DEPARTMENT OF THE INTERIOR
FRANKLIN K. LANE, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

Bulletin 666

OUR MINERAL SUPPLIES

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GEOLOGISTS IN CHARGE

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

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20 CENTS PER COPY

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[The letters prefixed to the titles are those used to designate the chapters for advance publication. The dates of publication are given in parentheses.]

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OUR MINERAL SUPPLIES.

INTRODUCTION.

By H. D. McCaskey and E. F. Burchard.

In September, 1914, soon after the beginning of the war in Europe, the Director of the United States Geological Survey summarized the mineral reserves of the United States and made certain suggestions as to making America industrially independent.[1] At that time, two and one-half years before the United States became involved in the war, it was clearly recognized that this country would soon have to face unusual conditions resulting from the depletion or exhaustion of her stocks of imported minerals. Many of these minerals had been imported from choice rather than from necessity, or at least they had been imported when their cost was less than the cost of domestic materials, or because their quality was presumably more desirable, or because their ports of importation were more convenient to the consumers, or for other commercial reasons, and consequently for such minerals it required only the development of an American industry to render our potential supplies available.

In keeping up the supply of minerals that are admittedly lacking or are found in inadequate quantities in the United States a more difficult problem had to be solved. As the war in Europe progressed and ocean commerce became more and more unsettled the difficulty of obtaining supplies of certain minerals increased, and the Geological Survey was called upon by the public and by other Government bureaus for an ever-increasing amount of information and advice concerning these minerals, and also concerning the commercial situation with regard to other more plentiful minerals and their derivatives.

In order to meet this demand with published information a series of papers was prepared by the members of the Survey staff who were most familiar with the minerals required. These papers, collectively entitled "Our mineral supplies," were issued separately in the order

[1] Smith, G. O., Our mineral reserves: U. S. Geol. Survey Bull. 599, 48 pp., 1914.

of their completion. The first one, on chromite, appeared on April 13, 1917, one week after the United States entered the war. All but two of the chapters were available in 1917. The chapter on quicksilver was delayed owing to other demands on the author to whom it was first assigned, although the essential data were given to the war boards informally and served their purpose. In order to complete the series for publication the preparation of this chapter was assigned to Mr. Ransome in September, 1918. The bibliography, compiled under the direction of the Survey editor, affords a convenient check list of the Survey publications on the minerals considered in this volume.

In so far as practicable each chapter contains a discussion of the source of supply of the mineral considered, its uses, both in peace and in war, and the normal demand, and for some of the minerals the probable demand under war conditions is indicated. The table of contents (p. 3) shows the chapters prepared for this bulletin, their authors, and the dates of publication.

The importance of national independence in mineral supplies both in peace and in war needs no demonstration here. In times of peace industrial independence for the United States requires domestic control of such resources as coal, iron ore, and petroleum. Other commodities may in part be imported advantageously because of cheaper sources of foreign supply or superiority of foreign grades, and still others may be almost wholly imported because of lack of known or developed domestic sources of supply. In war times, however, with foreign supplies cut off through hostilities between nations and also by hindrances to commerce, the importance of independence, potential at least, in minerals of all classes becomes most impressive. The lesson that has been pointed out by recent events is that the discovery and development for war purposes of mineral supplies in which the United States is deficient should be undertaken by the Federal Government.

As shown in the several chapters the domestic supplies of minerals may be divided into three classes—(1) mineral supplies that are adequate to all probable peace and war needs of the United States; (2) mineral supplies that are sufficient for a large part of these needs; (3) mineral supplies that are inadequate in quantity or quality, or both, the lack of which must be offset by imports, use of substitutes, or curtailment of use. Among the materials to be grouped in the first class are arsenic, barytes, bauxite, bismuth, bromine, calcium chloride, cement, clay, coal, copper, corundum and emery, diatomaceous earth, feldspar, fluorspar, garnet, gravel, grindstones, gypsum, iron ore, lead, lime, lithium minerals, magnesite, manganiferous ores (low grade), molybdenum, petroleum, phosphate rock, pulpstones, salt, silica, talc and soapstone, sulphur, tripoli, volcanic

ash, and zinc; in the second class are antimony, mercury (quicksilver), mica, pyrite, strontium, tungsten, and vanadium; and in the third class are asbestos, chromite, graphite, manganese ore (high grade), monazite, nickel, nitrates, platinum, potash, and tin.

