

**ELEMENTS OF
ENGINEERING GEOLOGY**

WORKS OF PROFESSOR H. RIES

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ELEMENTS OF ENGINEERING GEOLOGY

By

H. RIES, Ph.D.

PROFESSOR OF GEOLOGY EMERITUS
CORNELL UNIVERSITY

AND

• THOMAS L. WATSON, Ph.D.

LATE PROFESSOR OF GEOLOGY, UNIVERSITY OF VIRGINIA
AND STATE GEOLOGIST OF VIRGINIA

SECOND EDITION ~~REVISED~~

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Preface to Second Edition, Revised

The general plan of this work remains the same, but portions have been rewritten and additional matter incorporated.

The tables of references have also been revised.

Ithaca, N. Y.
December 1946

Preface to Second Edition

The chief changes which have been made in this edition, are the inclusion of two new chapters. One of these on the geology of reservoirs and dam sites represents a branch of engineering geology that has assumed such importance as to warrant special attention. The other, which treats the subject of historic geology briefly, has been added to the book in response to numerous requests.

In addition a number of references have been added to the different chapters.

Ithaca, N. Y.
October 1930

Preface

The importance of geology to engineering is constantly receiving wider and stronger recognition, for it is realized that whatever line of work the engineer is engaged in, whether highway construction, tunneling, quarrying, river and harbor improvement, water supply, mining, etc., he is almost certain to encounter problems of a geologic character. Indeed, during the late European war, the importance of engineering geology to military operations came to be widely though tardily recognized. There has thus naturally developed an increased demand for instruction in geology as applied to engineering. The aim has been, therefore, to emphasize the practical application of the subjects treated in this volume to engineering work.

This volume is more than a condensation and simplification of a larger text book, *Engineering Geology*, published by the authors in 1914, since it has involved complete rewriting of many parts of the larger book and the amplification of other parts. Although *Engineering Geology* has met with a very gratifying reception, there are many institutions that desire a smaller volume to meet the requirements of a briefer course. It was to meet this demand that the present book was prepared.

Ithaca, N. Y., and Charlottesville, Va.
January 1, 1921

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GEOLOGICAL SURVEYS

In the preceding pages of this book reference has been made, from time to time, to reports published by state and national geological surveys. Many of these and others not mentioned, as well as geologic maps, can be obtained on application to the director or state geologist who also frequently can furnish engineers with information regarding local geologic details in their territory; hence we give herewith a list of the national, state, and provincial (Canada) geological surveys, together with the name of the official in charge at the present time.

UNITED STATES

- U. S. Geol. Survey, Washington, D. C.; W. E. Wrather, Director.
U. S. Bur. Mines, Washington, D. C.; R. R. Sayers, Director.
Alabama. Geol. Survey Alabama; Walter B. Jones, State Geologist, Tuscaloosa.
Arizona. Ariz. Bur. Mines; T. G. Chapman, Director, Tucson.
Arkansas. Arkansas Geol. Survey; H. B. Foxhall, State Geologist, Little Rock.
California. Div. Mines, Dept. Natural Resources; O. P. Jenkins, Chief, Division of Mines.
Colorado. Colo. Geol. Survey Board; Ben H. Parker, Secretary, Denver.
Connecticut. Conn. Geol. & Natural Hist. Survey; Edward L. Troxell, Superintendent, Hartford.
Delaware. No geological survey.
Florida. Florida State Board Conservation, Florida Geological Survey; Herman Gunter, Director, Tallahassee.
Georgia. Div. Mines, Min. & Geol., Dept. Natural Resources; Garland Peyton, Director.
Idaho. State Bur. Mines & Geol.; W. Fahrenwald, Director, Moscow.
Illinois. State Geol. Survey Div., Dept. Registration & Education; M. M. Leighton, Chief, Urbana.
Indiana. Div. Geol., Dept. Conservation; Chas. Deiss, State Geologist, Indianapolis.
Iowa. Iowa Geol. Survey; A. C. Trowbridge, Director and State Geologist, Iowa City.
Kansas. State Geol. Survey, Kansas; Raymond C. Moore, Director and State Geologist, Lawrence.
Kentucky. State Dept. Mines & Minerals, Geol. Div.; D. J. Jones, State Geologist, Lexington.
Louisiana. Dept. Conservation, Louisiana Geol. Survey; James M. Cunningham, Acting State Geologist, Baton Rouge.
Maine. State Geol. Survey; J. M. Trefethen, State Geologist, Orono.
Maryland. Dept. Geol. Mines & Water Resources; Jos. T. Singewald, Jr., Director, Baltimore.

