

DEPARTMENT OF THE NAVY
Bureau of Medicine and Surgery
Washington 25, D.C.

BUMED 6240.3B
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30 September 1963

BUMED INSTRUCTION 6240.3B

From: Chief, Bureau of Medicine and Surgery
To: All Ships and Stations

Subj: Standards for potable water

Ref: (a) ONMINST 5711.9 dated 16 May 1958
(NOTAL)
(b) BUMEDINST 5711.2 dated 30 January
1959 (NOTAL)

1. **Purpose.** To establish standards for water for drinking and culinary purposes throughout the Naval Establishment.

2. **Cancellation.** BUMED Instruction 6240.3A is canceled.

3. **Background**

a. **Policy.** The Department of Defense has established the policy of compliance by the Military Departments with United States Public Health Service Drinking Water Standards, as may be modified by the Medical Services of the Departments, or as may be modified by competent authority for purposes of international agreement.

b. **International agreement.** Naval Tripartite Standardization Agreement ABC-NAVY-STD-23 was promulgated by references (a) and (b). The object of the agreement is to provide the United States Navy, the Royal Navy, and the Royal Canadian Navy assurance that drinking and culinary water delivered to each other's ships from installations under their cognizance meets certain minimum standards of quality.

4. **Quality Standards.** The standards for bacteriological quality, physical and chemical characteristics, and radioactivity shall be those in "Public Health Service Drinking Water Standards, 1962." Department of Health, Education, and Welfare. The Standards, as modified, may be found in NAVMED P-5010-5, "Water Supply Ashore," available through the Navy Supply System.

5. **Definition of Terms.** The following terms are defined for clarification in interpretation of standards:

a. **Adequate protection by natural means** involves one or more of the following processes of nature that produce water consistently meeting the requirements of these Standards: dilution,

storage, sedimentation, sunlight, aeration, and the associated physical and biological processes which tend to accomplish natural purification in surface waters and, in the case of ground waters, the natural purification of water by infiltration through soil and percolation through underlying material and storage below the ground water table.

b. **Adequate protection by treatment** means any one or any combination of the controlled processes of coagulation, sedimentation, absorption, filtration, disinfection, or other processes which produce a water consistently meeting the requirements of these standards. This protection also includes processes which are appropriate to the source of supply; works which are of adequate capacity to meet maximum demands without creating health hazards, and which are located, designed, and constructed to eliminate or prevent pollution; and conscientious operation by well-trained and competent personnel whose qualifications are commensurate with the responsibilities of the position.

c. **The coliform group** includes all organisms considered in the coliform group as set forth in Standard Methods for the Examination of Water and Wastewater, current edition, prepared and published jointly by the American Public Health Association, American Water Works Association, and Water Pollution Control Federation.

d. **Health hazards** mean any conditions, devices, or practices in the water supply system and its operation which create, or may create, a danger to the health and well-being of the water consumer. An example of a health hazard is a structural defect in the water supply system, whether of location, design, or construction, which may regularly or occasionally prevent satisfactory purification of the water supply or cause it to be polluted from extraneous sources.

e. **Pollution**, as used in these Standards, means the presence of any foreign substance (organic, inorganic, radiological, or biological) in water which tends to degrade its quality so as to constitute a hazard or impair the usefulness of the water.

f. **The standard sample** for the bacteriological test shall consist of:

(1) For the bacteriological fermentation tube test, five standard portions of either:

- (a) 10 milliliters
- (b) 100 milliliters

Cancelled by - JCO of 8/25/72

BUMEDINST 6240.3B
30 September 1963

(2) For the membrane filter technique, not less than 50 milliliters.

g. Water supply system includes the works and auxiliaries for collection, treatment, storage, and distribution of the water from the sources of supply to the freeflowing outlet of the ultimate consumer.