As all the chapters except that on quicksilver were prepared in the spring of 1917, their authors had only the statistics of 1916 available for comparison. Developments during 1917 and 1918 furnish a better indication of the needs of the United States under war conditions than those of earlier years, and inasmuch as the delay in completing the series of chapters permits this introduction to be brought up to a later date a comparison is possible between the quantity of supplies available in a normal pre-war year, such as 1913, and a war year, such as 1917.

The following tables of commodities, by classes 1, 2, and 3 as defined above, show for most of the important commodities in 1913 and 1917 the domestic production, the imports, and the exports, from which may be deduced the approximate quantity available for domestic consumption. The figures for a few commodities are confidential and may not be published.

CLASS 1.—*Domestic mineral supplies adequate to all probable peace and war needs of the United States.*

		Production.	Imports.	Exports.	Quantity available for consumption.
Arsenic [a] (short tons)	1913	2,513	1,519	None.	4,032
	1917	6,151	1,178		7,329
Barytes (short tons)	1913	45,298	35,840	None reported.	81,138
	1917	206,888	6		206,894
Bauxite (long tons)	1913	210,241	21,456	Not separately reported.	.....
	1917	568,690	7,691	[b] 21,791	554,590
Bismuth (pounds)	1913	157,300	117,747	None reported.	275,047
	1917	(c)	69,250		.....
Bromine (pounds)	1913	572,400	Not specifically shown.	Not specifically shown.	572,400
	1917	895,499			895,499
Calcium chloride (short tons)	1913	19,611			19,611
	1917	30,503			30,503
Cement, hydraulic (barrels of 376 pounds net).	1913	92,949,102	85,470	2,964,358	90,070,214
	1917	93,453,658	2,323	2,586,215	90,869,766
Clay (short tons)	1913	2,647,989	338,123	Not available.	2,986,112
	1917	3,113,844	268,036	83,217	3,298,663
Coal (short tons)	1913	569,960,219	1,612,550	[d] 24,798,080	546,774,689
	1917	651,402,374	1,460,983	[d] 29,846,863	623,016,494
Copper, new (refined) (pounds)	1913	1,236,823,913	378,243,869	[e] 817,911,424	797,156,358
	1917	1,873,546,171	555,000,000	[f] 1,126,875,368	1,301,670,803
Emery and corundum (short tons)	1913	[g] 957	[h] 20,426	Values only recorded.	.....
	1917	17,135	[h] 2,287		.....
Feldspar (short tons)	1913	120,955	Not specifically shown.	Not specifically shown.	.....
	1917	141,924			.....
Fluorspar (short tons)	1913	115,580	22,682	None reported.	138,262
	1917	218,828	13,616		232,444
Garnet, abrasive (short tons)	1913	5,308	Not reported separately.	Not reported separately.	.....
	1917	4,995			.....
Gravel (short tons)	1913	40,861,694	Values only recorded.	Values only recorded.	.....
	1917	35,573,819			.....
Grindstones and pulpstones (short tons).	1913	Values only.	[i] 7,726	Values only recorded.	.....
	1917	[j] 54,432	[i] 3,012		.....
Gypsum, crude (short tons)	1913	2,599,508	447,383	Not recorded.	.....
	1917	2,696,226	240,269		.....
Iron ore (long tons)	1913	61,980,437	2,594,770	1,042,151	63,533,056
	1917	75,288,851	971,663	1,132,313	75,128,201
Lead, refined (short tons)	1913	411,878	11,980	None.	423,858
	1917	548,450	6,887	56,209	499,128
Lime (short tons)	1913	3,595,390	4,139	29,475	3,570,054
	1917	3,786,364	7,353	18,794	3,774,923
Lithium minerals (short tons)	1913	530	Not reported separately.	Not reported.	.....
	1917	2,062		separately.	.....
Magnesite, crude (short tons)	1913	9,632	13,240	Not recorded, negligible.	22,872
	1917	316,838	30,277	Not recorded.	347,115
Manganiferous ore [k] (long tons)	1913	59,403	Included under iron ore.	None.	59,403
	1917	860,944			860,944
Molybdenum (pounds)	1913	None.	156,000	None recorded.	156,000
	1917	350,200	None recorded.		350,200
Petroleum (barrels of 42 gallons)	1913	248,446,230	17,809,058	[l] 4,630,229	261,625,059
	1917	335,315,601	30,162,583	[l] 4,098,124	361,380,060
Phosphate rock (long tons)	1913	3,152,208	Negligible.	1,366,508	1,785,700
	1917	2,851,886		166,358	2,685,528
Salt (short tons)	1913	4,815,902	154,765	70,289	4,900,378
	1917	6,978,177	64,922	113,993	6,929,106
Silica (short tons)	1913	204,759	None reported.	None reported.	204,759
	1917	675,127			675,127
Sulphur (long tons)	1913	491,080	22,605	89,221	424,464
	1917	1,134,412	1,015	152,833	982,594
Talc and soapstone:					
Talc (short tons)	1913	149,271	13,770	None reported.	163,041
	1917	198,613	18,609		217,222
Soapstone (short tons)	1913	26,562	Not separately reported.	Not separately reported.	.....
	1917	20,235			.....
Tripoli and diatomaceous earth [m] (short tons).	1913	27,383	Values only.	Not recorded.	.....
	1917	29,102			.....
Zinc (short tons)	1913	337,252	[n] 19,597	7,783	349,066
	1917	584,597	[n] 72,731	153,796	503,532

