WAR TIME MINERAL ACTIVITIES IN WASHINGTON.¹

EDSON S. BASTIN.

RETROSPECT.

In looking back toward the time of our entrance into the war in April, 1917, the feature in connection with the mineral activities in Washington that stands out with especial prominence is the frantic exertion on the part of the newly organized war boards and of the Army to accumulate within the shortest possible time the fundamental mineral information necessary for the intelligent equipping of the nation for war. The necessity for immediate action on many matters relating to mineral industries made it important to secure the necessary data with great promptness and the older bureaus, such as the U. S. Geological Survey, the Bureau of Foreign and Domestic Commerce, and the Bureau of Mines, that had been accumulating mineral information for many years, were besieged by requests and by callers. Requests for much the same information from several of the new organizations or even from different branches of one of them were common, and summary reports presenting in brief the salient features of the situation with respect to various mineral substances were particularly in demand. Many of the demands necessitated new investigations or elaborations of old ones.

At the present time most of the war organizations have been supplied with the fundamental mineral information available, and the new investigations are well in hand. Much more work is being done than a few months ago with less commotion and less duplication of effort, and means have been provided, as will be shown later, to eliminate nearly all unnecessary duplication.

¹ Published by permission of the Director, United States Geological Survey. Mr. Bastin is geologist of the U. S. Geological Survey, and Secretary, Joint Information Board on Minerals and Derivatives.

COLLECTION OF FUNDAMENTAL MINERAL DATA.

The fundamental data upon which the executive officers of the government have had to rely for guidance in mineral matters have been mainly statistical in nature, though supplemented by information derived from field examinations, part of which were special investigations for distinctly war purposes, but most of which had been conducted by the established bureaus long prior to the war. The information required may be classified under the general heads: Available supplies; Domestic and Foreign Reserves; Requirements; Price and cost of production; Uses and consumption. Each of these will be briefly considered:

AVAILABLE SUPPLIES.

Domestic Production.—Prior to the war practically all statistics of domestic mineral production, which were obtained by the U. S. Geological Survey, were upon an annual or semi-annual basis, a frequency adequate in peace times when industries changed only slowly under the operation of the law of supply and demand, but entirely inadequate for war times, when rapid developments and readjustments are taking place in many if not most of the important industries under the stimulus of greatly increased demands, the cutting off of imports to save shipping, and other causes. At the present time the statistics of production for most of the mineral substances of particular importance in the war situation are being obtained monthly, and others, such as copper, lead, zinc and aluminum, weekly, the latter being primarily for the guidance of the government purchasing agents. The Geological Survey is the main agency in the collection of production statistics for mineral substances, though fuel statistics are collected in cooperation with the Fuel Administration and certain derivative materials that are used in explosives such as nitrates and sulphuric acid, are studied statistically by the Chemical Section of the War Industries Board.

Imports.—The statistics of imports of many mineral substances have for a long time been reported monthly by the Bureau of Foreign and Domestic Commerce. Since the outbreak of the

war the publication of these monthly returns has been considerably expedited and certain commodities, such as ferromanganese, formerly reported only quarterly, have also been placed upon a monthly basis. Recently a special arrangement has been made whereby the import statistics for a selected list of mineral commodities are at ten-day periods, the fundamental data being furnished by the customs offices and the compilation being done by the Bureau of Tabulation and Statistics of the War Trade Board.

Exports.—Export statistics have long been compiled monthly by the Bureau of Foreign and Domestic Commerce and for many mineral commodities are now being compiled at ten-day intervals by the Bureau of Tabulation and Statistics of the War Trade Board from shippers' declarations filed with the customs officials.

Stocks.—Prior to the outbreak of the war figures showing stocks of materials on hand had slight utility and very little effort was made to obtain such statistics. In a few cases the stocks in the hands of producers were reported annually. With the interruption of shipping incident to the war and with the later voluntary reduction of imports with a view to saving of tonnage, it has become necessary to know what the stocks of mineral commodities are, not only in the hands of producers but also in the hands of importers, dealers, and consumers. Large stocks for example, might make possible important and immediate reductions of imports not otherwise advisable. The collection of reliable statistics of stocks is difficult but fairly complete data have been gathered with respect to tin, graphite, mica, nitrates and copper, and the collection of statistics for antimony and antimonial lead is now being started. The weekly statistics for copper, lead, zinc, aluminum and antimonial lead include stocks in the hands of producers and commitments, as well as production.

