring the office of State Geologist in practical touch with mining sections of the State which had come to the front by reason of recent railroad extension in the central and northwestern sections of the State, and which it might be said has not been visited and reported upon by former incumbents of this office. It gives me pleasure to inform Your Excellency that my observations lead me to believe that perhaps the most valuable mineral sections of the State have been brought to light by recent developments in the asbestos fields of Converse and Natrona Counties, and in the copper camps of Fremont and Big Horn Counties.

I have the honor to be

Very respectfully,

STATE GEOLOGIST.

## INSPECTION OF MINES OTHER THAN COAL MINES.

I beg leave to report that under Chapter 35, Session Laws of 1903, which provide for the State Geologist to be ex-officio inspector of mines other than coal mines, that the only mines actually operating in the State which came under the purview and purpose of this Act were the iron mines of the Colorado Fuel & Iron Company at Sunrise, Wyoming, the Copper Belt Mine at Rawhide Buttes, the Williams-Luman Mine at Copper Mountain in Fremont County, Wyoming, and the New Rambler Mine in Albany County, Wyoming.

Officially I visited, made an inspection of the machinery and appliances used for mining at each of these properties, and found them abreast of the mechanical appliances used in modern, scientific mining, and every safety device provided which might be claculated to insure the safety of the operatives.

Especially have the iron mines of the Colorado Iron & Fuel Company been equipped with every mechanical device necessary for the comfort, convenience and safety of the men employed therein.

During the past year no serious accidents have been reported in connection with metaliferous mining in the State; and none have happened which entailed the loss of life or limb, or caused thirty days loss of working time.

Under the provisions of Chapter 162, Session Laws of 1909 any person who knowingly makes or publishes in any way whatever, or permits to be so made or published any book, prospectus, notice, report, statement, exhibit or other publications of or concerning the affairs, financial condition or property of any corporation, joint stock company, co-partnership or individual,

which said book, prospectus, notice, statement, exhibit or other publication, shall contain any statement which is false or wilfully exaggerated, or which is intended to give, or which shall have tendency to give, or which is intended to give, or which shall have tendency to give, a less or greater apparent value to the shares, bonds or property of said corporation, joint stock association, co-partnership or individual, or any part of said shares, bonds or property, than said shares, bonds, or property, or any part thereof, shall really and in fact possess, shall be deemed guilty of a felony, and upon conviction thereof shall be imprisoned for not more than ten years or fined not more than ten thousand dollars, or shall suffer both said fine and imprisonment." In view of which provisions, after the office of State Geologist had received repeated and emphatic complaints of frauds being perpetrated upon eastern investors with reference to certain alleged mining locations in the county of Crook, near the town of Moorcroft, I deemed it my duty to make an examination into the facts and conditions said to obtain there. As a result of my examination I found that certain eastern mining sharks, to wit, Denoon and Tranter, had located about four hundred pretended iron claims, and upon the same ground had located also about the same number of Bentonite claims, the existence of which was only manifest by notices posted on the ground here and there, without any work of any character having been done to justify any pretense of a legal location of mining claims under the United States and State laws. All of these pretended mineral locations had been recorded in the office of the County Clerk and Recorder of Crook County, and copies of said pretended location certificates had been made the basis of sales of said alleged mineral locations to eastern investors. Judging from the number of complaints received by my office, and from conversations with persons conversant with the operations of these parties, it was estimated that probably

\$300,00.00 had been obtained fraudulently from eastern investors. Other parties besides those named were engaged in the same unlawful practices, including sales of pretended oil claims to eastern parties.

As a result of my investigations I laid the information I had obtained before the Attorney General of the State, only unfortunately to learn that the law was ex-poste facto to the commission of the crimes heretofore described, and was advised to take the matter to the United States authorities, which I did. The United States authorities upon investigation found that the frauds had been carried on through the express office and not through the United States mails, and therefore refused to initiate prosecution.

Later when I brought to the attention of the legal department of the State Administration other instances of the violation of this law, I was informed that it would be futile to press the matter, in as much as there was no appropriation available to pay the expenses of prosecutions under the law.

I am of the opinion that this is one of the most vital and valuable provisions of the law for the promotion, both of the mining industry of the State, and the protection of the investors outside of the State, who rely not alone on the wisdom and integrity of our laws, but their faithful execution also, and I therefore suggest that it would be the part of a wise public<sup>policy</sup> for future legislatures to make an adequate appropriation to defray the necessary expense of prosecuting all infractions of this most salutary law.