6. Source and Protection

a. The water supply should be obtained from the most desirable source which is feasible, and effort should be made to prevent or control pollution of the source. If the source is not adequately protected by natural means, the supply shall be adequately protected by treatment.

b. Frequent sanitary surveys shall be made of the water supply system to locate and identify health hazards which might exist in the system.

c. Approval of water supplies shall be dependent in part upon:

(1) Enforcement of rules and regulations to prevent development of health hazards:

(2) Adequate protection of the water quality throughout all parts of the system, as demonstrated by frequent surveys;

(3) Proper operation of the water supply system under the responsible charge of personnel whose qualifications are acceptable to the Bureau of Yards and Docks or the Bureau of Ships, as appropriate;

(4) Adequate capacity to meet peak demands without development of low pressures or other health hazards; and

(5) Record of laboratory examinations showing consistent compliance with the water quality requirements of these Standards.

7. Standards. The limits listed below are generally those contained in "Public Health Service Drinking Water Standards, 1962." For sampling procedures and techniques, refer to NAVMED P-5010-5.

a. **Bacteriological quality: limits.** The presence of organisms of the coliform group as indicated by samples examined shall not exceed the following limits:

(1) When 10 ml. standard portions are examined, not more than 10 percent in any month shall show the presence of the coliform group.

The presence of the coliform group in three or more 10 ml. portions of a standard sample shall not be allowable if this occurs:

- (a) In two consecutive samples;
- (b) In more than one sample per month when less than 20 are examined per month; or
- (c) In more than five percent of the samples when 20 or more are examined per month.

When organisms of the coliform group occur in three or more of the 10 ml. portions of a single standard sample, daily samples from the same sampling point shall be collected promptly and examined until the results obtained from at least two consecutive samples show the water to be of satisfactory quality.

(2) When 100 ml. standard portions are examined, not more than 60 percent in any month shall show the presence of the coliform group. The presence of the coliform group in all five of the 100 ml. portions of a standard sample shall not be allowable if this occurs:

- (a) In two consecutive samples;
- (b) In more than one sample per month when less than five are examined per month; or
- (c) In more than 20 percent of the samples when five or more are examined per month.

When organisms of the coliform group occur in all five of the 100 ml. portions of a single standard sample, daily samples from the same sampling point shall be collected promptly and examined until the results obtained from at least two consecutive samples show the water to be of satisfactory quality.

(3) When the membrane filter technique is used, the arithmetic mean coliform density of all standard samples examined per month shall not exceed one per 100 ml. Coliform colonies per standard sample shall not exceed 3/50 ml., 4/100 ml., 7/200 ml., or 13/500 ml. in:

- (a) Two consecutive samples;
- (b) More than one standard sample when less than 20 are examined per month; or
- (c) More than five percent of the standard samples when 20 or more are examined per month.

When coliform colonies in a single standard sample exceed the above values, daily samples from the same sampling point shall be collected promptly and examined until the results obtained

from at least two consecutive samples show the water to be of satisfactory quality.

b. **Physical characteristics: limits.** Drinking water should contain no impurity which would cause offense to the sense of sight, taste, or smell. Under general use, the following limits should not be exceeded:

Turbidity-----	5 units
Color-----	15 units
Threshold Odor	
Number-----	3

c. **Chemical characteristics: limits.** Drinking water shall not contain impurities in concentrations which may be hazardous to the health of the consumers. It should not be excessively corrosive to the water supply system. Substances used in its treatment shall not remain in the water in concentrations greater than required by good practice. Substances which may have deleterious physiological effect, or for which physiological effects are not known, shall not be introduced into the system in a manner which would permit them to reach the consumer.

(1) The following chemical substances should not be present in a water supply in excess of the listed concentrations where, in the judgment of the Bureau of Yards and Docks and the Bureau of Medicine and Surgery, other more suitable supplies are or can be made available.

Substance	Concentration in mg/l (ppm)
Alkyl Benzene Sulfonate (ABS)	0.5
*Antimony (Sb)-----	0.01
Arsenic (As)-----	0.01
Chloride (Cl)-----	250.
Copper (Cu)-----	1.
Carbon Chloroform Extract (CCE)-----	0.2
Cyanide (CN)-----	0.01
Fluoride (F)-----	(See (3))
Iron (Fe)-----	0.3
Manganese (Mn)-----	0.05
Nitrate ¹ (NO ₃)-----	45.
Phenols-----	0.001
Sulfate (SO ₄)-----	250.
Total Dissolved Solids-----	500.
Zinc (Zn)-----	5.