DOMESTIC AND FOREIGN RESERVES.

The increased needs for certain materials and especially the reduction of imports from distant parts of the world has required the collection of much information upon the available reserves

of these minerals in various parts of the United States and in nearby foreign countries, particularly in Canada, Mexico and the West Indies, that might, with little if any utilization of shipping, be made contributory to our domestic supplies. The Geological Survey, the Bureau of Mines, and the Mineral Commodities group of the Shipping Board in particular have been active in the collection of this sort of information. By the first two bureaus a joint field examination of the chromite and manganese resources of Cuba has recently been completed.

REQUIREMENTS.

Requirements also constitute a new line of statistical research of little importance in peace times when the formula $\text{consumption} = \text{production} + \text{imports} - \text{exports}$, based upon annual statistics, furnished a sufficient measure of the country's requirements. The tremendously increased amounts of certain mineral commodities that are now being consumed and the rapid changes that are in progress in their mode of utilization has made necessary special and careful studies of our civil requirements, our military requirements, and the requirements of our allies. In the case of small industries such as the monazite industry, it has been possible to settle the question of requirements for a year in advance at a single conference between the principal consumers and government officials. In the case of chromite, quicksilver, tin and other mineral substances the problem is much more complicated. One difficulty has been the inability of the military authorities themselves to predict their requirements as readily as other requirements could be estimated, because of the changing military situation.

A subsidiary problem in the study of the requirements is the separation of the essential from non-essential and less-essential requirements, which involves the collection of trustworthy data to show the quantities of materials entering into different consumptions. Where the supply of material is limited and non-essential forms of consumption must be forbidden, this class of information assumes considerable national importance. Data on

requirements have been collected by the War Trade Board, War Industries Board, and the Shipping Board, by the Geological Survey and Bureau of Mines, but in the future the War Industries Board will probably be mainly responsible for requirements data. It will have the close coöperation of the Army, Navy and the other organizations mentioned above in gathering these data.

PRICE AND COST OF PRODUCTION.

Price data have been much in demand for the guidance of government purchasing agencies, mainly of the War Industries Board and the War and Navy departments. They have also been necessary to the price-fixing activities of the War Industries Board. Investigations by the Federal Trade Commission to determine the cost of production of certain mineral substances have been a prerequisite to price fixing. Statistical studies now in progress in the Geological Survey to determine the quantities of coal and of copper mined per man in mines with large output as compared with mines of small output may also be of much usefulness in rendering these industries more efficient under war conditions of labor shortage.

USES.

Much attention has been devoted to a consideration of how essential certain mineral substances are in the war economy of the nation as compared with other minerals and with the more important non-mineral resources. These problems are the more difficult because they can not be handled mathematically but at least an approximate solution of them is necessary to the just decision of matters of priority in transportation and in the allocation of both raw and finished products. It is further necessary to have information concerning the most economical form in which certain mineral substances can be shipped as bearing mainly upon the problem of economy in rail and water transportation.

The older bureaus dealing with mineral matters have been able to furnish most of the information demanded except as to mili-

tary uses and have obtained additional data through conferences and correspondence with the industries concerned.

EXECUTIVE USE OF FUNDAMENTAL MINERAL DATA.

With this outline of the nature of the data that have been collected in response to the war time needs, attention may be directed to the uses to which this information has been put by the government departments possessing a greater or lesser degree of executive authority.

THE PURCHASE OR COMMANDEERING OF SUPPLIES FOR GOVERNMENT USE.

The military branches of the government are the only ones which have the power of commandeering, but in the case of the mineral commodities which have recently been commandeered, namely, platinum, palladium and iridium, the War Industries Board has acted as the agent of the Army and Navy and has been charged with practically all the details of the transaction except the actual signature of the commandeering orders. The decision to commandeer and the determination of just how far it was necessary to push this rigorous measure has been based largely upon careful statistical studies by the War Industries Board, the Department of Commerce, and the Geological Survey. The actual purchase of materials for government use devolves upon the departments using the materials, in the present situation mainly the War and Navy departments; but a large share of these purchases are arranged for, or approved by, the War Industries Board, one division of which is charged with the task of correlating the demands of various government departments so that they shall not operate to the detriment of each other or of the industries.