Under the provisions of Chapter 33, Session Laws of 1900, providing that the State Geologist may make examination of and report upon mining prospects, undeveloped oil or coal lands or other form of mineral deposit, I beg leave to report that a great number of requests for such examination were made to this office, which according to the representations of the

petitioners transparently failed to meet the requirements of the law, which made it incumbent upon the State Geologist to make report upon same; other causes which probably prevented me from making examinations, were my prolonged absence in making the extended tour of the mining sections of the central and northern portions of the State, and my protracted ill health after my return therefrom.

One examination and report, made in consequence of the provisions of this wise and beneficent law was of the property of the United States Asbestos Mining & Fibreizing Company, located on Casper Mountain in Natrona County, the meat of which report I take the liberty of incorporating herein, because in my judgement it imbodyes the truth with reference not only to the specific property examined, but gives my general views as to the producing power and value of many other prospects along the belt of the asbestos zones in Natrona and Converse Counties, Wyoming, which belt in my opinion is destined to be the theatre of the chiefest and most remunerative mineral production of the State, aside from that of coal. The portions of the report to which I desire to call attention, are as follows:

Casper Mountain, which is the western end of the axis of the asbestos zone, may be regarded as the Northwest extremity of the Laramie Range. The Mountain is an Anticline with due East and West trend; broken by a great fault which extends parallel to the strike along the North front of the Mountain. The old formation South of the fault rises in great height, forming Casper Mountain, and exposing a granite and schist core which is traversed by great bands of Serpentine Asbestos carrying rock.

The following sketch by N. H. Darton, U. S. G. S., gives the cross section of the mountain south of Casper and through the property of the U. S. Asbestos Mining and Fiberizing Company.

(Sketch Ommitted)

The property is developed by about thirty-five pits surface cross cuts and tunnels. I examined about twenty-five of these workings and found chrysolite asbestos fiber in each. This mineral is found in regular mineralized dikes or veins in the serpentine rock. The serpentine forming quite a large part of the core of the mountain. The quality of the asbestos fiber found on this property is a very high grade cross fiber chrysolite equal in my judgment to the Cahada fiber mined at the same depth.

I noticed that as depth was gained on the veins the fiber became more silky and soft; this is due to the

fact that asbestos has a certain per cent of combined water, and by being exposed to the elements for ages it loses some of its water and becomes a little harsh. The color of the fiber is of a greenish white.

The fiber of this property ranges in length from one-sixteenth to one and one-half inches, and in my opinion on many of the claims it composes from 10 per cent of the vein matter mined. Some of these veins are from twenty to thirty feet wide and will probably prove in some instance to be wider. I am of the opinion that about ten per cent of the fibre mined will go as No. 1 grade and bring a very high price, besides this you will have No. 2, 3, 4, and 5 grade which are very valuable.

I desire to say that whilst I am convinced from a thorough examination of the asbestos fields in Central Wyoming, that they are of greater extent and value than any others known, with equal development not excepting the celebrated Thetford and Black Lake regions of the Province of Quebec in Canada. It is greatly to be regretted that the development of the asbestos industry has been and will continue to be for sometime greatly retarded and crippled by an unwise and exorbitant capitalization of the several companies which have monopolized practically all the known prospects opened in the country. When a reorganization of these corporations shall have been effected, and a capitalization of them commensurate to their revenue paying capacity, founded upon the production of the mines, is had, then, and not till then, will there be that industrial development of the region which its merit justifies. There may be justification for the capitalization of corporations working extensively developed and producing asbestos mines at ten or twenty million dollars, but to incorporate mere prospects, no matter how promising at such figures involves the companies themselves in suicide, and carries upon its face transparent fraud upon the general public which is invited to invest in stock.

Under Chapter 92 of the Session Laws of 1905, known as the Voluntary Publicity Law, by virtue of which mine owners may make sworn statements to be filed in the office of the State Geologist, in the mining register kept in said office,

showing the value and condition of their properties, only one such report has been presented and filed. All interest seems to have been lost in the provisions of this law by the mining industry of the State, and I am of the opinion that these views are correct, because the public put no faith upon what is regarded as a self-serving voluntary report upon a mining property, naturally made by one who is not an expert and whose views are naturally colored by his interest in the property.

