

ON A NEW TUNGSTEN (SCHEELITE) DEPOSIT AT LOWER SACKVILLE, HALIFAX COUNTY, N. S.—BY HARRY PIERS, Curator of the Provincial Museum of Nova Scotia, Halifax.

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Previous discoveries of Tungsten ores in Nova Scotia.—Before describing the Tungsten prospect at Lower Sackville, Halifax County, it will be well to very briefly refer to the occurrences of similar and related ores which had previously been found in Nova Scotia since about 1893, the data regarding which are much scattered. The ores so far found here are Scheelite or Calcium Tungstate, Hübnerite or Manganese Tungstate, Wolframite or Iron-and Manganese Tungstate, and the decomposition product, Tungstite or Oxide of Tungsten.

Tungsten ore in the form of Scheelite was apparently first discovered in Nova Scotia about 1893 or '94, associated with a little arsenopyrite and pyrite in a quartz vein intersecting the main auriferous vein of the Quartzite Division of the Gold Measures at the Ballou or Old American Mine, Malaga Gold District, Queen's Co. (See Rept. Geol. Surv. Canada for 1894, n. s., vol. 7, p. 14 R.)

It was next found as brownish Hübnerite in quartz in a gneissic or granitic rock of Pre-Cambrian age at Tom Murphy's Brook, Emerald, near Northeast Margaree, Inverness Co., about 1897-98. (See Rept. Geol. Surv. Canada for 1898, vol. 11, p. 10 R. For specimen of this mineral, see Prov. Museum acc. no. 1737.)

In November, 1907, Tungstite, the yellow oxide of Tungsten, was discovered in drift boulders $1\frac{1}{2}$ mile west of the crusher of the Consolidated Mines Company, Moose River Gold District, in the eastern section of Halifax Co., by John A. Reynolds and W. S. Currie, of Moose River, and was determined by A. L. McCallum and Dr. T. L. Walker, in May 1908, (see sample, Museum acc. no. 3237); and about June of that year Scheelite in quartz was found by Mr. Reynolds in drift boulders near Stillwater Brook, about $2\frac{1}{4}$ miles southwest of Moose River Gold Mines, (see sample, acc. no. 3246); and finally in the latter

part of the same month, the Scheelite, of a buff colour, was located *in situ* on the footwall of a quartz vein, interbedded in a slate belt, between quartzite walls, dipping northwest at an angle of 75°, at Stillwater Brook, about three-quarters of a mile north of the place where the last-mentioned boulders had been discovered,—that is, about 2½ miles west-southwest of Moose River Gold Mines. (See sample of this ore, acc. no. 3527.) Other scheelite-bearing veins were also found alongside this ore. This deposit was very extensively developed by an incline shaft which was some three hundred feet long by March, 1911. It became a well-known and much-talked-of mine, and the place itself received the name of Scheelite. The deposit first belonged to W. S. Currie, J. A. Reynolds and A. L. McCallum; afterwards passed to A. A. Hayward; and then to various companies. It had produced a large amount of ore for several years, but finally after the Great War, the mine was closed, said to have been because the pay-streaks were too restricted, and too much dead-work had therefore to be done. It was the most important deposit of Tungsten ore yet located here.

Owing to the important nature of this extensive deposit, search for the mineral was greatly stimulated throughout the province, and in December, 1908, brownish buff-coloured Scheelite was also discovered in a rather narrow interbedded quartz vein in a slate belt, in the Quartzite Division of the Gold Measures, just northeast of Perry Lake, about a mile northwest of the Waverley Gold District, Halifax Co., by Louis Newell McDonald, who had prospected the vein for gold about ten years before. This deposit has never been developed. (See samples of this ore, acc. nos. 3331-2.)

The discovery of small quantities of tin ore (cassiterite) in pegmatitic granite at Lake Ramsay in the northwest section Lunenburg Co., in October, 1906, and at Wallabach Stream, between Camp and Harris Lakes, 4½ miles to the north-northeast, late in 1907, led to extensive prospecting in the whole of the interesting New Ross district. Tungstite and Wolframite were found in quartz at Ernest Turner's tin prospect on the northwest side of Wallabach Stream, in pegmatite

in irruptive granite of probable Devonian age, about 11th June, 1909, by Dr. T. L. Walker, (see museum acc. nos. 3374 and 3688). The Geological Survey of Canada also reported Hübnerite as having been found near Lake Ramsay (Sum. Rept. for 1907, p. 82), and Scheelite with cassiterite, copper pyrite, and zinc blende in quartz-porphry on the Wallabach Stream. (Sum. Rept. for 1911, p. 339).

