125 per cent. I believe that the Government should take this matter into their serious consideration, and determine whether the oil refiners of this country should receive more protection than the average manufacturers in the other districts in Canada. If the Government should come to the conclusion to reduce the duty on coal oil, they will be doing what is largely in the interests of the people, who are obliged to use a large quantity of coal oil every year. It is an article of prime necessity, it is not an article of luxury; it must be used by the masses of the people, and it should therefore be placed at their disposal at as cheap a price as possible. It was stated in the House last year that the lowering of the duty on sugar removed a burden of taxation off the shoulders of the people. The result of that very good act on the part of the Government was that the price of sugar fell in the market, and the consuming public were able to buy it cheaper. In the same way, if the Government should reduce the duty on coal oil from 7½ to, say, 5 cents a gallon, it would relieve the people of at least one third of the burden which they are now obliged to bear in this matter. I am quite sure that if the duty were lessened the people would receive a corresponding benefit. It was for that reason that I moved for these papers, so that we may learn whether as large a quantity of coal oil is imported as before, and also for the reason that the matter may be brought to the attention of the Government. I hope they will consider this question—not upon the basis of free trade, because I do not contend that coal oil should be put upon the free list; for so long as we have the National Policy in this country, it is only right, and equitable, that protection should be given to the oil producers as well as to every other industry, along the lines of justice. I, therefore, trust that the Government will try to see their way clear to reduce the duty upon coal oil to 5 cents a gallon.

Motion agreed to.

Recent Amendments to the Mineral Act of British Columbia.

The following excerpts from the Mineral Act, as recently amended, are of interest: —

Sec. 11 of the Act, as amended, limits the free miner's right to cut timber to "such timber as may be required for the purposes of the claim or claims worked by him alone, or by him in partnership with another or others."

Secs. 14 and 15 have been repealed and are replaced by the following, to which careful attention should be given by every prospector: —

"14. Any free miner desiring to locate a mineral claim shall, subject to the provisions of this Act with respect to land which may be used for mining, enter upon the same and locate a plot of ground, where possible not exceeding 1,500 feet in length by 1,500 feet in breadth, in a rectangular form, that is to say, all the angles shall be right angles, but the lines need not necessarily be meridianal. In defining the size of a mineral claim it shall be measured horizontally, irrespective of inequalities on the surface of the ground.

"15. A mineral claim shall be marked by two posts, each post being at least 4 inches square and 4 feet above the surface of the ground. The posts shall be numbered 1 and 2, and upon each post shall be written the name given to the mineral claim the date of the location and the name of the locator. Upon No. 1 post there shall be written, in addition to the foregoing, "Initial post," the approximate compass bearing of No. 2 post, and a statement as to whether the claim lies to the right or left of the line from No. 1 to No. 2. Thus: '(Name of claim),' '(date),' 'A. B.'s claim,' 'Initial post,' 'direction of No. 2, northeast,' claim lies to right (or left) of line from No 1 to No. 2 post.

"It shall not be lawful to move No. 1 post, neither shall it be lawful to move No. 2 post, except for the correction of distance by the Provincial Government surveyor. Nos. 1 and 2 posts shall govern the direction of one side of the claim.

"(a). The owner of a mineral claim shall be entitled to all minerals which may be within his claim, but he shall not be entitled to mine outside the boundary lines of his claim continued vertically downwards.

"(6). This Act shall not prejudice the rights of claim owners who have located their claims under former Acts."

Sec. 24 is amended to allow work done outside a claim to count as assessment work, provided the Gold Commissioner is satisfied it is a bona fide development work. This section also now gives partners right to do statutory the assessments for all or any one of a group of claims, provided they file a declaration of their intention with the Gold Commissioner.

Sec. 25 now reads: "In case of any dispute as to the title to a mineral claim, priority of record will determine the right, subject to any question as to the validity of the record, and subject also to the compliance by the free miner with the provisions of this Act.

Sec. 37 is amended so as to lay more on the shoulders of an adverse claimant. Such claimant must now, without any demand on the part of the defendant, "show, with reasonable particularity, the nature, boundaries and extent of such adverse claim."

By Sec. 56 the plan of a claim required, when a certificate of improvement is applied for, must now be made by an authorized land surveyor.

These are some of the main changes. A section now entitles the free miner to a copy of the amended Act on payment of 25 cents.

Nova Scotia's Increased Royalty.