- Massachusetts.* No geological survey.
- Michigan.* Geol. Survey Div., Dept. of Conservation; J. E. Eddy, State Geologist, Lansing.
- Minnesota.* Minn. Geol. Survey; Frank F. Grout, Director, Minneapolis.
- Mississippi.* Miss. Geol. Survey; W. C. Morse, Director and State Geologist, University.
- Missouri.* Missouri Geol. Survey & Water Resources; Edward L. Clark, State Geologist, Rolla.
- Montana.* State Bur. Mines & Geol.; F. A. Thomson, Director, Butte.
- Nebraska.* Neb. Geol. Survey; G. E. Condra, Director, Lincoln.
- Nevada.* Nev. State Bur. Mines; J. A. Carpenter, Director, Reno.
- New Hampshire.* Min. Resources Committee, N. H. State Planning & Development Committees; T. R. Meyers, Geologist, Durham.
- New Jersey.* Div. Geol. & Topography, Dept. Conservation & Development; Meredith E. Johnson, State Geologist, Trenton.
- New Mexico.* N. Mex. Bur. Mines and Mineral Resources; E. C. Anderson, Director, Socorro.
- New York.* N. Y. Geol. Survey; State Museum, State Education Dept.; J. G. Broughton, Assistant State Geologist, Albany.
- North Carolina.* N. C. Dept. Conservation & Development, Div. Min. Resources; Jasper L. Stuckey, State Geologist, Raleigh.
- North Dakota.* N. Dakota Geol. Survey; Wilson M. Laird, State Geologist, Grand Forks.
- Ohio.* Geol. Survey of Ohio; Geo. W. White, State Geologist, Columbus.
- Oklahoma.* Oklahoma Geol. Survey; Robert H. Dott, Director, Norman.
- Oregon.* State Dept. Geol. & Min. Ind.; F. W. Libbey, Director, Portland.
- Pennsylvania.* Topographical & Geol. Survey, Dept. Internal Affairs; S. H. Cathcart, Director, Harrisburg.
- Rhode Island.* No geological survey.
- South Carolina.* S. C. Geol. Survey; Stephen Taber, State Geologist, Columbia.
- South Dakota.* State Geol. Survey; E. P. Rothrock, State Geologist, Vermillion.
- Tennessee.* Div. Geol., Dept. Conservation; H. B. Burwell, State Geologist and Director, Nashville.
- Texas.* Bureau Econ. Geol., Univ. Texas; J. T. Lonsdale, Director, Austin.
- Utah.* No geological survey.
- Vermont.* Vt. Geol. Survey; E. C. Jacobs, State Geologist, Burlington.
- Virginia.* Virginia Geol. Survey; Arthur Bevan, State Geologist, Charlottesville.
- Washington.* Div. Mines and Geology; Sheldon L. Glover, Supervisor, Olympia.
- West Virginia.* West Va. Geol. & Econ. Survey; Paul H. Price, State Geologist, Morgantown.
- Wisconsin.* Wisconsin Geol. & Natl. Hist. Survey; E. F. Bean, State Geologist, Madison.
- Wyoming.* Geol. Survey Wyo.; Horace D. Thomas, State Geologist, Laramie.

CANADA

- Federal Dept. Mines & Resources, Ottawa; C. S. Parsons, Director Mines and Geology Branch.
- Alberta.* Research Council, Alberta, N. E. Tanner, Minister of Lands and Mines, Edmonton.

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British Columbia. Dept. Mines; J. F. Wallace, Deputy Minister of Mines, Victoria.

Manitoba. Dept. Mines; Geo. E. Cole, Director, Winnipeg.

New Brunswick. Dept. Lands & Mines; W. J. Wright, Provincial Geologist, Fredericton.

Newfoundland. Newfoundland Geol. Survey; Claude K. Howse, Geologist, St. Johns.

Nova Scotia. Dept. Mines; L. D. Currie, Minister, Halifax.

Ontario. Dept. Lands & Mines; M. E. Hurst, Provincial Geologist, Toronto.

Quebec. Dept. Mines, Div. Geol. Survey; J. W. Jones, Chief, Quebec.

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