About the 16th of May, 1911, Scheelite, with a little arsenopyrite and oxides of iron and manganese, was found by Orlando Harlow in a quartz vein, said to be six inches wide, in slate, in the Gold Measures, a half mile west-northwest of Huey Lake, about $2\frac{1}{2}$ miles west of Baker Settlement and about 11 miles westward of Bridgewater, Lunenburg Co. Several veins were located there. (See Geol. Surv. Canada Sum. Rept. for 1911, p. 339; and for sample of ore, see museum acc. no. 3757).

In Queen's County, the well-known prospector and local geologist, Walter H. Prest, discovered white Scheelite in drift at Fifteen-mile Brook, between Middlesfield and Greenfield, about or shortly before May, 1911, (see museum acc. no. 3689, and Geol. Surv. Can. Sum. Rept. for 1911, p. 334); and in October of the same year, E. R. Faribault of the Geological Survey discovered that ore *in situ* in a quartz vein prospected for gold by Mr. Ells at Fifteen-mile Brook, near Middlefield, a short distance to the northeast of where Mr. Prest had previously found numerous loose pieces of the same mineral. This is in the Quartzite Division of the Gold Measures.

In 1911, the Provincial Museum received a specimen of Scheelite with arsenopyrite in quartz from near Tangier, Guysborough Co., (see acc. no. 3698). About 1914, Mr. Brennan discovered brownish-buff Scheelite in a vein cutting the Dunbrack Vein, Oldham Gold District, Halifax Co., (see acc. no. 5042). And in 1919, George A. Cameron found buff-coloured Scheelite with arsenopyrite in a sharp fold of an east-and-west quartz vein of the Gold Measures, at a depth of 155 feet, in a cross-cut south from the Kaulback shaft, on the old Torquoy

property, Moose River, Halifax County, about $2\frac{1}{2}$ miles due east of the Scheelite mine at Scheelite. (See museum acc. no. 4796.) It was apparently in a well-defined ore-shoot confined to the sharp fold referred to.

Apparently all of these eleven deposits of Tungsten ore in Nova Scotia, are associated with quartz veins (mostly interbedded ones) in the Quartzite Division of this Gold Measures, (Lower Cambrian or possibly Pre-Cambrian age), of Halifax, Lunenburg and Queen's Counties, with the exception of the ores about Lake Ramsay and New Ross, Lunenburg Co., which are in pegmatite in Devonian granite, and the Hübnerite at Emerald, Inverness Co., which is in Pre-Cambrian rocks. Tungstite is liable to occur as an alteration product at any of the known deposits. Scheelite is the most common ore here, and it is usually associated with more or less arsenopyrite. The only deposit which so far has been commercially worked, is that at Scheelite near Moose River.

Discovery of the Sackville deposit.—In September, 1921, Frederick W. Dixon, while prospecting a $2\frac{3}{4}$ inch quartz vein in an outcrop of quartzite on his property at Lower Sackville, Halifax County, N. S., discovered arsenopyrite in the vein, and brought samples to the Provincial Museum for determination on the 23rd of that month. (See museum acc. no. 5026.)

On continuing to prospect the vein, he found that it widened to six inches or more; and on 3rd of October, he discovered therein another mineral. Not knowing what it was, he brought a sample to the Museum on the next day, (see acc. no. 5038). This was identified as a brownish-pinkish-buff coloured Scheelite in white quartz, the Scheelite having tabular-shaped cavities which had been left unfilled at the time of deposition, and which give it a sort of semi-cubical appearance when broken. Thus it very greatly resembled in colour and general appearance the Scheelite from Perry Lake about a mile northwest of Waverley, which had been discovered in 1908. A little yellow Tungstite (oxide) also showed on one of these specimens (acc. no. 5039). I told Mr. Dixon he had better immediately take up the mineral rights to the property, which he did; and on 10th

October he informed me where the specimens had been discovered, as the location of the vein had been unknown to me. As it was on the southwestward range of the Waverley anticline, and about on the strike of the very similar ore at Perry Lake, $3\frac{1}{2}$ miles to the northeast, I thought that the vein, on being further prospected to the northeast, might possibly be correlated with the latter.

Prospecting work.—Mr. Dixon accordingly examined the rock outcrops in that direction, but failed to locate an extension of his vein. With the aid of a few men, work was begun in sinking on the vein where it cropped, and this was continued till winter put an end to the season's operations. He extracted a considerable amount of fine-looking ore, very promising large samples of which were brought to the Museum on 22nd October and in January, (acc. nos. 5045 and 5060).

In the spring of 1922, he resumed the work of prospecting the vein, and followed it downward on its dip, extracting more ore of excellent quality.