I have the honor to submit herewith my expense account from April 1st, 1909, to February 1st, 1910:

Traveling expenses-----	\$ 150.90
Board, while traveling-----	148.10
Stenographer and typewriter-----	103.00
Postage-----	20.70
Records, stationary and printing-----	49.35
Papers, magazines and books-----	18.75
Forwarded-----	490.80
Miscellaneous-----	273.80
	<hr/>
	\$ 764.60
Balance on hand-----	235.40
	<hr/>
	\$1000.00

Previous to my extended tour of examination of the mining camps of Central and Northern Wyoming in the month of May last, I visited the Grand Encampment District in southern Carbon County, Wyoming, and found the industry in that section both as to mining and reduction of ores paralyzed in consequence of stock jobbing operations of similar character to those which had been so common in the mining camps of the West, and to the baneful effects of which more mining failures are due than to any other cause. This was made the more apparent when it was realized that such great producers as the Rudefeha or Ferris-Haggerty Mine was idle. My examination of the formations and inspection of the mines and prospects in what is known as the Grand Encampment District convince me that however great and exceptional has been the production and output



of the Rudefeha mine, it will be duplicated by other mines in the District as soon as scientific and extensive development work has been prosecuted.

During the past year the "New Rambler" in southern Albany County has resumed work and is turning out large quantities of its unique ores, carrying gold, platinum and copper, which demonstrates that the closing down of the mines in that section south of the Union Pacific Railroad does not signify the exhaustion of the ores, but rather arises as generally when any great mine suspends operations from friction between the owners, or from some fraudulent disposition on the part of owners or stockholders to monopolize the property. My understanding, however, with reference to this particular property is that its resumption of work occurred in consequence of the extension of the Laramie and Hahns Peak Railroad to Centennial, which shortened the wagon haul of the output of the mines some thirty miles.

On June the first, 1909, I left Cheyenne on the general tour of inspection heretofore referred to, taking in first the iron mines in Sunrise Park and the Hynds copper mine near Hartville. As heretofore intimated my investigation in connection with the iron mines, with the ores and output of which both the scientific and industrial public are acquainted, was to ascertain in particular the conformity to law in the matter of safety appliances, and devices in use. I might say, parenthetically, that the output of these celebrated mines for the year 1909 was about 600,000 tons. The high quality of the hematite ore being fully sustained.

The Hynds mine heretofore mentioned deserves emphatic consideration, from the fact that after having patented for twenty years without any development made upon the ore body, which was sticking out of the ground for all of that time, it

became a large producer of exceptionally high grade copper ore, as soon as a few feet of drifting was done. At the time I visited this new Laramie County copper producer there was about 600 tons on the dump, which would average not less than twenty-five per cent in copper. In my opinion this phenomenal mine will be shown only to be representative of many others of similar character eventually to be opened up along the copper belt reaching from Sunrise Park to the old Michigan mine in Muskrat Canon, covering a distance of twenty-five miles.

As exemplifying my theory of the extensive and valuable copper belt just spoken of, I may mention the fact that at Rawhide Buttes is located what is known as the Copper Belt Mines Company, the chief shaft upon which has reached a depth of six hundred and forty feet, in connection with which there is about 3500~~0~~ feet of underground workings. The openings in this mine show at numerous places large bodies of ore carrying in about six per cent of copper and appreciable values in gold and silver. The company is developing this property and is ~~expecting~~ expecting to put up reduction works for their own ores the coming summer. Along this copper belt between Sunrise Park and Muskrat Canon, in my judgment occur the most remarkable surfact<sup>ion</sup> anywhere indicat<sup>ion</sup> of rich copper leads to be found in the west.

From Hartville I made a deflection into Halleck Canon to examine the well known graphite mines of that locality, and found verified what I had often heard, namely, that the largest and highest grade bodies of amorphous graphite in the world occurred in that canon.

After leaving Laramie County, I visited what is known as the North Laramie Peak Mining District, which I found to be a very highly mineralized and promising region. The mine which I showed the greatest development, into which I was able to effect

entrance, was the Three Cripples Mine. This mine had a ninety foot shaft on a large lead of pyritic iron, carrying values in copper, gold, silver and traces of nickel, it being in my judgment a most promising prospect.

From this point our route carried us through the asbestos fields heretofore described, and on the values of which in my opinion too much emphasis cannot be laid.

Owing to information obtained at Casper that there was no activity of any character in the Salt Creek Oil Fields, I did not visit them. But since that time I am gratified to report to Your Excellency that work has been resumed extensively in the district, and that a number of wells have been sunk and other are being sunk, from which the most satisfactory results are being obtained, giving promise of the shipment of oil from the Salt Creek wells to the railroad at an early day, or conveyance of the oil by pipe line to the railroad.