Coal Lessees. "But our leases explicitly state that the rate of royalty is fixed for the current term. How can you increase it at will without a breach of faith?"

Premier. "Needs must when the devil drives; and you must understand the Legislature of Nova Scotia has the power to break a contract or to take your property without compensation; but I may tell you the Attorney-General says there is no breach of faith."*

Coal Lessees. "We are differently advised, still, so content are we that moral justice and right is on our side that we are ready to leave the question to arbitration or the Courts. Will you agree?"

Premier. "No; the supreme Court sometimes makes mistakes."*

The Premier of Nova Scotia is now in England seeking to raise money on the good faith of the Legislature of Nova Scotia.

Mineral Resources of the Yukon and Mackenzie Districts—A Great Petroleum Field—Promising Alluvial Diggings.

Contributed by A. M.

North of the great plains, along the Athabasca, Peace, and Mackenzie rivers, are situated a number of petroleum districts, the total area of which probably exceeds that of all the known oil fields in the world combined. On the Athabasca indications of gas and oil occur along the valley for a distance of over two hundred miles. The basement rocks here consist of petroliferous Devonian limestones. Resting on these is a thick stratum of soft sands of Cretaceous age, which has been blackened and cemented into a coherent tarry mass by the floods of oil which have welled up in bygone ages from the underlying limestones. The tar sands are first seen in descending the Athabasca, at the Boiler Rapid, or about 170 miles below the "Athabasca Landing," and are there present in bluffs along the valley for a distance of over eighty miles. They have, according to the reports of the Geological Survey, a thickness of from 150 to 225 feet, and outcrop at the surface over an area of about a thousand square miles. The tar sands themselves, where exposed, *although 15 to 20 per cent. of their bulk consists of* bitumen, are not supposed to have any great commercial value, as the lighter oils have long since volatilized away, and only the heavier constituents remain. In the upper part of the vein, however, where they are buried beneath the later cretaceous divisions, it is highly probable that the oil remains in its original condition, but the solution of this question depends upon a generous use of the drill.

West of the Athabasca river tar springs are reported on Lesser Slave Lake, and are also known to occur on Peace river. The latter are thus described on Page 11., Summary Report of the Geological Survey for 1889. Inspissated petroleum lining cracks in calcareous nodules was found along Peace river for some sixty miles below the Peace river landing. At Tar Island, about thirty miles below the mouth of Smoky river, there is a saline spring which is kept in a constant state of ebullition by the escape of natural gas. Small quantities of tar line the sides of the spring and float on the surface of the water. This spring, and a couple of others which are reported nearby, are situated near the axis of a broad flat anticlinal, one of the essential conditions of a successful oil field. Gas and oil in paying quantities are most frequently found in these great natural domes, and the only element of uncertainty in this district is the presence or absence of some porous formation to act as a reservoir. It is possible that the loose sands found along the Athabasca extend this far, or that some equivalent formation occupies their place; but as natural sections are wanting, this can only be proved by artificial sections obtained by boring.

North of the Athabasca oil region, tar springs are known to occur along the northern shore of Great Slave Lake, and petroliferous limestones floor the valley of the Mackenzie nearly all the way to its mouth. At Fort Good Hope, a few miles south of the Arctic Circle, are situated the tar springs from which the Hudson Bay Company obtain the pitch used by them for boat building purposes.

Favorable indications of the presence of oil, in the shape of tar sands, tar springs, effusions of natural gas, and petroliferous limestones, are thus seen to characterize the country bordering on the Mackenzie-Athabasca valley for a distance measuring from the south to north of over a thousand miles. It is highly improbable that productive oil beds are continuous throughout the whole of this vast region, but there is every reason to believe that over a considerable proportion of it the oil is sufficiently concentrated to be of economic value. Up to the present time the remoteness of these northern oil fields from the centres of civilization has prevented any attention from being directed towards them, but the expected completion of the Calgary and Edmonton Railway during the coming summer will place them within a reasonable distance from railway communication, and they will probably soon take their place among the oil producing regions of the world.

