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REPORT
ON THE PROPERTY OF
THE HUTCHINS CONSOLIDATED
GOLD MINING COMPANY.
CROOK COUNTY,
WYOMING.

By
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REPORT
ON THE PROPERTY OF
THE HUTCHINS CONSOLIDATED
GOLD MINING COMPANY,
CROOK COUNTY,
WYOMING.

The property of the Hutchins Consolidated Gold Mining Company lies in the Bear Lodge Mountains, about eight miles north of Sundance, Crook County, Wyoming. Sundance, a town of some 300 population, the county seat of Crook county, is situated in the southern portion of the Black Hills, the Bear Lodge Mountains constituting a portion of that uplift. Although

some 32 miles from the railroad the Sundance region is readily reached from Upton, the nearest railway point, over good roads.

The property owned by this company is held by right of location, and comprises the following named mining claims, situated in Sections 17, 18, 19 and 20, Township 52 north, Range 63 west:

Bessie Smith	20.5 acres
Bessie Smith No. 1	20.5
Bessie Smith No. 2	20.5
Bessie Smith No. 3	20.5
Bessie Smith No. 4	20.5
Bear Lodge	20.5
Bear Lodge No. 1	20.5
Bear Lodge No. 2	20.5
Bear Lodge No. 3	20.5
Sunnyside	20.5
Sunnyside No. 3	20.5
Bull Hill	20.5
Bull Hill No. 1	20.5
Bull Hill No. 2	20.5
Bull Hill No. 3	20.5
Bull Hill No. 4	20.5
Bull Hill No. 5	20.5

Sunnyside Fraction No. 1	7.5 acres
Sunnyside Fraction No. 2	19.5
Tuxedo	17.5
Tuxedo Fraction No. 2	6.2

a total of about 378 acres.

TOPOGRAPHY AND CLIMATE.

The Black Hills, of which the lands under discussion form a part, are a small group of mountains lying in northeastern Wyoming and western South Dakota, elevations above sea-level ranging from 4,500 feet to 7,200 feet. The Bear Lodge Mountains, an extensive mass of igneous rock, rise in steep slopes cut by narrow canyons, the culminating point being Warren's Peak with an altitude of 7,160 feet. On account of the bountiful rainfall the region forms an oasis in the surrounding semi-arid country, the flora of the district resembling that found in the states

of the Mississippi valley. Although the snow fall in the winter ranges from two to five feet, work may be carried on during the entire year.

IMPROVEMENTS AND DEVELOPMENT.

Surface improvements on this property consist of a bunk house, two small cottages, a stable, and a shaft house, the latter being equipped with a small steam hoist.

Development has been confined to work on or near the surface. There are a number of shallow shafts, three open cuts, each forty feet or more in length, and a tunnel 154 feet in length.

GEOLOGY.

In the Sundance district sedimentary and

igneous rocks are exposed at the surface, although rocks of igneous origin occupy practically the entire area owned by the Hutchins Consolidated Gold Mining Company. The igneous rocks, comprising several varieties, have been intruded among the sedimentaries, and are nearly all of Tertiary age.

SEDIMENTARY ROCKS.

The sedimentary rocks, which have no bearing on the lands in question, will not be discussed in detail in this report. They comprise limestones, shales, and sandstones of the Cambrian, Ordovician, Carboniferous, Triassic and Jurassic systems. Rocks of Cretaceous age were not seen by the writer, but, some six miles west of Sundance, coal of excellent quality is obtained from the Dakota formation, Cretaceous system.

IGNEOUS ROCKS.

The igneous rocks of the Bear Lodge Mountains belong to two distinct and widely separated periods, the one of pre-Cambrian, the other of early Tertiary age. To the pre-Cambrian period belong the granites of the Bear Lodge district, while the Tertiary rocks, which are all of closely related types, have been derived, probably, by differentiation ~~from~~ a single magma. These Tertiary rocks occur as laccoliths and dikes, the rocks of the Bear Lodge laccolith comprising syenite-porphyry and monzonite-porphyry, cut, here and there, by phonolites of somewhat later age.

GRANITE.

Granites occur in the Bear Lodge uplift on the southern slope of Warren's Peak; a short distance northeast of the Peak; and at several other points

in the region. Only the first mentioned locality was visited by the writer. Although usually referred to as dikes, the granite masses are believed to be inclusions in the later porphyries.

