

west, and extends in a northwesterly direction from Galena, above Spillimacheen, to about 7 miles north of the Big Bend of the Columbia—a distance of about 140 miles.

The Canadian Pacific railway traverses the district in an easterly and westerly direction; the stations within the division being Bear Creek, Beaver, Donald, Golden, Palliser, Otter Tail, Field, Hector and Stephen.

The predominating rock formation on the Rocky mountain side of the Columbia is carboniferous limestone, overlying argillaceous slates and shales, which are exposed in some of the deeper canyons and along the banks of the larger streams.

On the southwestern or Selkirk side, igneous granular rocks such as diorites, syenites, granites, dolerites, etc., (frequently porphyritic) form the higher mountains and ridges, while on the flanks, and in the depressions or basins, metamorphic slates and schists, with occasional bands of limestone form the country rock, and in many places are traversed by porphyritic and other eruptive dykes, and metalliferous quartz lodes.

On the northeastern side more or less development work has been done at different times on the Monarch, near Field, (argenteriferous galena and blende), and on some silver-lead claims along the Otter Tail, also on Beaver Foot creek, and Ice river, and in the Blue Water country north of Donald.

On the Selkirk, or southwest side, the mining camps are much more numerous, and are generally found near where the slates and schists have been broken through by the eruptive rocks.

The Spillimacheen and Jubilee mountain camps, about 40 miles above Golden and on the southwest side of the Columbia, are, however, exceptions, as at these points and for some distance southeast the carboniferous limestone extends across the Columbia, and the lodes, argenteriferous, galena and copper ores, are found either in the schists or limestone near the contact.

The other mining localities on this side are situated as follows:

On Bugaboo creek, (copper, gold and silver-lead), from 8 to 25 miles west of Spillimacheen landing.

Vermont creek, (copper, gold, silver-lead and bismuth), about 21 miles southwest of Carbonate Landing.

Copper creek, (copper, gold and silver-lead), west-southwest from Carbonate Landing, about 22 miles by trail.

Spruce Tree creek, on north side of Middle Fork of Spillimacheen river, (copper ores and gold quartz), 22 miles from Carbonate Landing.

Carbonate Landing and Carbonate mountain, (silver-lead, copper ore, and gold quartz), on the south side of the North Fork of Spillimacheen river, about 25 miles from Carbonate Landing.

Cariboo creek, on the opposite side of the Middle Fork and about the same distance from Carbonate Landing, (gold quartz, galena and copper).

Robbie Burns basin, (gold quartz), on north side of the Middle Fork, 27 miles from Carbonate Landing.

International basin, (gold quartz, silver-lead and copper ores), on the head waters of the Middle Fork of Spillimacheen river, 30 miles from Carbonate Landing.

Boston and Bannison, across the divide from the International basin, (gold quartz, silver, lead and copper ores), 31 miles by trail from Carbonate and about the same distance from Bear Creek station on the C. P. R.

McMurdo creek, (gold quartz, silver-lead and copper ores), about 30 miles from Carbonate, and west of Robbie Burns basin.

Prairie mountain, (gold quartz, galena and copper ores), about 10 miles east of Bear Creek station on the C. P. R.

On Fifteen-Mile creek, (copper and gold), from 7 to 10 miles from the landing on the Columbia river.

Canyon creek, (copper ores and gold quartz), from 8 to 10 miles from Golden.

There are strong, well-defined lodes and very encouraging prospects in many of the above camps, and in some of them the surface showings are unusually good, but, except in one or two camps, very little work of importance in determining the extent of the ore bodies, or the prospective value of the lodes, has been done.

Most of the claims are at a standstill for want of capital, and there seems to be a good opening here at present for one or more development companies to take hold of properties on a stock basis or on working bonds, and do a safe and profitable mining business.

There are government trails to all the camps, and the cost of visiting and examining the most promising claims would not be great.

In almost every locality where lodes are found there are streams in the immediate vicinity capable of furnishing all the power required to generate electricity for operating mills, concentrators, trams, hoisting works, compressors, etc.

Timber is plentiful and in many places so abundant that charcoal for smelting purposes can be supplied in large quantities and at a moderate price for a number of years. This is an important consideration, as a large portion of the ores of this district might be smelted or reduced to a matte on the ground thus saving, on an average, probably 75 per cent. of the cost of shipping crude ore to a market. Iron and limestone can, I think, be obtained in or near most of the camps.

GOLD MINING IN THE ROSSLAND DISTRICT, BRITISH COLUMBIA.*

By J. J. SANDEMAN.

ROSSLAND, British Columbia, is situated in the West Kootenay district, and from a geological and mineralogical point of view it forms a study of great interest. The present site of the town of Rossland was at one time the crater of a volcano from which lava and ashes deluged the surrounding country. The variety of igneous material which covers the district seems to intimate that the eruptions were intermittent and that the volcano itself was of great age. The occasional presence of quartzite or metamorphosed sandstone seems to indicate that a shallow sea existed here, previous to volcanic outbreak. The district may be roughly described as an area of gabbro, surrounded by quartz-diorite so highly metamorphosed that the contacts are very indistinctly defined. The gabbro area, though only about $1\frac{1}{2}$ miles wide, by 4 or 5 miles in length, is one of great importance to the district; for it is in the gabbro, or closely bordering it, that the best mines have been discovered. The Gertrude mine appears to be the only exception from this rule, for 200 feet below the surface, the top of a gabbro-dyke has intruded and scattered what had promised to be a fine body of ore.

Many erroneous local conjectures have been made about the age of this district. Fossils have been found which geologists declare belong to the carboniferous period; these, however, serve only to prove that at some time carboniferous strata had overlain the present igneous rocks and had been subsequently removed, probably by glacial agencies. The writer has, so far, been

* From a paper read before the Institution of Mining Engineers.