West of the Rocky Mountains, in the great country drained by the Yukon and its tributaries, the geological conditions are entirely different from those prevailing in the Mackenzie Basin. This region lies in the auriferous zone which borders the western part of the continent, and the gold-bearing belt, according to the reports of the members of the "Yukon Exploring Expedition," appears to have lost none of its wonderful richness in its extension northwards. Miners entered the district about the year 1881, and the prospecting which has been carried on since then has shown that gold is of almost universal occurrence, although only in some places is it found in sufficient quantities to be profitably worked in the face of the high prices prevailing for labour and provisions. Stewart River and Forty Mile Creek are the richest streams so far discovered. The former yielded over $100,000 worth of gold to a handful of miners during the years 1885-86, some of the bars paying as much as $100 per day per man. The gold on Forty Mile Creek is reported to be richer than that on the Stewart, but the greater part of this stream lies in Alaskan territory. The following extract from Dr. Dawson's report will afford some idea of the present condition and future prospects of gold mining in the Yukon country. (Annual Report Geological Survey of Canada, 1887-88, Part I., page 182):

"Mining can scarcely be said to have begun in the region more than five years ago, and the extent of country over which gold has been found in greater or less quantity is already very great. Most of the prospecting has been confined to the banks and bars of the larger rivers, and it is only when these innumerable tributary streams begin to be closely searched that 'gulch diggings,' like those of Dease, McDame, and other streams in the Cassiar district, and possibly even on a par with Williams and Lightning creeks, in Cariboo, will be found and worked. The general result so far has been to prove that six large and long veins, the Dewes, Tet-lin-too, Big Salmon, Pelly, Stewart and White, yield "fine-gold" along hundreds of miles of their lower courses. With the exception of the Lewes, no part of the head waters of any of these have yet been prospected or even reached by the miners, and scarcely any of their innumerable tributaries have been examined. The developments made up to this time are sufficient to show that when means of access are improved, important bar mining will take place along all these main rivers, and there is every reason to anticipate that the result of the examination in detail of the smaller streams will be the discovery of much richer auriferous alluviums. When these have been found and worked, quartz mining will doubtless follow, and the prospects for the utilization of this great mining field in the near future appears to me to be very promising."

The Yukon district remains as the last refuge of the placer miner. These pioneers of mining enterprise have gradually advanced northwards, following the auriferous belt from California through Oregon, Washington Territory, and British Columbia, and are now spreading themselves in the face of difficulties and dangers from which all but the bravest and strongest quail over this inhospitable region. In the progress of their work the metalliferous lodes from which the loose gold has been derived will, as in other districts, be gradually discovered, and mining ventures of a more solid character will follow.

Extraction of Ore from Wide Veins or Masses.*

By G. D. Delprat, London, Eng.

The object of this paper is to describe an application of the cross-cut system of mining, as carried on in the Cabezas del Pasto mine, one of the copper mines in the south of Spain. The system is not new, but it is not very generally adopted. It offers, however, decided advantages over other systems more in use; especially where the ore is found in large masses or wide lodes, it allows the extraction of all the ore without leaving any pillars or roofs. A somewhat detailed description of the various operations and costs of working may not only be interesting, but may possibly lead to a more general adoption of this method in cases where at present the pillar-and-stall system is preferred.

The copper-lodes in the south of Spain and Portugal are the following: They are nearly all lenticular masses of great lateral dimensions and unascertained depth; their direction is approximately east-west, and their dip towards north. Some are contact-lodes, having slate on the hanging-wall and porphyry on the foot-wall; others are imbedded in porphyry, and others again are imbedded in clay-slate.

The upper portion of these lodes consists of "gossan," a siliceous peroxide of iron, mixed with more or less clay. The depth to which the gossan goes down varies in different localities from 40 feet to 120 feet and more. Below the gossan is found the iron-pyrites, with about 2 to 3 per cent. of copper. The gossan is generally admitted to be the result of the decomposition of the pyrites, the copper rendered soluble, filtering into the underlying layers of undecomposed ore, and enriching the ore below the gossan above the general average. Very rich pockets and streaks of ore, containing sometimes 10 per cent. of copper and more, are often found in the upper portions of the lodes. The copper contained in the ore is generally in the shape of gray and black sulphides and copper-pyrites; rich pockets often show chalcopyrite and fahlerz. In nearly all the mines the ore has been found to get poorer in copper with greater depth; a cross-section through the Cabezas del Pasto mine shows this diminution, and may be taken as a fairly representative case. The greater the lateral dimensions of a deposit, the greater is generally the depth down to which a fair percentage of copper is found.

In the Rio Tinto mines, which are the largest copper mines in Spain, a depth of 700 feet has been reached in

*Actual expressions used.

*Transactions of the February meeting of the American Institute of Mining Engineers.