The granite occurring south of Warren's Peak is an aggregate of quartz with one or more of the feldspars. Mica is absent, while magnetite and apatite are the accessories. Quartz is fairly abundant. Orthoclase is the dominant feldspar, although oligoclase and albite are present in small proportions. The rocks are uniform in texture and of rather fine grain. Occasionally they appear somewhat porphyritic, due to the development of phenocrysts of feldspar.

SYENITE-PORPHYRY.

The principal rock of the Bear Lodge uplift

is a porphyry in which the orthoclase is in excess of the plagioclase, and may be termed syenite-porphyry. At some points, however, the syenite-porphyry grades into monzonite-porphyry, orthoclase and plagioclase being present in nearly equal amounts. On the whole, the rock may well be called latite-phonolite, as it closely resembles, in many respects, the latite-phonolite of the Cripple Creek district, Colorado.

The rocks are usually ~~grey~~ ^{gray} in color, though shades of red and yellow are not uncommon. Alteration has proceeded far, the rock containing small cavities formed by the removal, by solution or decay, of some of the minerals. The syenite- and related porphyries of the Bear Lodge uplift are characterized by the great variation in their grain and in the size and abundance of the phenocrysts. The phenocrysts, which are sometimes rare and sometimes abundant, consist principally

of oligoclase. The groundmass which is usually fine-grained, though sometimes granular, consists principally of orthoclase. The ferro-magnesian minerals which were present have for the most part been removed by weathering.

PHONOLITE.

Phonolite occurs in the Bear Lodge Mountains as dikes cutting the syenite-porphyrines. The phonolites are gray in color, with a distinct greenish tinge, and are always porphyritic. The ground^dmass is composed principally of orthoclase, aegirite, augite, and a small amount of magnetite, while the phenocrysts comprise orthoclase, aegirite, and small amounts of apatite, titanite and magnetite.

At several points within the area are dikes of a dark green rock, locally known as basalt. They are, however, tinguaite, a variety of the phonolites,

the decided green color being imparted by the presence of aegirite crystals in great abundance.

BRECCIA.

At a number of points both north and south of Warren's Peak breccias were noted, caused, no doubt, by the intrusion of the later porphyries through the then existing fissures. These breccias contain fragments of the porphyries, and sometimes of granite, imbedded in a gray to yellow matrix. The breccias are always greatly weathered.

GEOLOGIC RELATIONS.

In early Tertiary time the syenite-porphyries of the Bear Lodge Mountains were intruded at the base of the Cambrian beds. The strata forming the top of the uplift were removed by erosion, and the syenite-porphyries were cut by the phonolites and associated dike rocks. The phonolites are fresh, but the other

igneous rocks, excepting the granites, are much weathered.

Mountain building epoch
After the intrusion of the phonolites the ~~period of volcanic activity~~ closed. The fissuring of the rocks then occurred, though the nature of the stresses that produced the fissuring is not readily determined. It seems probable that the fracturing was caused by the shrinkage of the rocks and a slight settling of the dome.

ORE BODIES.

With but few exceptions the ore bodies of the Bear Lodge district are associated with a system of nearly parallel fissures. The fissures are narrow, in no case, so far as noted, exceeding four inches in width. These minute fissures, which are abundant on the property of the Hutchins Consolidated Gold Mining

Company, have a northwest-southeast strike, apparently radiating from Warren's Peak, the filling being quartz, fluorite, and on the surface, limonite. No definite vein system has been traced out, the country rock showing gold in the pan at all points tested. As a rule the fissures are steeply inclined, dipping to the northeast.

Pyrite in greater or less quantity is found in all the rocks of the district, though gold, in the surface ores, is entirely free. Gold combined with tellurium (sylvanite or calaverite) has been found in considerable quantity in one of the mines of the district, about one mile from the Hutchins Consolidated property. A short distance north of the Hutchins claims is the Copper Prince Mine, where the ores on the dump contain malachite and chrysocolla. Some of the ores from this

mine show native gold in small particles.

Crossing the property of the Hutchins Con. company is a vein of massive manganese oxides--psilomelane and pyrolusite. This is one of the few massive veins in the district.

