

May 24, 1917.

## WATER SUPPLY STANDARDS.\*

By William J. Orchard,

Sanitary Engineer, Wallace &amp; Tiernan Co., Inc.

**W**ATER supply standards may be divided into two classes, *viz.*, technical standards and non-technical standards. Technical standards may again be divided into two classes, *viz.*, official standards (formed by the promulgation of laws and regulations), and unofficial standards (which may be defined as those based on experience or current practice).

A résumé of legislation and the regulations of supervising health bodies indicates that the only definite technical standard that has officially been promulgated in the United States is that of the secretary of treasury, under date of October 21, 1914, being "A bacteriological standard of purity for drinking water supplied to the public by common carriers in interstate commerce."

From information available, it would appear that none of the state health departments have officially promulgated standards of purity, either bacteriologically or chemically. In many states, legislation exists prohibiting pollution of public water supplies, or the sources from which they are obtained. A few of the state health departments recognize the standards of the Treasury Department and aim to have all water supplies conform to these limits. Other state departments of health have official standards which are used as a means of guidance in interpretation of water analyses, most of these being bacteriological standards only.

Reports received from thirty-one state health departments indicate that thirteen states have laws protecting water supplies, but have not adopted any minimum chemical or bacteriological standards. Two states have laws protecting water supplies and have unofficially adopted United States Treasury standards. Nine states have laws protecting water supplies and have adopted tentative unofficial standards, while eight states have neither laws nor standards.

Unofficial or tentative standards that have been adopted by some of the state departments of health are of interest. A few examples are enumerated:—

**Minnesota.**—The Minnesota State Board of Health has not set any arbitrary standard for the purity of water. In interpretation of results, a water is not considered to be of good sanitary quality unless the bacteriological count for four days at 20° C. is less than 100 per c.c., and B. coli absent in 100 c.c. samples. This standard is subject to qualification under certain conditions. The Minnesota State Board of Health will not report on any water supply unless a thorough field investigation has been undertaken and unless samples have been collected by their own representatives. This phase of the situation is presented in a paper by H. A. Whittaker, director of the Division of Sanitation of the Minnesota State Board of Health, entitled "Fallacies in the Investigation of Water Supplies," which was presented before the engineering section of the American Public Health Association in October last.

**Alabama.**—The Alabama State Board of Health recognizes the standards adopted by the Treasury Department, allowing, however, a bacteriological count of 300 per c.c. after twenty-four hours' incubation at 37° C.

**Virginia.**—The State Board of Health of Virginia has not adopted any standards and in an interpretation of

analyses is largely governed by the particular conditions surrounding the source of supply, and even though a water derived from a protected watershed on which there is no habitation, might show coli in 1 c.c. and 10 c.c. samples, unless human contamination could be shown, the water supply might be considered as good. For the information of local authorities, however, the Virginia State Board of Health indicates on its standard report forms, the significance of bacteriological counts and B. coli interpretations, differentiating between bad, suspicious, or good supplies, as follows:—

"Where colon bacilli are found in quantities of 1 c.c. of water, the sample is dangerous, and is reported bad, regardless of the number of other bacteria found in the sample.

"Where colon bacilli are found in 10 c.c. or 20 c.c. of water, and the number of other bacteria is large, the sample is regarded as dangerous, and is reported bad.

"Where colon bacilli are found in 10 c.c. or 20 c.c. of water, and the number of other bacteria is small (less than 500 per c.c.) the specimen is classed as suspicious.

"Where colon bacilli are not found in samples, and where bacteria are less than 500 per c.c., the sample is reported good."

**Maryland.**—The State Department of Health of Maryland has not established any standards or limits on the quality of public water supplies, but certain standards have been recommended for filtration plants. These standards are quite novel and are based on the coefficient of efficiency which is defined as "the ratio of the logarithm of raw water count at 20° C. to the logarithm of the plant effluent count." For the removal of colon, the standards are based on a so-called "standard hygienic efficiency" which is defined as "The sum of the percentages obtained by allowing a value of 20 per cent. to each successive step in the colon removal." These standards are discussed in detail in a paper by Wolman, published in the American Journal of Public Health, November, 1916.

**Montana.**—The Montana Department of Health has adopted tentative chemical standards for the hygienic purity of waters, applicable to restricted areas in the state, and as a rule, only supplies that show no B. coli in 10 c.c. are recommended for public consumption.

**California.**—The California Bureau of Sanitary Engineering considers a supply in which B. coli cannot be confirmed in 10 c.c., by the latest laboratory methods, as being safe. The occasional occurrence of B. coli in the same quantity is not considered seriously, but their presence in 10 c.c. continuously, or in less than that amount occasionally, is not considered favorably. Condemnation is usually reserved for a field inspection to determine if possible what portion of the B. coli are of human origin.

**Iowa.**—Iowa presents the interesting situation where chemical standards adopted for the waters of the state several years ago, have been abandoned, following the collection of information showing their inadequacy.

A résumé of reports received from over thirty state health departments shows the varied interpretations placed on bacteriological analyses, and the relative importance given to sanitary survey of watersheds in conjunction with analyses.

If the standards of the U.S. Treasury Department must apply to all water supplies used in interstate traffic, and if, as experience has clearly shown, supplies used by railroads can conform to Treasury standards, the interesting contention is presented that all public water supplies should conform at least to this standard.

\*Paper read before the Chemical and Bacteriological Section of the American Water Works Association, May 10th, 1917.