The War Industries Board to meet these responsibilities must keep constantly in touch with conditions in all of the important industries feeding the war machines. To this end the statistics of production, of stocks and of commitments, are now for many

of the more important raw materials reported weekly, generally by telegraph. Copper, lead, zinc, aluminum, antimony and antimonial lead, before the war reported annually or semiannually, are now reported weekly to the Geological Survey primarily for the use of the government's purchasing agents in the War Industries Board. By means of monthly statistics covering the mineral substances and derivatives used in the manufacture of explosives such as sulphur, pyrite, sulphuric and nitric acids, the government purchasing agents are kept in reasonably close touch with these industries also.

REDUCTION OF IMPORTS TO CONSERVE SHIPPING.

To effect the transfer of materials across the Atlantic, we are making more economical use of the ships engaged in trade with our country by the elimination of every ton of imports not absolutely essential in accomplishing our great purpose. Upon the Committee on Mineral Imports and Exports advisory to the Shipping Board, has devolved the task of determining for what mineral commodities imports could be reduced and to what extent. The work of this committee, which has been prosecuted with great energy and judgment, will probably result in the saving of approximately a million tons in cargoes on mineral commodities alone during the year 1918. The task has involved not only the use of all available data concerning present supplies and requirements, but has involved the estimation of mineral resources not yet developed but which could and would be developed to counterbalance the decrease in imports. While resources within our own boundaries are the most important, those of neighboring countries less distant than those from which some of the imported minerals have come have also received consideration. The recommendations of the committee of the Shipping Board are enforced by the War Trade Board through partial or complete embargoes announced in advance or through control of individual import licenses.

REDUCTION OF EXPORTS TO CONSERVE DOMESTIC SUPPLIES, ETC.

To the War Trade Board has been assigned the task of preventing supplies needed by our enemies from reaching them either directly or indirectly, and of reducing or forbidding the export of materials that can not well be spared from our own industries. This control has been exercised through a licensing system, and mineral commodities can now be exported only after a license has been secured.

In fulfilling these functions it has been necessary for the War Trade Board to be informed concerning the uses of mineral substances; the rôle they play in our own economy and the purpose they might serve if they reached the hands of our enemies. It has also been necessary for them to know whether the domestic supplies are sufficient to leave an exportable surplus. The older government bureaus and the War Industries Board have been active in furnishing the War Trade Board with these classes of information; the so-called "Export Conservation List" of this board is constructed on the basis of such information.

Restriction of exports for the primary purpose of saving tonnage has thus far not been largely resorted to, whatever the necessities of the future may demand.

ALLOCATION OF IMPORTS AND OF DOMESTIC PRODUCTION.

In the case of all materials the demand for which considerably exceeds the supply, good policy requires that their use be restricted to those industries for which they are essential. Tin, for example, for supplies of which we are wholly dependent upon foreign deposits, can now be obtained in quantities that are only sufficient if wastefulness is avoided, and under an agreement with the War Industries Board the Pig Tin Committee of the American Iron and Steel Institute has become responsible for the fair and equitable distribution of all supplies with a view of securing the most economical utilizations.

In the case of manganese ore, the importations of which are being restricted in order to save shipping, those supplies of imported ore that are still allowed to come in are of higher grade

than most of the manganese produced in this country and must be looked upon essentially as "sweeteners" to be fairly and equitably distributed where they are most needed, provision being made that such steel manufacturers and others as could successfully use lower grade domestic material should not receive the imported article.

High-grade English clays the import of which requires large ocean tonnages also must be allocated only to those firms producing materials for which the domestic clays are unsuited.

Allocation must be resorted to in the case of certain domestic supplies as well as imported materials. The sulphur supplies of the country must, for example, be allocated only to those acid makers who can not make use of pyrite, of pyrrhotite, or of smelter fumes. Further the allocation of pyrite, of coal and of other mineral commodities should be so controlled as to avoid unnecessarily long or cross hauling in rail transportation.