> As has been set forth on the preceding pages, the rocks of the Bear Lodge district comprise syenite-porphyrines, granites, phonolites, and igneous breccias. A region which apparently has much in common with this area is the Cripple Creek district of Colorado. The following extract from Professional Paper 54, of the United States Geological Survey, tends to show this similarity:

"During Tertiary time volcanic eruptions broke through these ancient rocks at several points and piled tuffs, breccias, and lavas on the surface of the plateau. The eruptive rocks of the Cripple Creek district are the products of one of the smaller isolated volcanic centers

of this period, a center characterized by the eruption of phonolite, which does not occur elsewhere in this region. * * * * The most characteristic massive rock of the Cripple Creek volcano is phonolite. * * * * The general succession of igneous rocks, according to Cross, is as follows: The earliest rocks were andesites containing some orthoclase. Then came a series of allied phonolitic rocks, rich in alkalis and moderately rich in silica, together with some andesites. Among these are trachytic phonolite, nepheline syenite, syenite-porphry, phonolite, mica andesite, and pyroxene andesite. * * * * The 'phonolite', 'nepheline syenite', 'trachytic phonolite', 'syenite porphyry', and 'andesites' of Cross are all very closely related and have been found to be in most cases so closely connected by intermediate types as to be practically inseparable."

"The ore bodies are almost in all instances causally related to fissures. * * * * All of the ore deposits are characterized by the narrowness of the fissures which gave passage to the ore-bearing solution and by the comparative small volume of material deposited in these fissures. * * * * Productive lodes occur in all the rocks of the district, with the possible exception of the schist. They are most abundant in breccia and in granite. Many lodes follow phonolitic

or basic dikes."

"The characteristic feature (of the ores) is the occurrence of the gold in combination with tellurium and chiefly as calaverite. Native gold is present in the unoxidized ores only as a rarity. Pyrite is widely distributed in the country rock and also in the veins, with tellurides. Galena, sphalerite, tetrahedrite, stibnite, and molybdenite are sparingly present. Among the gangue minerals quartz, fluorite, and dolomite prevail. The ore occurs chiefly as a filling of narrow fissures, and consequently the ores as mined have the approximate composition of the country rock. * * * * The pyrite is rarely auriferous except when admixed with tellurides."

"Within the oxidized zone of the veins native gold is abundant, but it rarely exhibits its normal characteristics. It forms small particles, many of which are entirely invisible to the naked eye, or in a few cases larger grains; spongy masses, thin sheets, or plates."

Among the minerals listed as occurring in the Cripple Creek district are the following: Native gold, sylvanite, calaverite, pyrite, molybdenite, stibnite, galena, sphalerite, tetrahedrite, fluorite, quartz, limonite, psilomelane, wad, calcite, dolomite, and titanite.

Under the heading "Structure of the Cripple Creek Gold Deposits", the following appears:

"In the first place, the actual openings in the rocks available for the deposition of the ore are, as a rule, remarkably narrow. In the second place, the amount of material carried in the mineralizing solutions and deposited as gangue and ore minerals was comparatively small. In consequence of these two conditions, the district contains no such massive veins, solidly filled with quartz or other vein minerals, as are characteristic of the San Juan region in Colorado or the Mother Lode region in California. * * * * "

"As elements of geological structure, the lode fissures of Cripple Creek are exceedingly inconspicuous. They are marked neither by bold outcrops of quartz nor by superficial bands of ferruginous gossan * * * * ."

"The structure associated with the deposits most characteristic of the district is that known as a sheeted zone. As here developed such zones consist of a varying number of narrow, approximately parallel fissures which collectively form a lode ranging from a few inches to 50 or 60 feet, or rarely 100 feet, in width. * * * * As a rule the fissures are mere cracks, showing no brecciation, slickensiding, or other evidence of tangential movement of the walls."

"The most abundant mineral in the fissure fillings or veins is quartz. It is in nearly all cases associated with fluorite, whose purple color often renders it more conspicuous than the quartz, even when the latter predominates. * * * * In some lodes the veinlets which contain the tellurides are no thicker than a sheet of paper. The majority of the individual veins in the district range from the width of those just described up to 5 or 6 inches, * * * * ."

"In general, then, the typical vein of Cripple Creek consists of one or more fissures ranging from 1 to 6 inches in width, whose walls are lined with crystalline crusts of quartz, fluorite, or dolomite."

The following points in common tend to emphasize the similarity existing between the Bear Lodge and the Cripple Creek districts:

- Mountain Building*
- 1.-- ~~Volcanic activity~~ in early Tertiary time;
 - 2.-- The eruption of syenite-porphyrines (latite-phonolites) and allied rocks;
 - 3.-- The intrusion of phonolitic dikes;
 - 4.-- The occurrence of ores in sheeted zones and narrow fissures;

5.-- The absence of massive, solidly filled veins;

6.-- The occurrence of gold in combination with tellurium;

7.-- The occurrence of the same gangue minerals in the two districts, viz.,- quartz, dolomite and fluorite;

8.-- The occurrence of the same metallic minerals in the ~~two~~^{two} districts, viz.- gold, sylvanite, calaverite, pyrite, galena, copper minerals, limonite, psilomelane, wad and titanite. (Galena is reported from Black Buttes, near the Bear Lodge district. Stibnite, sphalerite, and molybdenite have not yet been reported from the Bear Lodge district. It has not been definitely determined whether the gold tellurides of the Bear Lodge district are present as sylvanite, or calaverite, or both).

