

## Proposed Review of the Mineral Resources of the British Empire.<sup>1</sup>

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IN general terms the mineral production and metallurgical activities of the British Empire are already known; but no one has measured a base-line with sufficient precision for projecting with confidence the probable effects of further prospecting and future exploitation, coincident with the growth of metallurgical science, not only on the Empire as a whole, but also on each independent unit of Imperial territory.

War stresses demonstrated that the Empire is in reality a *political* unit, and, because of the strength and efficiency of the navy, its resources were then worked successfully as a *military* unit. But we all know that it is still far from being an *economic* unit, and it is conceivable that military developments in the near future may make it difficult, perhaps impossible, for the mineral resources of all parts to be assembled for any purpose.

Great Britain is at present the chief manufacturing section of the Empire, and it consequently will remain for many years to come the principal arsenal and base for stores of most sorts. In order to be precise regarding the mineral supplies that can be relied on in any contingency, it is necessary to have exact details regarding the resources of each isolated unit of territory; for there are many essential munitions—animal and vegetable as well as mineral—that Great Britain itself cannot supply, either in the right kind or in the requisite quantity.

In mentioning military requirements, I do not refer to munitions in the narrow popular sense as lethal munitions. They form only a fraction of the supplies that are essential to an army in the field. What a soldier wants on active service under modern conditions may differ largely in form, but agrees very nearly in substance, with what he wants during ordinary peace-time civilised life; and whilst the A.I. extract of young men is in the field, the larger insoluble residue of the population insists on its accustomed food, clothing, business, and amusements at home. The maintenance of the *morale* of a modern civilised community requires of raw materials and manufactured products the same kind that is necessary for the fighting army, but in a much larger quantity.

Thus, the economic and military problems of supply are not very different in nature: the fighting strength of a nation is limited by its industrial strength, and its industrial existence depends on the maintenance of a sufficient supply of raw materials.

There are, however, some raw materials that a country, for commercial reasons, often neglects under normal industrial conditions: its requirements of the articles manufactured from such materials can be obtained from other countries ordinarily in circumstances so favourable that the local establishment of manufacture may not be worth while commercially. For example, before the War, the wolfram deposits in South Burma were worked mainly by British companies, but

practically the whole of the mineral went to Germany for the manufacture of tungsten; and then, although Sheffield occupied about the front place among manufacturers of high-speed tool-steel, its tungsten was obtained from Germany. Attempts made before the War to smelt tungsten in Great Britain had not been commercially successful; and at the time, that seemed to be a small matter, for we readily obtained all the tungsten we wanted from Germany, and Germany obtained all the ore she wanted from British territory. With the War, however, two inconveniences followed in order. First, we had to devise our own plant for smelting tungsten, and, under compulsion of necessity, we succeeded before the middle of 1915. Second, Germany found herself without tungsten ore, and that proved naturally to be more serious; for, although she obtained some molybdenum from Norway as a substitute, it was not exactly the same thing; and even this new move was countered by British purchases of the Norwegian output of molybdenic ores.

Three lessons can be stated at once from this example:

(1) Whilst the military authorities of Britain may rely on our ordinary industrial complex for nine-tenths of their requirements, it is their business to see that the essential tenth is secured, and they cannot identify that tenth unless we provide full information regarding our resources.

(2) It is *important* to be sure that we can smelt as well as mine an essential ore; technical progress in mining and metallurgy in Great Britain must keep pace with the prospective developments of other nations.

(3) It is absolutely *essential* to be sure that we can get access to supplies of the necessary ores.

Germany rushed into a war that she expected to be over in a few months; she made the mistake of thinking she had sufficient reserves of tungsten ore. We made no mistake in that direction; for apparently the British General Staff did not think at all of a matter so small. Between 1911, when war was seriously threatened, and 1914, when it became unavoidable, efforts were devoted with conspicuous success to the training of an army that gave a new meaning to the word 'contemptible'; but who thought it necessary to provide for the smelting of an inconspicuous metal like tungsten, either in Britain or in British territory?

I have quoted the recent War conditions as the basis for our lesson, because the results were sharp and demonstrable, as well as still fresh in our memories. The way in which Germany was embarrassed by the blockade is a warning of what may happen if, by more effective means for cutting communications in the future, Britain becomes isolated, or, more likely, one of the outlying Dominions becomes blockaded in a future war.

