**National Safety Council**
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# Drinking water on construction jobs

Adequate supply of Potable drinking water shall be provided.

2. Drinking water on construction sites should be obtained and handled with care to prevent contamination. Polluted sources or improper control of storage or distribution, including the means used in dispensing water to workers, can lead to a number of communicable diseases.

3. What hazards may be encountered? And what precautions should be taken in supplying drinking water on construction jobs? These and other questions concerning potable water are discussed in this data sheet, along with further recommended procedures to avoid physical illness.

4. Water from a polluted source is frequently responsible for the spread of diseases such as typhoid, cholera and dysentery. Tuberculosis, diphtheria and tonsillitis may be spread not by the water itself, but by drinking devices contaminated by mouth secretions of those carrying the germs of these diseases. Many other diseases including the common cold, influenza and cerebrospinal meningitis may likewise be transmitted.

## Sources of supply

5. The most desirable source of drinking water is a public system approved by the area health authorities having jurisdiction. In most areas bottled water meeting drinking water purity criteria is now available.

6. Alternative sources of drinking water require the employer to ensure the bacteriological, chemical and physical qualities of water meet the standards of the U.S. Public Health Service and those of local and state boards of health. The accompanying tables list the limiting concentration of contaminants in drinking water and the recommended control limits for fluoride.

7. Local health authorities always should be consulted and their approval obtained before using springs or wells as a water source. Water from those sources always should be considered dangerous until treated or otherwise proved safe.

8. All convenient supply sources should be inspected before employees arrive on a job site. Any source found unsafe should be eliminated or made inaccessible. Warning signs should not be considered sufficient protection.

## Testing and treatment

9. The use of other-than-approved public water systems may require testing and treatment procedures to meet health authority regulations.

10. An analysis of the water from each convenient source should be secured from the laboratory of the state board of health having jurisdiction. Samples should be collected only in laboratory-supplied bottles, and sampling techniques should conform to laboratory-issued instructions. Treatment required will be indicated by the results of these tests. Personnel responsible for testing and treatment of potable water should be trained and competent as evidenced by a water operator's certificate from the state health department.

11. Local health department recommendations following analysis of water samples may call for a form of treatment, such as sedimentation, filtration, chlorination or a combination of these. The treatment should meet the recommendations of health authorities, and should comply with the latest standards set by the U.S. Public Health Service.

12. Chlorination should be provided as a minimum treatment to any water supply. This may be accomplished by means of either stationary or portable chlorinating

units, which may be set to proportion the dosage of chlorine automatically. The equipment should have a capacity of at least 50 percent greater than the highest expected dosage to be applied at any time. Manual control should be permitted only where flow is relatively constant and where an attendant is always on hand to effect the necessary changes promptly.

**13.** Where hypochlorite solutions are used for treatment, solutions of calcium or sodium hypochlorite should be prepared in separate mixing tanks, then diluted and allowed to settle before being withdrawn to the solution storage tank. Fresh calcium hypochlorite solutions should be prepared every four to five days unless properly alkalized with sodium carbonate.

**14.** Periodic analysis of water should be performed to disclose contamination, which may develop during operations (Figure 1). The recommendations of the local health authorities should be followed in respect to frequency of tests.

**15.** Regular residual chlorine tests of chlorinated water should be made. Samples should be taken from the distribution systems at regularly used faucets and fountains. Residual chlorine tests should be made as specified in the latest edition of *Standard Methods for the*

## Recommended limiting concentrations of contaminants in drinking water

| Undesireable substance | Concentrations above which water should not be used if other sources available (mg/L) | Dangerous substance | Concentrations above which water supply should be rejected (mg/L) |
|---|---|---|---|
| Alkyl benzene sulfonate | 0.5 | Arsenic | 0.05 |
| Arsenic | 0.05 | Barium | 1.0 |
| Chloride | 250 | Cadmium | 0.01 |
| Copper | 1 | Chromium (hexavalent) | 0.05 |
| Carbon chloroform extract | 0.2 | Cyanide | 0.2 |
| Cyanide | 0.01 | Endrain | 0.002 |
| Flouride | See Table below | Flouride | See Flouride Table |
| Iron | 0.3 | Lead | 0.05 |
| Manganese | 0.05 | Lindane | 0.004 |
| TN (Total Nitrogen) | 10 | Methoxychlor | 0.100 |
| Phenols | 0.001 | Selenium | 0.01 |
| Sulfate | 250 | Silver | 0.05 |
| Total disolved solids | 500 | Toxaphene | 0.005 |
| Zinc | 5 | 2, 4, -D | 0.1 |
| | | 2, 4, 5, -TP-Silvex | 0.1 |