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ORE DEVELOPED.

Development work on the property of the Hutchins Consolidated Gold Mining Company, though reaching a total of several hundred feet, has been distributed in surface work at a number of points and in such a manner that no tonnage of ore can be said to be developed. During the course of the examination *mine* eight samples were taken and the following results obtained on assaying, (See corresponding sample numbers on accompanying map.):

No.	Description	Gold	
		oz. per ton	Value per ton
1	Tunnel From face 10 feet north.	<i>Clay</i>	
2	Tunnel Next 10 feet north of sample No. 1.		
3	Tunnel Next 5 feet 2 inches north of Sample No. 2.		

No.	Description	Gold	
		oz. per ton	Value per ton
4	Shaft Bessie Smith claim. 4 feet.		
5	Opencut Bear Lodge No. 2 claim. 18 inches. Quartz and fluorite.		
6	Opencut Bear Lodge No. 2 claim. Phonolite dike. 20 feet.		
7	Opencut Bear Lodge claim. 9 inches. Quartz, syenite and fluorite.		
8	Shaft Bear Lodge claim. 4 feet. 10 inches. Chert, syenite and limonite with small amount of ilmenite.		
9	Shaft Bear Lodge No. 1 claim. Psilomelane and pyrolusite. 14 inches.		

MINING FACILITIES.

TIMBER.

The name "Black Hills" was given to this region on account of the dark appearance of the mountains when seen from a distance, due to the extensive forests which cover the higher lands. Although there are numerous open parks, large areas are densely timbered, yellow pine being the principal tree. The largest timber attains a height of 80 to 100 feet, and a diameter of 20 inches to three feet.

Cordwood costs about \$1.50 per cord. Lumber-- Oregon pine-- is sold at from \$30 to \$40 per thousand feet, but yellow pine lumber, which meets all the requirements of the miner, may be obtained at local saw-mills at a much lower price.

COAL.

Coal of excellent quality, suitable for blacksmith's use, is mined about six miles west of Sundance. An analysis of this coal, which sells at the mine for \$1.50 per ton, follows:

Moisture	-----	11.00 per cent.
Volatile matter	-----	41.16
Fixed carbon	-----	40.37
Ash	-----	7.47

WATER SUPPLY.

Numerous creeks in the vicinity of the Hutchins Consolidated mine contain small quantities of water, which, if properly developed and conserved, will furnish sufficient water for mining and milling operations. Ample water for all purposes will, no doubt, be obtained from the mines as underground development proceeds.

RECOMMENDATIONS.

It is not considered advisable to continue sinking on the south side of the Hutchins hill as the dip of the mineralized zones is to the northeast. A shaft at a point where the shaft house and hoist are now located will entail needless cross-cutting to tap the known mineral-bearing zones as sinking is continued.

The best point for development by means of a shaft is thought to be on the north side of the Hutchins hill, near the mouth of the tunnel. A shaft sunk in that vicinity should cut the mineralized zone at about 250 feet depth.

CONCLUSIONS.

The results of the investigation of the property of the Hutchins Consolidated Gold Mining Company, and of the adjoining area in the Bear Lodge district may be summarized as follows:

The district closely resembles geologically, the Cripple Creek district of Colorado, though in the one case the igneous rocks are due to a laccolithic intrusion, while in the other they are the result of a volcanic outburst;

The ore bodies are closely connected with a system of narrow, parallel fissures;

The movement along the fissures appears to have been very slight;

The fissures were caused by shrinkage and a slight settling of the dome;

On the surface, in the fissured zone, gold in greater or less quantity was found at every point tested;

In mines near and adjoining the Hutchins Consolidated mine gold combined with tellurium has been discovered;.

There is strong reason to believe that gold tellurides will be found in the Hutchins Consolidated mine when but little further developed;

The district as a whole, and the property of the Hutchins Gold Mining Company in particular, is believed to offer a first-class opportunity for mining investment, although, as a matter of necessity, the usual risks attendant upon mining must be taken.

Respectfully submitted,

State Geologist,

Cheyenne, Wyo.
June 22, 1912.