Great Britain is so obviously unable to provide many essential raw materials in sufficient quantities even under peace conditions, that to show by a

<sup>1</sup> From a paper read on April 21 before the Institution of Mining and Metallurgy.

detailed survey that she may be short of another mineral or two will not add much to the responsibility; but it is important to make estimates of the resources of each Dominion, and, separately, for groups of them and the Colonies—the minerals that each can mine and smelt, the ways in which each can supply the needs of others, the kinds that each can draw from adjoining foreign territory, and the amounts of the smaller, but necessary, mineral products that each should accumulate as stocks to draw on in a temporary emergency. Most nations carry stocks of gold and some of silver, but why not antimony, nickel, tungsten, and quicksilver as well? If isolated, could any Dominion, except Australia, meet its requirements in antimony? Could any country, except Canada, provide enough nickel? Could any part of the British Empire raise its own mercury? Yet, it would be less expensive to accumulate stocks of these sufficient for a few years' requirements than to buy a battleship; for a battleship is expensive to maintain, it gets quickly out-of-date, and it would be of little use in any event without supplies of most of these metals. Stocks of some metals are desirable also from the economic point of view, as they can be used to prevent speculative changes in prices.

Production figures give us a partial idea of resources; but something far more complete than this is necessary in devising a fiscal policy within the Empire itself, and *vis-à-vis* the rest of the world. The major mineral products are naturally those of most public concern from the economic point of view, but what we regard as minor and accessory minerals in times of peace may become vitally, or, more correctly, fatally, important under conditions of war.

Statistics of current production form an essential basis on which to design an economic policy, but they are unsatisfying in two important respects: (1) They do not reveal a country's resources in those minerals that could be exploited if and when necessary, but are not now worked under those commercial conditions that have developed by existing fiscal regulations; and (2) they do not give us an idea of the reserves available for future exploitation.

No other country has been more thorough than the United States in accumulating and publishing figures for production. Yet, in spite of these advantages, the international, and consequently political, aspects of mining and metallurgy, which arose directly from war and post-war conditions, remained to a certain extent neglected. In 1921 the Mining and Metallurgical Society of America combined with the American Institute of Mining and Metallurgical Engineers to establish a joint committee, under the chairmanship of Prof. C. K. Leith, to survey the problems of industrial preparedness in the United States; and this Committee on Foreign and Domestic Mining Policy first established a series of propositions, to be tested by a special sub-committee, for each important mineral.

The propositions<sup>2</sup> adopted by the Committee are summarised as follows:

\* "International Control of Minerals," New York, 1925, p. 7.

(1) The international movements of certain minerals are inevitable, and although they may be hindered by fiscal barriers, they cannot under civilised conditions be stopped altogether. It is thus considered to be foolish to attempt by artificial restrictions to make any country self-contained: each should be allowed to benefit by drawing on the special advantages of others.

(2) Thus, in order to reduce transport expenses, concentration generally, followed according to circumstances by smelting or fabrication, should be accomplished near the source of supply.

(3) Prof. Leith and his colleagues plead for freedom for all nationals to prospect and exploit, and they urge that laws granting concessions should require that licensees of prospecting rights over large areas should be compelled, within reasonably short time, to narrow their claims for mining leases to areas that can be exploited effectively.

(4) Pressure on backward governments may be necessary to prevent them from shutting out those who are willing and able to develop mineral resources, of which they have surplus supplies, whilst industrial countries are suffering from deficiency; but any government using such pressure should observe the principle of the open door for all nationals.

(5) Government—that is, the United States Government—should improve the official intelligence agencies in foreign lands and so assist Americans with the information and help necessary for mineral enterprise abroad. There should be more attempts to obtain and correlate information regarding the world's resources in important minerals.

(6) The committee classified the known mineral deposits of the United States into:

(a) those that are obviously in quantities large enough to spare a surplus for export;

(b) those that just meet domestic needs, without excess or deficiency;

(c) those that exist in noticeably inadequate amounts; and

(d) those that the United States lack almost entirely.

The American assumption that we have nearly full knowledge of the distribution of mineral deposits of importance may be approximately accurate for the United States, but it would be unwise to apply it to Canada, to our African colonies, or to Australia. Possibly new discoveries in these areas will not disturb the world's supply of coal, manganese, iron ore, or petroleum in the near future, but it would be unwise to add copper and other relatively cheap base metals; in any of these partially explored areas there may well be deposits large enough and rich enough seriously to divert the present streams of the metal trade. Even the new discoveries of manganese on the Gold Coast threaten to change the source of supply of these ores.

However, it is useless to investigate our resources in minerals, and futile to discuss schemes to secure local smelting and refining, if the laws which control the grant of concessions for prospecting and mining add unduly to the cost of exploitation.

