

two documents, which are corollary, supply the needed information and recommended requirements as to the sanitation practices and standards suitable for evaluation of water and water supply systems required to maintain a physically, chemically, and bacteriologically safe water supply system. The methods of analysis that are acceptable are those set forth in the current edition of *Standard Methods for the Examination of Water and Sewage*.³

B. DRINKING AND CULINARY WATER

Water supplied in drinking fountains and food preparation centers of the plant must be safe, clean, potable, and cool. Safety of the water may be threatened by contamination with disease-producing organisms, chemical toxins, and, with their increasingly wide use, radioisotopes. Maximum permissible concentrations of radioisotopes in drinking water are set forth in the National Bureau of Standards *Handbook 52*.⁴ It should be borne in mind that the values given in this handbook for any isotope assume contamination by that isotope only. If the water is contaminated with several isotopes, then the maximum concentration of each isotope is proportionally reduced.

Drinking water should be maintained within the temperature range of 40 to 80° F. (optimal range is 45 to 50° F.). When cooling of the water is needed, it can be accomplished by mechanical refrigeration or by ice. When ice is used, it must not come in contact with the water since it can become a source of contamination.⁵

Most industrial plants have requirements for water of varying quality. In the majority of circumstances there is no need for these supplies to meet the high quality and bacteriological standards set for drinking and culinary water. The separate distribution and plumbing systems that convey this nonpotable water (any water supply not supervised as a drinking water supply must a priori be considered nonpotable) are potential health hazards and must not be used as a source of water for drinking purposes. The outlets provided on the nonpotable distribution systems should be posted plainly with permanently attached, durable signs indicating that the water is unfit for drinking, culinary, or ablutionary purposes.

A sanitary drinking fountain of approved design is the most efficient method of providing drinking water for employees. The American Standard Minimum Requirements for Sanitation in Places of Employment⁶ states that: "Sanitary drinking fountains shall be of a type and construction approved by the health

³ *Standard Methods for the Examination of Water and Sewage*. 10th ed., American Public Health Association, New York, 1955.

⁴ *Maximum Permissible Amounts of Radioisotopes in the Human Body and Maximum Permissible Concentrations in Air and Water*, Natl. Bur. Standards Handbook 52.

⁵ J. M. Dallavalle and R. R. Jones, Basic principles of industrial sanitation, *Am. J. Pub. Health*, 30, 369 (1940).

⁶ American Standard Minimum Requirements for Sanitation in Places of Employment, Z4.1-1955. American Standards Association, New York, 1955.

authorities having jurisdiction" (or meet local plumbing code requirements). New installations shall be constructed in accordance with the requirements of the health authorities having jurisdiction, or, if there are no such requirements, in accordance with American Standard Specifications for Drinking Fountains, Z4.2-1942, or the latest revision thereof approved by the American Standards Association, Incorporated.⁷ In order to keep refrigeration needs to a minimum, individual disposable drinking cups may be provided. Whenever it is not feasible to provide a drinking fountain connected to the supply, an approved drinking water container with an approved fountain or individual disposable cups should be provided. In general, location of fountains may be determined by an over-all standard of one drinking fountain for each 50 employees. However, the distance the employee must travel to the nearest source may be a controlling factor in locating drinking water sources. (The Z4.1-1955 American Standard⁶ requires that this distance be no more than 200 feet.) Similarly, wherever the employees are subjected to above-normal heat stress, this fact should be the controlling criterion for the location of a drinking water source.

In a few industries salt has been added to the drinking water supply to prevent heat exhaustion during the summer months. In one plant salt was added to the drinking water in one area starting in 1941 and was extended to the remainder of the drinking water in 1944. There has been a marked decrease in "heat sickness" since this program has been adopted. Acceptance by employees has been good. There were numerous complaints when the program was inaugurated and normally there are some calls in the late spring, when salinization is started. However, the concentration of salt does not exceed 0.1 per cent (1,000 p.p.m.), and when the units are started up in the spring, the concentration is gradually increased, taking about two to three weeks to reach the maximum concentration. This practice, together with more general use of water coolers, has reduced complaints to a very low point. The equipment at the salinizing stations consists of a brine tank, a metering device, and a proportioner. Grade A rock salt is purchased in 100-pound paper bags. It is charged into the brine tank daily, and a saturated solution is maintained in the tank. The solution is drawn from the tank and injected into the drinking water feed line by means of the proportioner and a fixed percentage of salt is maintained in the water line throughout its length.⁷

C. WATER USES IN INDUSTRY

The phenomenal growth and diversification of industrial production during the past half-century have brought a need for large quantities of water of varying quality. Illustrative of this complex water demand is one chemical plant that had developed five separate water systems to meet its manufacturing and employee needs. In general, water used in industry may be classified under eight headings:⁸

⁷ W. T. McCormick, personal communication.

⁸ K. MacKichan, Estimated use of water in the United States, *U. S. Geol. Survey Circ.* No. 1115, May, 1951.