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.)

INTRODUCTION............................................................. VII

GOLD AND SILVER:

(B) Reconnaissance of the Conconully and Ruby mining districts, Wash., by E. L. Jones, jr. (published Aug. 12, 1916)................................. 11


(F) The Golden Arrow, Clifford, and Ellendale districts, Nye County, Nev., by H. G. Ferguson (published Oct. 3, 1916)............................. 113

(I) The Gold Log mine, Talladega County, Ala., by E. S. Bastin (published Oct. 10, 1916)................................................................. 159

(J) Placer deposits of the Manhattan district, Nev., by H. G. Ferguson (published Jan. 20, 1917)............................................................ 163

LEAD AND ZINC:

(A) Notes on the Promontory district, Utah, by B. S. Butler and V. C. Heikes (published Mar. 16, 1916).................................................. 1

RARE METALS:

(D) Molybdenite near Ramona, San Diego County, Cal., by F. C. Calkins (published July 8, 1916)............................................................. 73

(D) An occurrence of nickel ore in San Diego County, Cal., by F. C. Calkins (published July 8, 1916)...................................................... 77

(G) Tin ore in northern Lander County, Nev., by Adolph Knopf (published Sept. 8, 1916)................................................................. 125

(L) Tungsten deposits of northern Inyo County, Cal., by Adolph Knopf (published Jan. 26, 1917)............................................................. 229

MISCELLANEOUS:

(C) Some manganese mines in Virginia and Maryland, by D. F. Hewett (published June 22, 1916)............................................................ 37

(H) Gypsum in the southern part of the Bighorn Mountains, Wyo., by C. T. Lupton and D. D. Condit (published Nov. 29, 1916).............. 139

(K) The Garrison and Philipsburg phosphate fields, Mont., by J. T. Pardee (published Jan. 20, 1917)............................................................ 195

INDEX ........................................................................... 251

III
ILLUSTRATIONS.

PLATE I. Topographic and reconnaissance geologic map of the Conconully and Ruby districts, Wash .......................................................... 34
II. Geologic map of the Boise Basin, Idaho ......................................................... 84
III. Map showing outcrops of gypsum-bearing formations in southern part of Bighorn Mountains, Wyo .................................................. 140
IV. Sections of Embar formation at Bighorn River canyon, head of No Wood Creek, Sheep Mountain anticline, and Tensleep Canyon, Wyo .............................................................. 144
V. Sections of gypsum beds in Chugwater and Embar formations, Wyo. 146
VI. Geologic map of the Manhattan district, Nev .................................................. 168
VII. Map of the productive portion of Manhattan Gulch, Nev .......................... 178
VIII. Geologic map of the Garrison phosphate field, Montana .................. 206
IX. Map showing distribution of phosphate lands in the western United States ................................................................. 210

FIGURE 1. Index map showing location of Promonotory district, Utah ........ 2
2. Section showing stratigraphic succession of sedimentary rocks in a portion of the Promontory district, Utah ........................................ 5
3. Index map showing location of the Conconully and Ruby mining districts, Wash .............................................................. 13
4. Map showing location of manganese deposits in Virginia and Maryland ................................................................. 38
5. Sketch map showing location of the workings of the Piedmont mine, Campbell County, Va ............................................................. 50
6. Map showing principal underground workings of the Piedmont mine, Campbell County, Va ............................................................. 53
7. Sketch map showing location of the workings of the Midvale mine, Rockbridge County, Va ............................................................. 55
8. Plan of the principal underground workings of the Midvale mine, Rockbridge County, Va ............................................................. 57
9. Sketch map showing location of the workings of the Kendall & Flick mine, near Elkton, Rockingham County, Va ............................................................. 62
10. Plan and cross sections of the Niesswaner shaft, Kendall & Flick mine, near Elkton, Rockingham County, Va ............................................................. 65
11. Map showing location of aplite dikes and molybdenum prospect near Ramona, San Diego County, Cal ............................................................. 73
12. Sketch map of principal workings of Friday mine, near Julian, San Diego County, Cal ............................................................. 80
13. Geologic map of Golden Arrow, Nev., and vicinity ......................................................... 114
14. Section across Kawich Range 24 miles north of Kawich, Nev ........ 115
15. Map showing geologic relations in vicinity of mines at Golden Arrow, Nev ............................................................. 116
16. Geologic sections on lines indicated in figure 15 ......................................................... 117
17. Map of the tin-bearing area in northern Lander County, Nev., and vicinity .............................. 126
VI ILLUSTRATIONS.

Figure 18. Map of part of central Nevada, showing the location of the Manhattan district ................................................. 165
19. Curve showing variations in fineness in placer gold of Manhattan district, Nev ................................................. 186
20. Index map showing location of Garrison and Philipsburg phosphate fields, Mont .................................................. 195
21. Map showing relation of the Garrison and Philipsburg phosphate fields, Mont., to the Philipsburg quadrangle ............. 196
22. Profile and sections along phosphate bed east of East Brock Creek, Garrison field, Mont ...................................... 222
23. Map of the tungsten-bearing area in northwestern Inyo County, Cal., and vicinity ................................................. 230
24. Diagrammatic sections showing the relation of the metamorphic sedimentary rocks and ore bodies to the intrusive granite-rocks of the Tungsten Hills, Cal ................................................. 235
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."

<table>
<thead>
<tr>
<th>Date in title</th>
<th>Date of publication</th>
<th>Bulletin No.</th>
<th>Date in title</th>
<th>Date of publication</th>
<th>Bulletin No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1902</td>
<td>1903</td>
<td>213</td>
<td>1910, Part I.</td>
<td>1911</td>
<td>470</td>
</tr>
<tr>
<td>1903</td>
<td>1904</td>
<td>225</td>
<td>Part II</td>
<td>1912</td>
<td>471</td>
</tr>
<tr>
<td>1904</td>
<td>1905</td>
<td>260</td>
<td>Part I</td>
<td>1913</td>
<td>530</td>
</tr>
<tr>
<td>1905</td>
<td>1906</td>
<td>285</td>
<td>Part II</td>
<td>1913</td>
<td>531</td>
</tr>
<tr>
<td>1906, Part I</td>
<td>1907</td>
<td>315</td>
<td>1912, Part I.</td>
<td>1914</td>
<td>540</td>
</tr>
<tr>
<td>1907, Part I</td>
<td>1908</td>
<td>340</td>
<td>Part I</td>
<td>1914</td>
<td>541</td>
</tr>
<tr>
<td>1908, Part I</td>
<td>1909</td>
<td>341</td>
<td>Part II</td>
<td>1915</td>
<td>581</td>
</tr>
<tr>
<td>1909, Part I</td>
<td>1910</td>
<td>381</td>
<td>Part I</td>
<td>1916</td>
<td>620</td>
</tr>
<tr>
<td>1910, Part I</td>
<td>1911</td>
<td>430</td>
<td>1916, Part I</td>
<td>1917</td>
<td>640</td>
</tr>
<tr>
<td>Part II</td>
<td>1911</td>
<td>431</td>
<td>Part II</td>
<td>1917</td>
<td>641</td>
</tr>
</tbody>
</table>

* 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.