THE FUTURE OF THE SYDNEY COALFIELD

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IT may be laid down as axiomatic in any commercial mining enterprize that maximum production of minerals is possible only while sufficient mineral remains unmined in reserves to ensure the maintenance of annual rates of output commensurate with the extent of capital investment and the production organization.

The demarcation and estimation of mineable reserves of mineral is most difficult in the case of metallic ores, and is least difficult in the case of coal seams, which occur within well-defined geological boundaries. All coal seams were originally formed as horizontal layers and are now found in horizontal attitude, or variously inclined from the horizontal by subsequent earth movements. With careful use of borings, coal reserves can usually be estimated with sufficient accuracy to permit of mine planning over long periods of the future. In some countries where coal-mining is an important factor in national economy, the best modern example being the United States, it is customary to purchase a mining area, known with fair presumption of accuracy to contain a given recoverable tonnage of coal, for an agreed price, and to plan a commercial enterprize of coal mining and sale much as one would purchase and commercially exploit a timber area.

The coal-mining industry, based on the coal reserves of the Sydney coalfield, in Cape Breton Island, differs in so many particulars from the usual North American coal-mining enterprize as to be unique, especially with respect to the future of the colliery towns and the mining population, and merits consideration on this single aspect of the future.

By an evolution of responsible government—very interesting historically as an example of nepotism among our rulers applied to natural resources and working out in the long run to the benefit of the people at large, but not relevant to this present writing—the coal seams of Nova Scotia became vested in the public domain.

By a further evolution—the various steps of which would cover the industrial and political history of Nova Scotia over

the past 50 years—the leases of the submarine portion of the Sydney coalfield have been so granted as to permit of unified engineering direction of one continuous undersea coal-reserve. No matter how fortuitous its occurrence, this result is a most fortunate one for maximum yield of coal over a maximum period of time from a limited natural resource. Actually there has been achieved in Nova Scotia by these unplanned developments a public ownership and unified engineering control of the coal resources of the Province that it has taken many years of parliamentary debate and action to create in Great Britain, and that in the United States is not in sight.

Starting, therefore, from the present status of the coal-mining industry, what may be the future of the colliery and steel towns depending for a source of livelihood so entirely upon the coal reserves of the submarine portion of the coalfield lying under and on each side of the busy harbor of the Sydneys?

The importance of the submarine area of the Sydney coal-field to Nova Scotia and the whole national economy of Eastern Canada and Newfoundland is much greater than its comparative areal extent would suggest if considered only on this basis. At this time the Sydney field produces 76 per cent of the Nova Scotia production, and 37 per cent of Canadian coal production. Because of the decrease impending in productive capacity of other Nova Scotian coalfields, the Sydney coalfield has growing importance.

Attempt to estimate the tonnage of recoverable coal in any coalfield, and the length of time this tonnage will support a mining industry with its attendant population, is a temerarious undertaking, as was abundantly demonstrated by the classic work of Prof. W. S. Jevons on British coal resources in 1863, and the subsequent work of his son, H. Stanley Jevons, in 1915.

Prof. Jevons in 1863 foretold serious injury to the trade of Great Britain from the rise in prices he expected because of the working out of the coal-seams which were cheapest to work. He did not foresee the discovery of extensive coalfields in South Yorkshire, Nottingham and Lincolnshire, in Warwickshire and in Kent, which so greatly extended the known coal resources of England. Unfortunately no such discoveries of concealed coalfields are likely in Nova Scotia, where the coalfields occur in the last strata laid down, and have for hundreds of millions of years been exposed to the eroding influences of rain, frost and flowing water and, relatively recently in a geological sense, by the last Ice Age.

Estimate of the duration of coal-mining enterprize and the industries based thereon has to take into account not only geological and technical factors but also a complex of social, national and scientific considerations affecting the uses and commercial value of coal.

As an example the writer, some 20 years ago, attempted to forecast Canadian coal production on the basis of population and *per capita* consumption of coal. The population curve assumed proved reasonably accurate, but *per capita* consumption of coal, which in 1920 was 3.8 tons, dropped in 1933 to 2.1 tons and is now at a lower figure than it was 30 years ago.

The experience of the United States has been similar. Decreased industrial and transportation activity, following the financial reversal of 1929, is partially responsible; but the two developments chiefly responsible are increased usage as sources of energy of petroleum and petroleum products and water-powers.

Subject to reservations of similar nature, and using as a basis a recent calculation made by the writer and his son in collaboration, combining, as far as such a combination of factors is possible, geological, mining engineering, and commercial data, it would appear probable that the reserves of the Sydney coalfield—reckoned on an arithmetical basis of division of calculated reserves by present optimum annual rate of production—will suffice to maintain coal-mining in the Sydney field for 180 years, more or less.

The land reserves of the Sydney field are so small that, in a calculation of this nature, they may be ignored and attention given only to the unmined submarine coal-seams.