## Recommended control limits for fluoride in drinking water

| Max. Daily Air Temperature Five-Year Annual Average (deg. F) | Concentration (mg/L) | | |
|---|---|---|---|
| | Lower | Optimum | Upper |
| 50.0-53.7 | 0.9 | 1.2 | 1.7 |
| 53.8-58.3 | 0.8 | 1.1 | 1.5 |
| 58.4-63.8 | 0.8 | 1.0 | 1.3 |
| 63.9-70.6 | 0.7 | 0.9 | 1.2 |
| 70.7-79.2 | 0.7 | 0.8 | 1.0 |
| 79.3-90.5 | 0.6 | 0.7 | 0.8 |

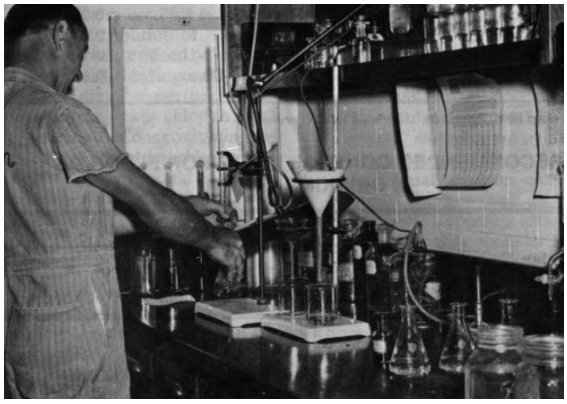

**Figure 1** shows a water sample in the process of being analyzed. Periodic laboratory tests are needed to determine the quality of both source water and treated water.
*(Courtesy Olin Industries Inc.)*

*Examination of Water and Sewage,* published jointly by the American Public Health Association and the American Water Works Association, or follow instructions from any manufacturer of this equipment. These tests make it possible to keep chlorine input at the minimum consistent with safety. Over-chlorination results in objectionable taste, and may cause workers to seek other sources of drinking water.

**16.** Chemicals in tablet or capsule form, under various trade names, are available for the chlorination of small quantities of water. The manufacturer's directions as to quantity and the waiting period before using the water should be followed.

*Note: This method is intended for use only in isolated localities and where water comes from sources of unknown quality. It should be used only in a static tank or container, not where supply is subject to change without replenishing the chemical.*

**17.** Boiling water for 20-30 minutes is an effective substitute for chlorination. It has the advantage of requiring no technical experience or special equipment, and requires only the facilities for storing during the cooling period.

*Note: The information cited here is intended for general information, but in all cases where chlorinators are used, the manufacturer's instructions should be carefully followed.*

## Distribution

**18.** Storage tanks, reservoirs or other containers in which water is stored should be closed tightly to prevent contamination.

**19.** All pipelines and other parts of the distribution system should be chlorinated for disinfection purposes before water passing through them is used for drinking.

**20.** Containers used for transportation and distribution of drinking water should be sterilized before use and periodically during use. (This treatment may be performed by steam sterilizing or by chlorinating.) Commercial solutions containing sodium or calcium hypochlorite are available, and should be used in accordance with the manufacturer's instructions.

## Dispensing

**21.** Sometimes portable containers are the only practicable means of providing drinking water in out-of-the-way places (See Figure 2). Using an open bucket should not be permitted. However, regardless of container type, a common cup or dipper should not be used, nor should employees be allowed to drink directly from a container. A chlorine residual should be maintained within the drinking water at all times.