¹ In areas in which the nitrate content of water is known to be in excess of the listed concentration, the public should be warned of the potential dangers of using the water for infant feeding.

* Not contained in Drinking Water Standards but this limit was determined by the Public Health Service and the Bureau of Medicine and Surgery.

(2) The presence of the following substances in excess of the concentrations listed shall constitute grounds for rejection of the supply:

Substance	Concentration in mg/l (pp)
*Antimony (Sb)-----	0.05
Arsenic (As)-----	0.05
Barium (Ba)-----	1.0
Cadmium (Cd)-----	0.01
Chromium (Hexavalent) (Cr+6)	0.05
Cyanide (CN)-----	0.2
Fluoride (F)-----	(See (3))
Lead (Pb)-----	0.05
Selenium (Se)-----	0.01
Silver (Ag)-----	0.05

* Not contained in Drinking Water Standards this limit was determined by the Public Health Service and the Bureau of Medicine and Surgery

(3) **Fluoride.** When fluoride is naturally present in drinking water, the concentration should not average more than the appropriate upper limit in the following Table I. Presence of fluoride in average concentrations greater than two times the optimum values in Table I shall constitute grounds for rejection of the supply. When fluoridation (supplementation of fluoride drinking water) is practiced, the average fluoride concentration shall be kept within the upper and lower control limits in Table I.

TABLE I

Annual average of maximum daily air temperatures ²	Recommended control limits--Fluoride concentrations in mg/l (ppm)		
	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

² Based on temperature data obtained for a minimum of five years.

d. **Radioactivity: limits.**

(1) The effects of human radiation exposure are viewed as harmful and any unnecessary exposure to ionizing radiation should be avoided.

BUMEDINST 6240.3B
30 September 1963

Approval of water supplies containing radioactive materials shall be based upon the judgment that the radioactivity intake from such water supplies when added to that from all other sources is not likely to result in an intake greater than the radiation protection guidance³ recommended by the Federal Radiation Council and approved by the President. Water supplies shall be approved without further consideration of other sources of radioactivity intake of Radium-226 and Strontium-90 when the water contains these substances in amounts not exceeding 3 and 10 $\mu\text{C}/\text{liter}$, respectively. When these concentrations are exceeded, a water supply shall be approved by the certifying authority if surveillance of total intakes of radioactivity from all sources indicates that such intakes are within the limits recommended by the Federal Radiation Council for control action.

(2) In the known absence⁴ of Strontium-90 and alpha emitters, the water supply is acceptable when the gross beta concentrations do not

³ The Federal Radiation Council, in its Memorandum for the President, Sept. 13, 1961, recommended that "Routine control of useful applications of radiation and atomic energy should be such that expected average exposures of suitable samples of an exposed population group will not exceed the upper value of Range II (20 $\mu\text{C}/\text{day}$ of Radium-226 and 200 $\mu\text{C}/\text{day}$ of Strontium-90)."

⁴ Absence is taken here to mean a negligibly small fraction of the above specific limits, where the limit for unidentified alpha emitters is taken as the listed limit for Radium-226.

exceed 1,000 $\mu\text{C}/\text{liter}$. Gross beta concentrations in excess of 1,000 $\mu\text{C}/\text{liter}$ shall be grounds for rejection of supply except when more complete analyses indicate that concentrations of nuclides are not likely to cause exposures greater than the Radiation Protection Guides as approved by the President on recommendation of the Federal Radiation Council.

8. Technical Assistance. Assistance with potable water problems may be requested from the following:

a. Preventive Medicine Units, in accordance with BUMED Instruction 6200.3A of 2 July 1957, Subj: U.S. Navy Preventive Medicine Units.

b. Bureau of Yards and Docks' Field Engineering Offices, in accordance with BUDOCKS Instruction 5450.19A of 21 September 1962, Subj: Sanitary Engineering Responsibilities of the Bureau of Yards and Docks Field Engineering Offices.

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