Allocation of domestic mineral supplies has thus far been limited mainly to the distribution of those needed for government plants and plants working on government contracts. An example is afforded by quicksilver, at least 40 per cent. of the production of which is held subject to government order and distributed under the supervision of the War Industries Board.

ECONOMIES IN CONSUMPTION,—DEVELOPMENT OF SUBSTITUTES, ETC.

Some of the most important recent readjustments in the mineral industry have had for their purpose the avoidance of waste and the development of substitutes in industries using materials of which there was a shortage. The Conservation Division (formerly known as the Commercial Economy Board) of the War Industries Board, whose functions are "to secure economy in the use of men and materials in commercial business to aid in carrying on the war," by obtaining the voluntary coöperation of certain mineral industries has brought about notable economies in consumption and elimination of waste for instance in chrome chemicals, tin and gasoline. In a part of this work they have

had the active coöperation of the Bureau of Standards, which developed babbitt metals and solders containing less than the usual amounts of tin, but apparently are as satisfactory for most purposes as the types richer in tin. Agreements have been reached with the solder and bearing metal manufacturers for large reductions in the tin content of such alloys. This conservation is soon likely to be carried a step farther by the use of lead-cadmium solders. Notable reductions in the tin consumed in so-called tin foils have also been effected.

The Shipping Board jointly with the War Industries Board, has been successful in obtaining the agreement of steel manufacturers to a much larger use of spiegeleisen instead of ferromanganese in the production of steel, thus permitting an increased utilization of domestic low-grade manganese ores and a correspondingly important decrease in the importation of high-grade manganese ores.

STIMULATION OF DOMESTIC PRODUCTION.

With mineral substances, which have an influence on the war program, it has been necessary to use every possible means to increase the domestic production, especially of those mineral commodities whose imports have been restricted, as manganese ore and chromite. Thus far the government has been able to render little direct aid in stimulating domestic production of war minerals, but has helped practically and promptly in indirect ways. It is hoped that legislation now pending will give the government the power to render efficient aid by governmental purchase of war minerals.

Mention should be made at this point of the abandonment by the Bureau of Mines and the Geological Survey of a large share of their investigative work that was not directly connected with war needs and the application of the personnel and the funds so released to the solution of war problems. A large share of the geologic staff of the Geological Survey has been engaged during the past two summers in the examination of deposits of minerals particularly needed at this time, notably petroleum, man-

ganese, chromite, pyrite, sulphur, platinum, and others. The Bureau of Mines has similarly focused a large share of its energies upon the working out of mining and metallurgical problems to stimulate the production or to conserve the utilization of mineral war necessities.

PRIORITY IN RAIL TRANSPORTATION.

It is obviously essential that those commodities necessary in the manufacture of munitions or in other ways very important to the war program, should be promptly transported even at the cost of much delay in the movement of less essential materials. The determination of priority of shipment of mineral commodities rests with the Car Service Section of the United States Railroad Administration, but they have received technical advice upon this matter from organizations possessing detailed information with regard to the part which each of these minerals plays in our industrial economy, particularly from the Geological Survey, the Bureau of Mines, and the War Industries Board. These bureaus have also acted as spokesmen for the mineral industry in transmitting to the Car Service Section, with recommendations, complaints from individual mineral producers regarding their inability to secure cars for the shipment of their products. In transmitting such complaints a statement has usually been included setting forth the importance of the particular mineral concerned. Priorities in rail transportation for coal, coke, and oil are decided by the Fuel Administration with which the Geological Survey is working in close coöperation.

The question of priorities in rail transportation is a most difficult problem involving an estimation not alone of the relative importance of various mineral commodities, but also a weighing of their importance relative to all the other needs of the community and a consideration of such subsidiary matters as the perishability of certain commodities.

FINANCING OF MINERAL ENTERPRISES.

The War Finance Corporation capitalized at \$500,000,000, established for the period of the war by an act approved by the

President on April 5, 1918, is empowered to make advances for periods not exceeding five years through banks (or in very exceptional cases, directly) to established and growing businesses whose operation shall be necessary or contributory to the prosecution of the war. It is believed that this act will to some extent stimulate the production of mineral commodities of war importance.

