DEPARTMENT OF THE INTERIOR
FRANKLIN K. LANE, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

Bulletin 640

CONTRIBUTIONS TO ECONOMIC GEOLOGY

(SHORT PAPERS AND PRELIMINARY REPORTS)

1916

PART I.—METALS AND NONMETALS EXCEPT FUELS

F. L. RANSOME AND HOYT S. GALE
GEOLOGISTS IN CHARGE

WASHINGTON
GOVERNMENT PRINTING OFFICE
1917

NOTE.—The Survey's annual volumes entitled "Contributions to economic geology" are issued in parts, and the last part will include a volume title-page, table of contents, and index for the use of those who may wish to bind the separate parts. A small edition of the bound volume will also be issued, but copies can not be supplied to those who have received all the parts.

CONTENTS.

[Arranged according to subjects. The letters in parentheses preceding the titles are those used to designate the papers for advance publication.]

ILLUSTRATIONS.

CONTRIBUTIONS TO ECONOMIC GEOLOGY, 1916.

PART I. METALS AND NONMETALS EXCEPT FUELS.

F. L. RANSOME and HOYT S. GALE, *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	1910, Part I	1911	470
1903	1904	225	Part II	1912	471
1904	1905	260	1911, Part I	1913	530
1905	1906	285	Part II	1913	531
1906, Part I	1907	315	1912, Part I	1914	540
Part II	1907	316	Part II	1914	541
1907, Part I	1908	340	1913, Part I	1915	580
Part II	1909	341	Part II	1915	581
1908, Part I	1909	380	1915, Part I	1916	620
Part II	1910	381	Part II	1916	621
1909, Part I	1910	430	1916, Part I	1917	640
Part II	1911	431	Part II	1917	641

[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, the papers included in these volumes are of two classes—(1) short papers giving comparatively detailed descriptions of occurrences that have economic interest but are not of sufficient importance to warrant a more extended description; (2) preliminary reports on economic investigations the results of

which are to be published later in more detailed form. These papers are such only as have a direct economic bearing, all topics of purely scientific interest being excluded.

Brief abstracts of the publications of the year are given in the annual report of the Director. The complete list of Survey publications affords, by means of finding lists of subjects and of authors, further aid in ascertaining the extent of the Survey's work in economic geology.

The reports on work in Alaska have been printed in a separate series since 1904, the volumes so far issued being Bulletins 259, 284, 314, 345, 379, 442, 480, 520, 542, 592, 622, and 642.