Twenty-five years since, or thereabouts, there were some 22 operating collieries in the Sydney coalfield, producing about the same annual tonnage of coal as now comes from 12 collieries. Obviously the size and importance of the individual collieries has been increased as measured by their individual output capacity. This evolution will continue under the direction of mining engineers, whose endeavor will be so to plan the winnings that these will produce in the future an annual tonnage at the rate which, some 40 years of mining has indicated, is what the market requires and will absorb.

Each of the three main colliery towns, i.e. Glace Bay, New Waterford and Sydney Mines, is situated on the shore and occupies a strategic position for coal winning. It seems probable, therefore, that no new population centres of any

importance will develop in the Sydney area, but that the three towns named will divide among them the future of the coal-mining industry in what will for generations to come continue to be, as is the case to-day, the most important coal-mining centre in Canada.

The iron-ore deposit on the east coast of Newfoundland, from which the Sydney Steel Plant obtains ore for the blast furnaces, is also an under-sea deposit, with estimated mineable reserves of ore commensurate with the coal reserves of the Sydney field. The common corporate ownership or control of these very large complementary reserves of the raw material of an iron and steel industry is fortunate in its bearing on the future of this industry, with its blast furnaces, open-hearth converters and rolling mills situated on the shores of Sydney Harbor. An equally large supply of good-quality limestone flux is being worked for supply of the Sydney plant at Port-au-Port on the west coast of Newfoundland.

One may be permitted a digression to note that the whole raw material basis of the coal-iron industry of Sydney, the location of its coal-mines, steel plants, the assemblage of raw materials and the forwarding to markets of coal and steel products, is uniquely maritime; having perhaps its closest parallel in Sydney, New South Wales, where coal-seams extend under that far-off antipodean harbor and supply coal for iron and steel manufacture.

It may be further noted—which is the purpose of this brief article—that because of the submarine situation of the coal reserves, the colliery shore-towns have prospect of unique permanence, as being the points of last possible access to the undersea coal-seams and the site also of the engineering projects the future may see develop for the winning of the ultimate tonnages of coal it may be found possible to obtain from distant undersea workings. One must visualise a future date—already within sight in Nova Scotia—when the exhausted condition of other coalfields in the Maritime Provinces will direct attention to the great national value of the submarine coalfield of the Sydneys.

The Sydney coalfield is singularly isolated. There is no reserve of coal of comparable size for 800 miles to the South or for 3,000 miles to the West. This fact, combined with reasonable expectation of long productivity of the Sydney field, based on careful estimate of the unmined coal, is sufficient evidence of its supreme national importance.

There has always seemed to be a note of disbelief in the permanence of the colliery towns, not so much among the citizens of these towns as amongst financial houses, building and loan companies in particular. To what extent the fluctuating fortunes of the coal industry or the instability of labor conditions has contributed to this outside opinion, it is not within the scope of this article to enquire; but if belief or disbelief in the permanence of a mining industry depends on the mineable reserve of mineral available, then it is fair to say that nowhere in Canada —so far as the writer's knowledge extends—is there any mining community where permanence of the local industry has greater hope of realization than in the Sydney coalfield and its environs.

One important qualification is necessary. Exact knowledge of the submarine coal reserves is obtainable only as they are penetrated by advancing workings. Access to the submarine coal-seams is possible only over a limited shore-frontage, with a consequently limited number of collieries. It would be imprudent to attempt any large increase in the daily coal-output capacity of the collieries now or in the future. To do so would imperil fullest ultimate recovery of coal over the longest future period. It would result in unnecessary per ton increases in the cost of mining, and shortening of the life of the coalfield. Coal will cease to be mined when the cost of mining exceeds the selling price. This stage, which arrives some day in every coalfield, can be postponed with greatest certainty in the Sydney field by long-range planning to limit capital expenditures to the minimum consonant with amortisement of capital, that is by the economy of effort which results from acceptance of the limitations of resources; in more homely phrase, cutting the garment to fit the cloth.

The corollary is that the number of men the coal-mining industry can employ viewed over a period of years, and ignoring temporary fluctuations in labor demand, such as are associated with wars and trade depressions, is not likely to decrease, but neither is the scope of employment likely to increase; in other words, while coal-mining employment in the Sydney field holds promise of unusual permanence, it also has arrived at a static condition.

A further consideration is that coal-mining will tend to become a more specialized occupation than has hitherto been the case, requiring more mechanical and electrical knowledge than formerly, more particularly among the official class.

The evolutionary processes which this article attempts to foretell will not be of any sudden nature. They will take place by imperceptible adjustments. Herbert Spencer, in his old-fashioned manner, once wrote that persistence of the organism was possible only through constant adjustment to changes in environment. One might venture a not very different statement, namely that acceptance of limitations of any natural resource, coupled with a determination to utilize that resource to the most complete extent, will ensure the longest enjoyment thereof by the greatest number of those who make their living therefrom.