Complementary to the work of the War Finance Corporation are the activities of the Capital Issues Committee of the Federal Reserve Board whose duty it is to pass upon all requests for issuance of securities in excess of \$100,000, to determine whether these expenditures are justified under war conditions when unusual demands are being made upon essential industries and when capital must be wisely conserved. The Capital Issues Committee on the one hand prevents the wasteful expenditure of capital and guides it into business operations that are contributory to the war needs and are as economical as possible of labor and transportation facilities. Such worthy operations may in turn receive direct financial aid from the War Finance Corporation. The bureaus possessing detailed information in regard to the mineral resources of the country have been largely called upon by the organizations mentioned above for information concerning the need for increased output in certain mineral industries.

At the present time there is no act under which financial assistance can be given for the development of idle or insufficiently operated mineral properties, but such legislation is now pending, as explained in a later paragraph.

AIDS IN THE DISTRIBUTION OF MINERAL INFORMATION.

As an aid in the distribution of mineral information, to forestall unnecessary duplication of effort, and for the special use of government administrators in obtaining all of the information available upon whatever mineral topic they have under consideration, an informal interdepartmental organization, known as the Joint Information Board of Minerals and Derivatives, was organized in February, 1918, with representatives of thirty-two

government bureaus and boards, a member of the War Industries Board as chairman, and a member of the Geological Survey as secretary. Meetings of this board have been held every week or two weeks for the purpose of focusing on certain topics, which were at the moment requiring administrative action, all the information available in the departments there represented. Thorough discussions were held regarding pyrite, sulphur, and sulphuric acid, manganese, tin and other mineral substances, and from these discussions it is believed that each of the administrative officers present returned to his own special duties with a clearer conception of the broad features of the situation, and with information that would insure harmony between his own activities and those of the other bureaus dealing with somewhat different phases of the same subject. Full minutes of the technical discussions for the confidential use of board members have added to the value of the meetings.

The Research Committee of the National Research Council is also concerned with mineral information as well as most other classes of information, its stated purpose being "the securing, classifying and dissemination of scientific, technical and industrial research information, especially relating to war problems, and the interchange of such information between the Allies in Europe and the United States." The board consists (1) of a civilian member, at present the Director of the Bureau of Standards, (2) the Chief of the Military Intelligence Section of the Army, (3) the Director of Naval Intelligence, and, (4) a technical assistant. The main office is in Washington with branch offices at the American Embassies in Paris and London.

Another organization, the War Minerals Committee, consisting of representatives of the Association of State Geologists, the Bureau of Mines, Geological Survey, American Institute of Mining Engineers, has done important work in disseminating information on mineral matters and in drafting the War Minerals Bill.

The Joint Information Board is entirely an interdepartmental organization but there has been organized in Washington a Service Bureau of the Committee on Public Information for the service of the general public as well as of government officials.

It is its duty to guide inquirers and transmit letters of inquiry as directly and with as little delay as possible to the government departments possessing the information desired, and in the present complexity of the government organization this bureau is proving immensely serviceable.

THE LOOK FORWARD.

The near future appears to hold a promise of greatly increased efficiency and added responsibilities in the federal administration of mineral affairs. The Mineral Administrator Bill, which at the time of the writing has been passed in somewhat different form by both Houses of Congress and is now in Conference, will make possible a larger measure of governmental assistance for the production in our own country of mineral substances of which there is an actual or impending shortage. The exact provisions of this act are still uncertain, but it is probable that it will authorize the government to contract with producers at prices sufficiently high or for periods sufficiently long to materially stimulate production. It will also permit the government to equitably distribute mineral supplies to those to whom they are most necessary for war purposes.

As passed by the House of Representatives the administration of this act is placed with the Interior Department, but whatever government agency enforces the act its task will be an arduous one, calling for the maximum use of all the mineral information at hand, and the technical personnel now available in the older departments, particularly the Geological Survey and the Bureau of Mines, and the linking up in some more intimate way of the activities of these organizations with the present mineral activities of the War Industries Board.