[a] White arsenic, As_2O_3.
[b] Includes bauxite concentrates.
[c] Only two producers and Survey not at liberty to publish figures.
[d] Exclusive of bunker coal.
[e] Exclusive of manufactured copper, as pipes and tubes, plates and sheets, and wire.
[f] Exports of pigs, ingots, bars, rods, pipes, and tubes, plates and sheets, and wire.
[g] Emery only. No corundum produced.
[h] Grains, ore, and rock.
[i] Represents grindstones only.
[j] Quantity represents grindstones only, as pulpstones were not reported by weight.
[k] Containing 5 to 35 per cent of manganese.
[l] Exports of refined products are not included nor are shipments of crude petroleum to Alaska, Hawaii, Porto Rico, and the Philippine Islands.
[m] Includes rottenstone, but excludes, in 1917, considerable production of diatomaceous earth for special uses upon which the Survey is not at liberty to report.
[n] Zinc content of ore plus blocks or pigs.

CLASS 2.—*Domestic mineral supplies sufficient for a large part of peace and war needs of the United States.*

		Production.	Imports.	Exports.	Quantity available for consumption.
Antimony (short tons)	1913	Not recorded.	[a] 8,250	None.	.....
	1917	258	[a] 17,914	None.	18,172
Mica (short tons)	1913	6,172	Quantity not reported.	149	.....
	1917	4,067		[b] 6	.....
Pyrites (long tons)	1913	341,338	[c] 850,592	None reported.	1,191,930
	1917	462,662	[c] 967,340		1,430,002
Quicksilver (flasks of 75 pounds)	1913	20,213	2,289	1,140	21,362
	1917	36,159	5,207	10,778	30,588
Strontium ore (short tons)	1913	No record.	No record.	None reported.	.....
	1917	4,035	[d] 1,700		5,735
Tungsten [e] (short tons)	1913	1,537	2,114	.....	.....
	1917	6,144	4,878	2,420	8,602
Vanadium (short tons)	1913	432	None reported.	None reported.	432
	1917	484			484

[a] Antimony content of ore plus metallic antimony, and antimony sulphide.
[b] For six months, January to June. Not separately classified after June.
[c] Pyrites containing more than 25 per cent of sulphur.
[d] Imports of English celestite.
[e] These figures represent ore carrying 60 per cent tungsten trioxide.

CLASS 3.—*Domestic mineral supplies chiefly inadequate in quantity or quality, or both for peace and war needs of United States.*

		Production.	Imports.	Exports.	Quantity available for consumption.
Asbestos (short tons)	1913	1,100	97,145	Not separately recorded.	.....
	1917	1,683	134,108	708	135,083
Chromite (long tons)	1913	255	65,180	None.	65,435
	1917	43,725	72,063	None.	115,788
Graphite [a] (short tons)	1913	4,775	28,879	2,692	30,962
	1917	13,593	42,577	2,573	53,597
Manganese ore [b] (long tons)	1913	4,048	345,090	.....	349,138
	1917	129,405	629,972	.....	759,377
Monazite sand (pounds)	1913	None.	817,810	None reported.	817,810
	1917	[c]	5,828,270		.....
Nickel (short tons)	1913	[d] 241	[e] 23,723	[f] 14,587	9,377
	1917	[d] 402	[e] 37,763	[f] 10,996	27,169
Nitrates, sodium and potassium (short tons)	1913	None.	691,230	.....	691,230
	1917	None.	1,732,996	.....	1,732,996
Platinum (troy ounces)	1913	[g] 1,034	[h] 118,661	Not separately recorded values only.	.....
	1917	[g] 7,384	[h] 30,207		
Potash salts [i] (short tons)	1913	.....	[k] 1,092,588	.....	[n] 1,092,588
	1917	[j] 126,961	[l] 25,287	[m] 525	[n] 151,723
Tin, metallic (short tons)	1913	50	52,329	Insignificant and not recorded.	52,379
	1917	110	72,166		72,276