The conditions for mining change with the increase of transport facilities, with the development of new local markets, and with the growth generally of industries and technical science. Facilities of the kind that are necessary to encourage enterprise should thus be reviewed at reasonable intervals. No rules can hold good for longer than a few years, but their revision at frequent intervals tends to unsettle the confidence of business men, which of all bad policies is the worst.

It is the business of a mining company to make as much profit as possible out of a mineral deposit during the period of its mining lease; it is the business of government to safeguard a national asset of vital importance which cannot be replaced or renewed. But it is better for a country that its mineral deposits should be worked than that they should be left lying idle. The mineral policy of a government is thus the choice of a judicious mean between extravagance and conservatism; and, as the values of minerals vary with the industrial development of a country and that of the countries with which it is in trade communication, this judicious mean will gradually shift its position between the two extremes. Thus, the whole problem of framing and working a mineral policy for a large State is a choice of the judicious mean in all things—rents, royalties, periods of tenure, and size of areas leased.

There is a fundamental difference between State ownership of mineral rights and State ownership of mines, but there is a prevalent tendency, and therefore danger, of lumping both together as similar forms of Socialism, thus bringing them both into the arena of party politics. Legal doubts about security of tenure, absence of clear title to surface rights, local variations in length of lease and rate of royalty, the independent necessity of acquiring wayleaves and water-rights, are frequent accompaniments of the private ownership of minerals, and they all adversely influence the financier who is asked to underwrite a mining enterprise in an area in which he is not otherwise interested. The

end effect of these disadvantages is a handicap to the enterprise, which, like every other item of cost in mining, results in a loss to the State of some part of its mineral reserves.

The mining industry differs fundamentally from others: mineral deposits cannot be transplanted from one country to another; no nation, not even the British Empire, and much less any Dominion, is self-contained; minerals are essential for the maintenance of our commercial life and for military security; yet they can be worked once, and once only, in the history of a nation; the necessity for exchanging minerals between the Dominions involves the question of their fiscal interrelations; the necessity of exchange with other nations affects our foreign relationships. The importance of being safeguarded in mineral resources is only in a degree greater than the importance of being able to smelt our own ores.

There are good reasons, therefore, for classing mining with most of the public utility services, that is, as an industry that might be safeguarded by State action, without the intervention of party politicians or fear of doctrinaire Socialism.

Official and State-aided organisations already exist for the collection and publication of mineral statistics, but institutions of the sort, in order to retain the public trust in them for reference purposes, properly avoid the discussion of those conditions that affect finance and therefore the progress of exploitation. There are so many phases of the two complementary industries of mining and metallurgy which require a wide range of specialists for judicial consideration, that the task of making a survey of our mineral economics might be safely entrusted to those institutions at home and in the Dominions Overseas that have joined in organising the Empire Mining and Metallurgical Congress and Council. It is suggested that these institutions be invited forthwith to inaugurate special surveys for their appropriate territorial units, each being left to follow the plan that appears to it most suitable to the special conditions of its own Dominion and State.

### The National Museum of Wales.

THE formal opening, by their Majesties the King and Queen, of the National Museum of Wales, took place at Cardiff on April 21, at a ceremony characterised by great dignity and splendour. Fifteen years ago their Majesties laid the foundation-stone of the building, and, in fulfilment of a hope expressed on that occasion, they graciously consented to open the first portion of the institution to be completed. Representatives from all parts of the Principality, embracing every side of the national life and thought of Wales, were present, while Mr. C. Tate Regan, Director of the British Museum (Natural History), and Mr. J. Charlton Deas, President of the Museums Association, represented the national and public museums of Great Britain.

Their Majesties were met on their arrival by Lord Kenyon, President of the National Museum of Wales, Lord Pontypridd, Lord Mostyn, Lord

Treowen, Lord Aberdare, Sir William Reardon Smith, the Treasurer of the Museum, and Dr. Cyril Fox, the Director. Mr. Dumbar Smith, the architect of the building, was presented to the King and asked His Majesty's acceptance of a mallet with which to perform the ceremony. Their Majesties then proceeded to the Entrance Hall of the building where the main ceremony took place. A loyal address on behalf of the Court of Governors and of the Council of the National Museum was read by Lord Kenyon and replied to by the King, after which the members of the Council of the Museum were presented to their Majesties. In the course of his reply to the address the King paid a well-merited tribute to the high ideals and achievements of the Museum, to the liberality of its benefactors, and to the wise planning and skilful designing of the building. He spoke of the valuable help the Museum could render by culti-