Examination of the deposit.—As the relative attitude of this vein to the country-rock could not be ascertained by Mr. Dixon, nor its relationship, if any, to the Perry Lake deposit, and without such information it was difficult to judge how intelligently the work of prospecting was being conducted, I visited the deposit on 3rd May, 1922, accompanied by Dr. F. H. Sexton, Mr. J. L. Hetherington, and the owner. I then made the following notes on the occurrence:

Location.—The deposit is situated on Fred. W. Dixon's property, formerly Robert Ward's, a very short distance to the north-northeast of the site of Fultz's old Twelve-mile House, at the forks of the Old Cobequid Road and what is known as the "New" Windsor Road, nearly two miles north of Bedford railway station on tide-water at the head of Bedford Basin, and about 12 miles by road from Halifax, Halifax Co.

Geological horizon.—It occurs in a vein of white quartz in heavily-bedded blue-gray quartzite or "whin" of the lower or Quartzite Division of the Gold Measures which are believed to be of Lower Cambrian or possibly even Pre-Cambrian age.

Description of the deposit.—Considerable difficulty was experienced in determining the true dip of the heavily-bedded quartzite, which outcrops in succeeding ridges to the east-northeast. However, I ascertained that it dipped 25° south-southeastward, and that its strike was $N.70^{\circ}E.$ (true bearings). This showed that the deposit was located a short distance on the southern side of the Waverley anticline, and not on the northern side as in the case of the Perry Lake interbedded deposit.

There had been sunk a small pit, of irregular shape, measuring about 32 feet in length along the direction of the strike of the rocks, and about 15 feet in greatest width, with a maximum depth of about 9 feet at the northeast end.

The vein-matter (ore-bearing quartz), had mostly been blasted out, and removed to a neighboring barn, but some of it remained on the northeastern part of the floor of the pit. Owing to this unfortunate removal of the greater part of the vein, it was difficult to ascertain its true attitude to the country-rock. The vein had cropped on the southern side of the pit, that being the spot where it had first been discovered on the surface; and there a small remnant of it, still in place, was 9 inches wide, while part of it there, now removed, is said to have been as thin as 3 or 4 inches. It then dipped northward at a steep angle of perhaps 50° , but soon flattened out on the floor of the small pit, and where last seen in the quartzite, on the northeast side, was apparently steepening again. Good ore had been obtained on the northern part of the floor of the pit, and Mr. Dixon says that the vein in one part had become as wide as 18 inches, which I could well believe from the size of some of the largest samples received at the Museum.

From this examination it is clear that the deposit is on the southern side of the axis of the Waverley anticline, the course of which is here about $N. 47^{\circ} E.$ (true bearings). The anticlinal axis is without doubt located in the low-lying ground, covered with deep soil, a very short distance to the northwest of the deposit. The swinging of the strike somewhat around towards the axis of the anticline, suggests that the rock at the pit may

be near the place where it noses around the axis. About a hundred feet south-southeast of the pit is an exposure of blebby (nodular) quartzite in slate, dipping southward about 60° , showing that the beds steepen just there. The quartzite ledge in which the deposit occurs, can be traced for some distance east-northeastward and diagonally across the Old Cob-equid Road; but the vein could not be located in the many exposures I examined in that direction.

A fissure vein.—From the opposing dips of the quartzite country-rock and of the quartz vein which carries the ore—the former dipping about 25° to the south-southeastward, and the latter at varying angles to the northward,—it is also clear that the vein is not interbedded as I hoped it was, but that it is a fissure one penetrating northward, at varying pitches, into the heavily-bedded quartzite which itself dips, as stated, S. 20° E. at an angle of 25° . The Perry Lake Scheelite deposit, on the contrary, is an interbedded vein on the northern side of the anticlinal axis, as it dips to the northwestward in harmony with the strata.

It seems quite possible that if the Sackville vein is followed further into the country-rock, it will be found ultimately to be an off-shoot from an interbedded vein somewhat to the northward at a moderate distance. This I believe will prove to be the case. As has been said, no indication of the extension of the vein could be located in the exposures on the strike to the east-northeastward; and to the westward soil covers the rock-surface.

Suggestion as to future exploration.—It seems that the best that can at present be done, is to follow the fissure-vein wherever it may lead into the measures, to ascertain what it is connected with and thus possibly locate a main interbedded vein which would be more regular and extensive, and it is to be hoped as well mineralized. This is what I recommended to be done, should the work be continued, unless new evidence of the existence of the vein could be found near by. The amount of ore present in the fissure-vein, judging by what had recently been taken out, should at least pay for this exploratory work. A

number of barrels of good ore were shown, all of which had been taken out of the small pit described.

Judged as a prospect only, which so far it only is, it seems to me to be one of the very best Scheelite discoveries that has yet been made in this province, and the deposit decidedly deserves to be further investigated.