**22.** Listed here are some of the accepted methods of dispensing water:

a. Fully enclosed water buckets with spigots at the bottom
b. Metal jugs with suitable carrying handles
c. Portable dispensers with closed-water compartments, spigots at the bottom and two additional, separate compartments for new and used paper cups.
d. A portable fountain consisting of an air-tight water compartment (usually insu-

lated to keep water cool for several hours), an angle jet drinking attachment and a hand-operated air pump for supplying pressure (a safety valve should be installed to relieve excessive pressure). Secure lid (tamper proof) marked as daily supply.

**23.** A supply of paper cups in a dispenser should be located at each water point. Trash receptacles also should be available for disposal of used cups.

**24.** Portable containers should be thoroughly cleaned daily and sterilized frequently (not less than once per week).

**25.** Where public water is available at a building construction site, a water line can sometimes be extended to upper floors as the building is erected. On each floor, a standard fountain can be installed. Full details concerning drinking fountains are given in ANSI standards. Such installations should be approved by local authorities.

**26.** Personnel assigned to water replenishment should be thoroughly instructed in the need for cleanliness and sanitation. They should be given specific instructions regarding the location of approved places from which drinking water may be secured. It is advisable that these employees be subject to the same physical examination program commonly applied to food handlers. Records of all training programs, inspections and water treatment operations may be required for state health departments, OSHA and any other regulatory bodies involved.

**27.** Water should be served at temperatures between 45° F and 50° F. However, in occupations where employees are exposed to high temperatures, 50° F to 55° F is safer.

**28.** Placing ice directly in the water for cooling may result in contamination. Ice used for cooling water by direct contact should be manufactured by a vendor and have the approval of the local health department. The ice also should be kept from becoming contaminated and should be considered food.

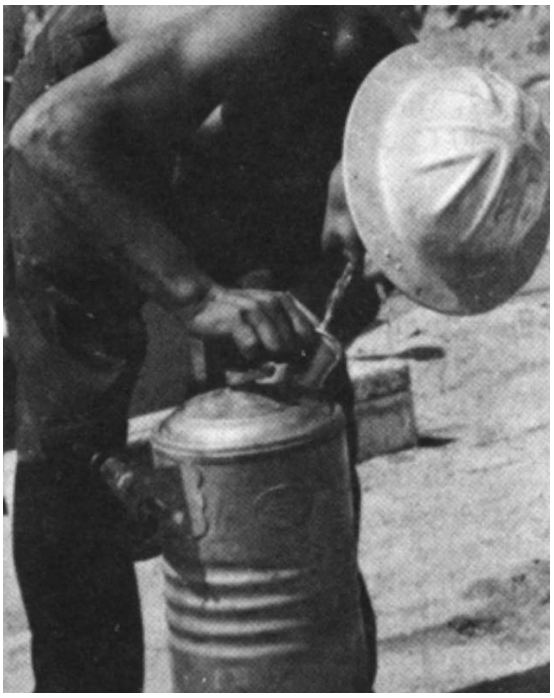

**Figure 2** shows a worker using a portable drinking container, which was supplied at the job site by the contractor.

**29.** Outlets for non-potable water systems that may exist on the jobsite require signs posted at each outlet to warn employees the water is not to be used for drinking.

## Acknowledgment

This data sheet was revised by the Construction Division of the National Safety Council, 1121 Spring Lake Drive, Itasca, IL 60143.

## Sources of information

American National Standards Institute, 1819 L Street, NW, 6th Floor Washington, DC 20036: *Drinking-Fountains and Self-Contained, Mechanically- Refrigerated Drinking-Water Coolers,* A112.11.1.

"Industrial Sanitation and Personnel Facilities," Chapter 18, *"Accident Prevention Manual for Industrial Operations, Administrations and Programs,"* National Safety Council.

Regulations promulgated under *Safe Drinking Water Act,* PL93-523, published in the *Federal Register* Vol.

42., No. 62, March 31, 1977. Republished in Title 40 Code of *Federal Register* Part 141.

U.S. Department of Labor, OSHA, *Code of Federal Regulations,* Title 29 – Labor – Part 1926, "Construction Safety and Health Standards," available from The Superintendent of Documents, Government Printing Office, Washington, DC 20402.



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