CHAPTER 1

GENERAL

1-1. Purpose and scope. This manual provides criteria for design and construction of potable water distribution systems for fixed military installations. Within the context of this manual, a water distribution system is considered to consist of all mains, service lines, valves, pumps, hydrants, and ancillary equipment needed to carry water from the source of potable water to the various points of use. Water distribution within an individual building or group of buildings is covered in TM 5-810-5/AFM 88-8, Volume 4. This manual is applicable to all elements of the Army or Air Force charged with planning or performing military construction.

1-2. Definitions. The following definitions, in addition to those given in paragraph 1-4, TM 5-813-1/AFM 88-10, Volume 1 are applicable to this manual.

a. Backflow. The flow of any foreign liquids, gases, or other substances into the distributing pipelines of a potable supply of water from any source or sources not intended.

b. Back-siphonage. The backing up, or siphoning, of a foreign liquid into a potable water system; this occurs when the potable water system, at any point or place, is at a pressure less than atmospheric, with an opening or break in the system, thereby drawing the foreign liquid toward the potable water.

c. Cross connection. Any physical connection which provides an opportunity for nonpotable water to contaminate potable water.

d. Distribution mains. All pipelines of the distribution system, except the small service pipes connecting building systems to the supply.

e. Transmission mains. Those pipelines or conduits which carry water from one point to another without intermediate service connections; e.g., pipelines from a pumping station to a reservoir.

1-3. System planning. The distribution system must reliably and economically supply water, in adequate quantities and at adequate pressures, to all water users. In order to plan or design a water distribution system, the location or point of demand must be known or assumed, and the magnitude of each demand known or estimated; water demands may then be categorized by purpose as domestic, industrial, special, or fire protection. Criteria for determining water demands are discussed in TM 5-813-1/AFM 88-10, Volume 1; AFM 88-10, Chapter 6; and TM 5-813-7/AFM 88-10, Volume 7. Criteria for sizing and locating water treatment plants and water storage facilities are presented in TM 5-813-3/AFM 88-10, Volume 3; and TM 5-813-4/AFM 88-10, Volume 4. Sizing of the water treatment plant, water storage facilities, distribution pumps, or distribution mains, is dependent on the size of the other parts of the system. It is not practical to size individual distribution mains without considering the other elements of the system. The effectiveness of any proposed combination of storage, pumping, and distribution works in meeting projected peak demands is best determined by hydraulic analyses of the system. Such hydraulic analyses, usually performed on digital computers, are very helpful to system planning.

1-4. Cross connections. (Cross connections and backflow prevention for Air Force facilities are defined in AFM 85-21).

a. Avoidance of cross connections. If fires are to be fought with both potable and nonpotable supplies, separate distribution systems must be used to deliver the two types of water to the required area. Hydrants or other connections for each system should be suitably identified to discourage improper use. Standby water reservoirs serving fire protection systems are sometimes filled from both potable and nonpotable supplies. If this is the case, the potable water shall be discharged to the reservoir through an air break not less than 12 inches above the maximum water level of the reservoir. In a similar manner, where potable water is to be used as gland seal on a pump handling nonpotable water, the potable water must be stored in a tank with an air gap between the end of the water supply line and the top of the tank. Special care must also be taken of such items as valve pits and water storage facilities to ensure that surface water runoff cannot enter potable water systems. Other situations that can result in back-siphonage are flexible hose having one end immersed in nonpotable water and the other end connected to a potable water hose bib, potable waterlines entering swimming pools

without air gaps, lawn irrigation systems with sprinkler heads flush with the ground, and improper connections at vehicle wash racks.

b. Prevention of backflow. Devices for the prevention of backflow include air gaps and reduced-pressure-principle backflow preventers. Air gap distances should be at least twice the diameter of the water supply line, and reduced-pressure-principle backflow prevention devices should meet the criteria of American Water Works Association (AWWA) C506 (See app A for references). Double check valves for backflow prevention are not considered suitable and should not be used. Back-siphonage can be prevented with air gaps, atmospheric-type vacuum breakers, or pressure-type vacuum breakers.