[a] Unmanufactured graphite.
[b] Containing 35 per cent or more of manganese.
[c] Only one producer and Survey not at liberty to publish figures.
[d] Nickel content of nickel salts and metallic nickel produced as a by-product in the electrolytic refining of copper.
[e] Nickel, nickel ore and matte, nickel oxide, alloys of nickel with copper, etc., imported for consumption.
[f] Nickel and nickel oxide.
[g] Refined new metals of the platinum group of domestic origin.
[h] Ore, unmanufactured, ingots, bars, sheets, wire.
[i] Gross weight.
[j] Available potash (K_2O), 32,573 short tons.
[k] Potash (K_2O) content, 270,720 short tons.
[l] Potash (K_2O) content, 8,100 short tons.
[m] Domestic potash salts, potash (K_2O) content, 200 short tons.
[n] Potash (K_2O) content: 1913, 270,720 short tons; 1917, 40,473 short tons.

The reaction of the war upon the demand for the several commodities is of interest. In abrasives, chemical materials, fertilizers, fuels, metals, and refractories, with few exceptions, domestic production was greater in 1917 than in 1913, whereas the output of structural materials was generally less. The classes of materials whose domestic production increased were all directly or indirectly contributory to the conduct of the war; the civil consumption of certain materials was less than normal because of governmental restrictions in use and because of high prices, but the military uses more than made up the deficiency. Inspection of the table shows also that of a few commodities the quantity available for consumption in 1917 was less than in 1913 on account of curtailment of imports, notwithstanding considerable increases in domestic production.

In any consideration of mineral supplies the actual consumption is all-important. The last column of each table shows the quantities available for consumption as calculated by adding production and imports and subtracting exports. These quantities may be very different, especially in war times, from the quantities actually consumed, because stocks accumulated in a former year may be heavily drawn upon. More complete data on stocks and on actual consumption of materials, even in peace times, are needed. As estimates of military needs alone and of shipping available have varied greatly and have been revised from time to time during the war, it is evident that consumption must vary, and a consideration of all factors shows that circumstances may at any time lead to the transfer of mineral commodities from one classification to another. For example, data originally made available to the war boards by consumers, combined with other data at hand, indicated at one time a serious shortage in supplies of chromite. Production was encouraged, imports were permitted to a certain extent, and conservation in consumption of the chromite available was attained, but these measures combined led to an actual oversupply and corresponding distress to the producers who were operating under war-time costs and who failed, at least in part, to receive the expected corresponding war-time prices.

Similarly, quality is often a factor as important as quantity in reckoning our independence of foreign supplies. For example, it was found necessary to import certain quantities of graphite, mica, asbestos, and several other minerals because for some uses the quality of the domestic material, no matter what the quantity, was not adapted to particular needs, whether of war or of peace.

On the whole, the severe test of war has shown that the United States possesses a larger degree of independence in mineral supplies than any other nation, especially in times when cost of production has been relegated to the rear. In peace times cost is of course a

determining factor, and a number of mineral industries that have thrived under war conditions are already declining under the pinch of foreign competition and decreased demand.

It is to be regretted that data on consumption and on cost of production have never been available in any Government organization in such completeness as the data on production compiled in the Geological Survey and the data on imports and exports compiled in the Bureau of Foreign and Domestic Commerce. It is to be hoped that means may be found to remedy these deficiencies and to improve related data already provided for, in order that more exact knowledge may be available for better preparedness in the future.

The cost of the war has been great, in blood and in treasure. The tuition fees that must be paid for the lessons that have been taught by national unpreparedness are so heavy that they must be borne in part by future generations. It will be unfortunate indeed if these lessons are not fully learned and applied in practice.