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## RELIEF FROM FLOODS

Reviewed by W. H. Breithaupt, C.E.

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By John W. Alvord and Charles B. Burdick. Published by the McGraw-Hill Book Company, Inc., New York. First edition, 1918. 175 pages, 22 tables, 54 figures, 6 x 9 ins., cloth. Price, \$2 net.

In the past number of years there has appeared a large bulk of literature on the question of flood relief. The exhaustive report of the Pittsburg commission on regulation of the Allegheny and Monongahela rivers in 1911, numerous reports of State commissions, notably the New York State reports since 1913, the Ohio flood reports, and many others. This book, while giving more attention to the Ohio problems, is a general compendium, aimed somewhat at the general public, but a good book for the engineer. It has good illustrations and instructive diagrams and tables.

The frequent reference to Ohio floods the authors frankly explain on the ground that this is their particular field. The enormous flood losses in the United States since 1900 are emphasized and particularly those in Ohio. Factors affecting stream flow and floods are precipitation, character of water-shed and climate. The wide variation, depending on topography and condition of surface, on sub-soil conditions and on saturation of the ground, is discussed.

Forestation, while no doubt of not much effect in many cases, is rather underestimated by the authors as to its effect on particular rivers as combined with topography and climate; as, for instance, with snowfall in northern climates.

In chapter 2, means for flood relief are discussed. These consist of flood prevention, flood protection, and flood diversion. In the United States no large detention basins have so far been built primarily for flood protection. There are many for conservation of municipal water supply. A detention basin is defined as a dam across a river valley having in its base an opening large enough to pass the channel capacity of the river below it. River control by means of levees is an old practice, as are also dykes protecting low lands on the sea-shore. The French were practically first in Europe in the art of river control by storage. Two dams on the Loire date from 1711. In Germany and Austria such work has been particularly extensive since 1900. A table is given of storage dams in France, Germany and Austria. The largest artificial storage reservoirs in Europe are in Russia, on the Volga and Meta Rivers. There are also considerable works of this kind in Spain. In the United States the largest capacity reservoirs are those on the headwaters of the Mississippi River, with capacity of 96 million cubic feet. These reservoirs have been effective in improving the low-water stage at St. Paul by 14 inches. The Ottawa River water storage, still under way, will be of larger capacity, and less cost than that on the Mississippi. A table is given of recommended reservoirs on the Allegheny and the Monongahela water-sheds.

In the Ottawa River project, and again in tables, pp. 133 and 153, reservoir capacity is given in acre-feet. The term "acre-feet" pertains, properly, to irrigation projects only. As applied to storage capacity in general this term is involved and to that extent confusing.

Chapter 3 discusses flood investigations and the importance of comprehensive exposition to the public.

Chapter 4 further discusses flood investigation, under three heads—Values and Losses, Topographical and General Physical Condition of the Water-shed, and Hydrology; annual flood losses, what territory can be profitably included in a protection project, rainfall records and stream flow, rating curves, etc. The Ohio River is in the path of most of the great rainstorms in Central North America.

Chapter 5 treats of probable magnitude of greatest floods to be provided for in relief works, discusses Kuichling's data and formulæ and the comparison ratios suggested by W. E. Fuller. A map of the United States is given showing mean annual flood coefficients.

In Chapter 6 flood protection by channel improvement is considered, under the methods of levee construction and channel betterment, and by cut-offs. Any such channel improvement delivers the water more rapidly to the river below and is therefore to that extent objectionable. In channel improvements it is necessary to observe the limiting velocity, to prevent scour. The protection afforded by sod on flooded areas is illustrated, and varieties of channels and conduits are discussed.

Chapter 7 deals with flood prevention by water-storage, distribution of stream flow, incidental storage, and storage for floods; the location and required capacity of flood reservoirs; detention basins and their automatic operation, spillways, outlets and drift barriers. The Dayton detention basins and the proposed works for the Scioto River are described. A final conclusion is that local conditions must govern the particular type of relief best adapted.

An appendix gives a comprehensive and valuable table of great floods in the United States, with record period of from 10 to 70 years, drainage areas, maximum and average annual floods and their ratios.

The book has a good index.

## WHAT INDUSTRY OWES TO CHEMICAL SCIENCE

Reviewed by L. J. Rogers

Canadian Inspection and Testing Co., Toronto

By Richard B. Pilcher and Frank Butler-Jones. Published by Constable & Co., Limited, London. 150 pages, 5 x 7½ ins., cloth. Price, \$1 net.

The authors deal with the great advancement made in industry in the last century, and indicate the manner in which chemistry has brought about changes. Possibly the most noteworthy of these are the steel and dye industry. "Experience accumulated slowly and at great cost had done great things, but the rate of progress in industry developed in the past century defies comparison with all the centuries combined since time was—so far as we know."