When I reached Lander I visited the Dallas Oil Fields, which are being exploited and developed by the Col. E. H. Power Leasing Company. I found most extensive operations being pushed in the nature of opening wells, reservoiring the oil, and transporting it by a ten mile six inch pipe line to the railroad, where it is being shipped to the Eastern market in tank cars owned by the Power Leasing Company itself. I ascertain that the Northwestern Railroad was using the oil for fuel in generating steam to propel its rolling stock, which of course is a most important factor in the future development of the fields, giving as it does, a home market for the product. In the Dallas Oil Fields there have been drilled up to the present time about twenty producing wells, the oil being obtained from depths ranging from 200 to 1500 feet. I was informed that contracts had been let by the company for the sinking of seventy five additional wells, the management having been <sup>encouraged by</sup> greatly <sup>en-</sup>countering permanent saturated oil sands.

Between the Dallas Oil Fields and the Hahnsberger Well, thirty miles distant to the northwest of the Dallas Fields, the country is being developed by a series of oil wells. The Hahnsberger well at a depth of 1500 feet disclosed thirty feet of liquid asphaltum, running 78 5/10 asphaltum, thus showing as high grade as any other well in the United States. All the conditions point to a revival of the oil industry in Central Wyoming, the operations being upon a legitimate business basis. It does not now seem that any adverse condition, either commercial or with reference to transportation can much longer delay the development of the wonderful oil fields of the State, and I predict that in the near future Wyoming's oil production will rank among the State's fore-most sources of revenue.

Owing to the fact that the South Pass - Miners Delight gold section had been so fully and recently covered by bulletins issued by my predecessor, Prof. H. C. Beeler, in connection with the other fact that there is very little activity existing in the section, I did not make any extended examination of the existing conditions there, and only suggest that any one desiring information can secure the publications made by this office, heretofore referred to. I am familiar with the formations and ores of the South Pass country and do not hesitate to predict that when transportation facilities carry cheap fuel to the camps, and scientific reduction is applied to the ores, there will be developed one of the great gold producing regions of the Rocky Mountains.

En route from Lander to the real wilderness of the State, southeast of the National Park, I encountered and made close examination of a number of very large dikes of conglomerate and pegmatite, which I have since ascertained carried from \$2.00 to \$4.00 in gold which will ultimately be saved by cyanide process, the industrial possibilities of such re-

duction being greatly economized on account of the available water powers at hand. It may be said that these dikes are the transparent source of the placer gold, which has recently been found in paying quantities along the Wind River as far down as Shoshone.

Southeast of the National Park about thirty miles on the Buffalo Fork River, one of the tributaries of the Snake, running west through Idaho to the Pacific Ocean, occurs a mineralized section known as the Buffalo Fork Mining District. The formation in this section is an uplift of granite, schist and diorite thrust up through sedimentary rocks. The ores occur as copper silphides found in very large veins, the average value being from 4 to 7 per cent. From my examination of the work which has been done, covering several hundred feet of shafts and drifts, I am satisfied this will ultimately be a very valuable copper producing section of the State. Its development is being retarded now by want of transportation facilities, but it is confidently believed that the Chicago & Northwestern coast extension will pass through the section at no distant day.

At Copper Mountain, notorious as the locus of the great Williams-Luman mine, I found that conditions had greatly improved by reason of the confidence given by the completion of the Boysen Dam, which will furnish cheap electric power to the mine, and the building of the Burlington extension through the canon and along the foot of the mountains to within ten miles of the camp. Outside of the Williams-Luman mine development work had been suspended to a large extent on account of adverse transportation conditions, but as soon as the facilities above mentioned become available a number of valuable prospects will be developed into paying mines. At the present time the work in the Williams-Luman mine is being concentrated upon the fourth level of its 800 foot shaft, in which large amounts of very high grade copper ore are being blocked out. Recently the Mc

Graw mine, which has been more extensively developed than any other at Copper Mountain excepting the Williamson-Luman has been sold, and the purchasers are preparing to install adequate machinery for its deep development.

Near Thermopolis I visited the sulphur mines being operated extensively by the Wyoming Sulphur Company. They are manufacturing and shipping about 75 tons of refined sulphur weekly. This sulphur industry is destined to be one of the largest and most profitable in the United States, as the ore occurs in inexhaustible quantity, making the output simply a matter of the extension of machinery for mining and reduction.

