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CONTRIBUTIONS TO ECONOMIC GEOLOGY

(SHORT PAPERS AND PRELIMINARY REPORTS)

1921

PART I.—METALS AND NONMETALS EXCEPT FUELS

F. L. RANSOME AND E. F. BURCHARD
GEOLOGISTS IN CHARGE

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PART I. METALS AND NONMETALS EXCEPT FUELS.

F. L. RANSOME and E. F. BURCHARD, *Geologists in charge.*

INTRODUCTION.

The Survey's "Contributions to economic geology" have been published annually since 1902. In 1906 the increase in the number of papers coming under this classification made it necessary to divide the contributions into two parts, one including papers on metals and nonmetals except fuels and the other including papers on mineral fuels. In 1915 the year included in the title was changed from the year in which the field work reported in these papers was done to the year of publication, and in consequence there was no volume entitled "Contributions to economic geology, 1914." The subjoined table gives a summary of these bulletins.

United States Geological Survey "Contributions to economic geology."

Date in title.	Date of publication.[a]	Bulletin No.	Date in title.	Date of publication.[a]	Bulletin No.
1902	1903	213	1912, Part I	1914	540
1903	1904	225	Part II	1914	541
1904	1905	260	1913, Part I	1915	580
1905	1906	285	Part II	1915	581
1906, Part I	1907	315	1915, Part I	1916	620
Part II	1907	316	Part II	1916	621
1907, Part I	1908	340	1916, Part I	1917	640
Part II	1909	341	Part II	1917	641
1908, Part I	1909	380	1917, Part I	1918	660
Part II	1910	381	Part II	1918	661
1909, Part I	1910	430	1918, Part I	1919	690
Part II	1911	431	Part II	1919	691
1910, Part I	1911	470	1919, Part I	1920	710
Part II	1912	471	Part II	1920	711
1911, Part I	1913	530	1920, Part I	1921	715
Part II	1913	531	Part II	1921	716

[a] The date given is that of the complete volume; beginning with Bulletin 285, the papers have been issued as advance chapters as soon as they were ready.

As the subtitle indicates, most of the papers in these volumes are of three classes—(1) short papers describing as thoroughly as conditions will permit areas or deposits on which no other report is likely to be prepared; (2) brief notes on mining districts or economic deposits whose examination has been merely incidental to other work;

and (3) preliminary reports on economic investigations the results of which are to be published later in more detailed form.

Although these papers set forth mainly the practical results of economic investigations they include brief theoretical discussions and summary statements of conclusions if these appear to require prompt publication.

Beginning in the spring of 1917 and continuing throughout the period of the war the United States Geological Survey made special field explorations, surveys, and laboratory studies of deposits of ores of metals used in the manufacture of ferroalloys, pig iron, and steel, including manganese, chromium, tungsten, molybdenum, titanium, uranium, vanadium, zirconium, and iron. More than 2,500 deposits were examined in 27 States, Cuba, Porto Rico, Santo Domingo, Costa Rica, and Panama. As soon as the field examination of a group of deposits could be completed systematic notes giving estimates of tonnage of ores were sent to Washington for the information of the Shipping, War Industries, and War Trade boards and other Government organizations that were interested in the question of what domestic supplies were available for substitution for foreign ores.

Summaries of the data were promptly published by the Geological Survey in the form of press bulletins, and several longer papers on these subjects have been published by the American Institute of Mining and Metallurgical Engineers.[1] Other papers prepared largely by Federal Survey geologists have been published by several State surveys.[2] The papers on chromite and manganese ore in this bulletin are some of the results of this war work; other papers were published in "Contributions to economic geology" for 1919 and 1920. In the field work the United States Geological Survey enjoyed the cooperation of the California State Council of Defense and the State geological surveys of Colorado, Georgia, Minnesota, Tennessee, and Virginia, the University of Nevada, the New Mexico State School of Mines, and the United States Bureau of Mines.

During the war period there were large increases in the domestic production of manganese, chrome, tungsten, and other ores of this steel-hardening group and of the ferroalloys. To war prices is doubtless due part of the stimulation for this increased production,

[1] Harder, E. C., and Hewett, D. F., Recent studies of domestic manganese deposits: Am. Inst. Min. and Met. Eng. Trans., September, 1919, 48 pp. Diller, J. S., Recent studies of domestic chromite deposits: Idem, 44 pp. Burchard, E. F., Manganese-ore deposits in Cuba: Idem, 52 pp. Burchard, E. F., Chrome-ore deposits in Cuba: Idem, 23 pp.

[2] Stose, G. W., and Schrader, F. C., Manganese deposits of east Tennessee: Resources of Tennessee, vol. 8, Nos. 3 and 4, 531 pp., Tennessee State Geol. Survey, 1919. Stose, G. W., Miser, H. D., Katz, F. J., and Hewett, D. F., Manganese deposits of the west foot of the Blue Ridge, Va.: Virginia Geol. Survey Bull. 17, 166 pp., 1919. Hull, J. P. D., LaForge, Laurence, and Crane, W. R., Manganese deposits of Georgia: Georgia Geol. Survey Bull. 35, 295 pp., 1919.

but it is believed that the work of the Federal geologists and their associates did much to encourage miners to patriotic efforts to develop domestic deposits of war-important minerals. It was demonstrated that the United States has reserve deposits of chrome ore adequate to supply a war demand for several years. Now that the war is over the country is conserving its domestic supplies by employing higher-grade and cheaper ore from foreign countries. The first paper in this bulletin, by J. S. Diller, "Chromite in the Klamath Mountains, California and Oregon," discusses in detail the occurrence and origin of chromite and in this respect serves as an introduction to the five papers that follow. The presentation of theoretical matter in these other papers is therefore reduced to a minimum.