After leaving Thermopolis I went to and examined the gas and oil fields of the Grey Bull section. This is one of the most remarkable fields of the character in the United States. When I was there <sup>there</sup> had been developed about eight gas wells of immense proportions. Some of them carried as much as 480 pounds rock pressure. The gas from these wells conducted through pipe lines to Basin, the county seat of Big Horn County, is being used to both light and heat the city. It will also be used at the town of Greybull. The oil which comes from the Grey Bull Field is of a very superior illuminating quality, carrying a very large per cent of kerosine and gasoline, and is of a paraffine base. At Byron and Garland, about twenty-five miles north-west from Grey Bull, even finer illuminating oils occur in a number of wells than at Grey Bull, and in that section it is contemplated in the near future to erect and operate a refinery. It may be said, without exaggeration that probably the oil fields of Big Horn County are equally if not more valuable than those in the southern sections of the State. At Cody which is about fifty miles west of Basin, and on the same oil belt, in two wells the same character of high grade illuminating oil has been disclosed,

thus proving the great extent of the Big Horn oil section, and the certainty of finding oil by sinking wells to a moderate depth

The precious minerals in Big Horn County, so far discovered and exploited, are at Kirwin, in the south central part of the County, and in the Sunlight Basin in the north-western part. In the Kirwin District a very large amount of development work has been done disclosing valuable veins, carrying lead, gold and silver, which will become producers as soon as the projected spur of the Burlington Railroad reaches the camp.

In the Sunlight Basin probably occurs one of the most valuable and promising mining camps, not only of Wyoming, but of the West. In this basin occurs extensive porphyritic formations in association with the granites and schists. Anterior to the discovery of the mineral belt in Sunlight Basin it had been thought that there were no occurrences of porphyry in the State, which seemed to hold good for the Central & Southern parts, but which has been disproven both in Sunlight Basin and in the Bear Lodge mineral district of Crook County. The ores occur in Sunlight Basin in large veins, cutting through the precipitous formations, and carrying large values of gold, silver, copper and in some instances lead. Sufficient development has been done on a number of veins spoken of to demonstrate their continuity with depth and the uniformity of values they carry. Another phenomenal feature of this section are the great porphyry dikes, which are impregnated with copper, similar to the Ely Section of Nevada.

In this same Basin occur immense deposits of sulphur which will ultimately be great revenue producers. The district possesses immense and readily available water power. This Sunlight Basin is peculiarly inaccessible at present to transportation, it being almost impossible to haul the ores by wagon out of this badly broken section to the railroad at Cody or at Bear Lodge, Montana. As soon as transportation facilities reach the Sun-

light Basin it will, in my opinion, quickly take rank as a mineral producer of high grade copper and gold ores, with any region of equal area in the United States.

In the Big Horn Mountains in Sheridan County, judging from the samples of ore furnished to me by prospectors, there are numerous localities which would justify exploitation, but as I am informed only surface work has been done.

One of the mineral districts of the State, the value of which I desire to give special emphasis to, is the Bear Lodge District in Crook County, about eight miles west of Sundance, the county seat. This like the Sunlight Basin is a porphyritic region, porphyry predominating over all other character of country rock. The veins are very large in width and carry low grade gold values in association with fluorine. The samples assays taken by me showed values ranging from four dollars up, <sup>the</sup> which settle the question that ores which are amenable to the cyanide process are of sufficient average value to insure rich returns from their mining and reduction. The western portion of the district also shows large veins of good grade copper. This section will develop into a very valuable and extensive producer of minerals.

Very considerable activity is being shown in the oil fields contiguous to Newcastle, in Weston County, and some valuable wells have been brought in. I did not make an exhaustive examination and study of the field, but am of the opinion that it will become a remunerative producer of high grade oils with scientific exploitation.

This extended tour heretofore described, of the mining regions of Central and Northern Wyoming, by which I calculated to educate myself as to their mineral resources, and commercial and economic advantages, ended about the first of September, 1909, and I contemplated a similar tour for the same purpose of



the mineral sections of the southern part of the State last Fall, but was prevented by protracted ill health from doing.

In conclusion I desire to say that in my judgment the undeveloped mineral resources of the State are more varied and probably of equal value with any similar area in the West, but their industrial development has been peculiarly retarded by several causes, now fast disappearing. The first of these, thoroughly understood by everybody, has been inadequacy of transportation facilities, due to the fact the few railroads which have traversed the State did not pass through or reach near to the mineral sections. And second by "wildcatting" that common curse of all new undeveloped and promising mineral sections. And third by reason of the fact that practically all capital which has entered the State has heretofore been absorbed by its great animal industries of cattle and sheep raising.

I desire to say in connection with the forgoing that the State at the present time, is practically clean from "wildcatting", and will become absolutely so if the provisions of the law know as Senate File No. 77, relating to false and exaggerated statements or publications as to mineral holdings by corporations and individuals is wisely enforced.

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STATE GEOLOGIST.