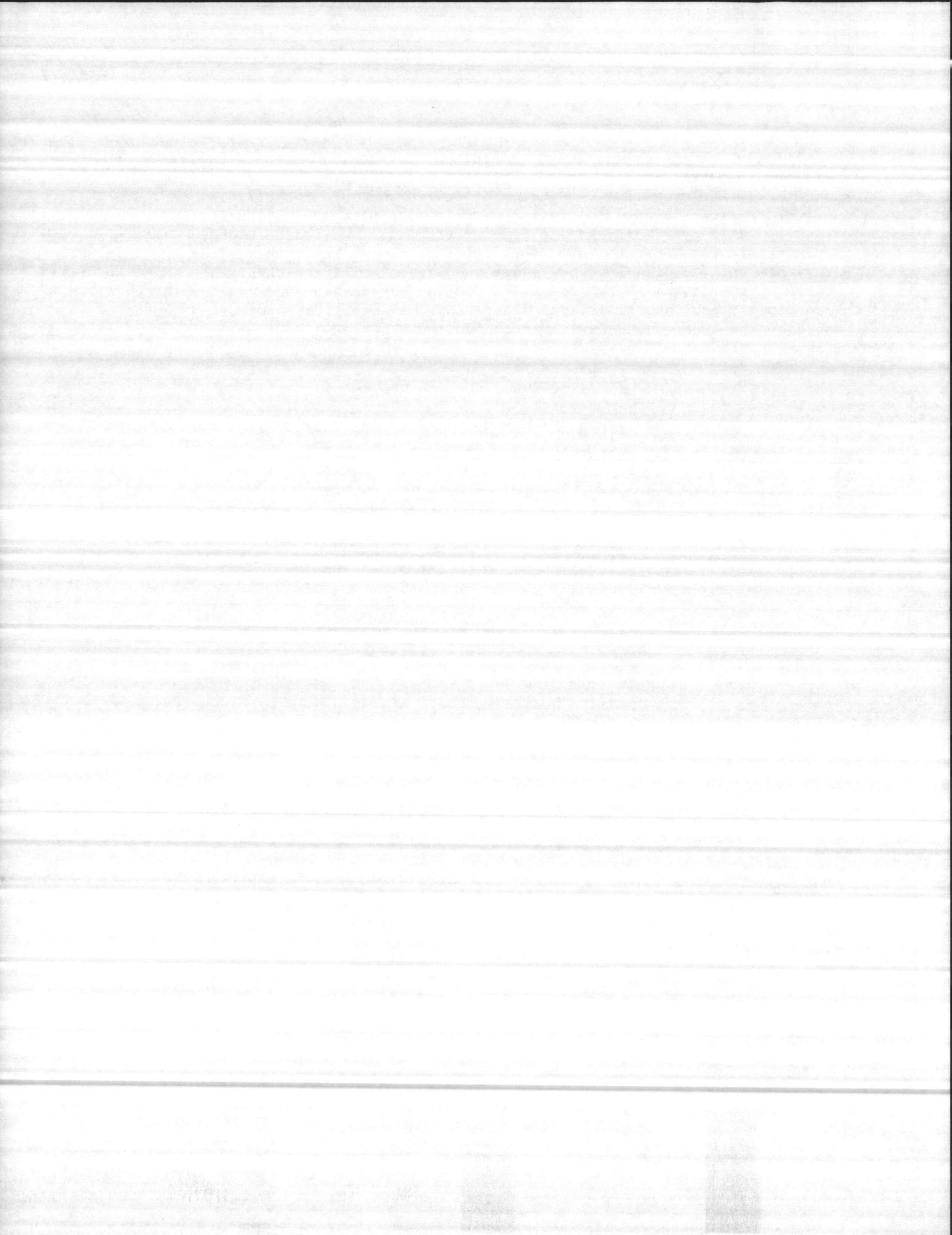


830 SEWAGE AND WASTE

Category group 830 provides for the disposition of all sewage and refuse by facilities for the collection, transportation, treatment, and disposal of sewage and industrial waste, and disposal of storm drainage water in storm and sanitary sewer systems. Components of sewage and refuse facilities include sewage treatment plants, outfall sewer lines, septic tanks, septic tank drain fields, sanitary sewers, sewage pumping stations, and incinerators. Certain industrial waste must be kept separate, and treated separately, from the sanitary sewage. In planning for sewage and waste facilities cognizance shall be taken of the Federal Water Pollution Control Act as amended, applicable to municipalities, industries, and others that may contribute to the pollution of surface and underground waters in the United States.



831 SEWAGE AND INDUSTRIAL WASTE, TREATMENT AND DISPOSAL

- 831 09 COMBINED SEWAGE AND INDUSTRIAL WASTE TREATMENT BUILDING (SF)
- 831 10 COMBINED SEWAGE AND INDUSTRIAL WASTE TREATMENT PLANT (KG)

The preferred method of sewage disposal is by discharge to a municipal or regional sewage system. Where this is not feasible, an on-station sanitary sewage treatment plant will be necessary to provide for the processing of sanitary sewage for ultimate disposal. Disposal of sewage is usually in a stream or other body of water or on land by subsurface irrigation or by direct absorption into the soil. A sewage treatment plant may include aeration tanks or trickling filters, settling basins, sump or storage wells, dry wells, pumps, screens, and accessories. The type and capacity of sewage treatment plant is determined by an engineering study of the installation, including planned population, number of family quarters, and industrial peak loads. See NAVFAC P-272, Definitive Designs, Part 2, for standard drawings of sewage treatment plants.

- 831 11 BALLAST CONTAMINATION SKIMMER (KG)
- 831 14 INDUSTRIAL WASTE TREATMENT BUILDING (SF)
- 831 15 INDUSTRIAL WASTE TREATMENT FACILITY (KG)
- 831 16 RUNOFF OIL/WATER SEPARATOR (KG)

No planning criteria for Category Codes 831 11, 14 and 15 are currently available. Each facility requires individual justification.

831 20 OUTFALL SEWER LINE (KG)

An outfall sanitary sewer line receives the sewage from a collecting system, or the effluent from a sanitary sewage plant, and carries it to a point of final discharge. Planning for outfall sewer lines will include land acquisition. The requirements for an outfall sewer line will be determined by an engineering survey.

831 30 SEPTIC TANK AND DRAIN FIELD (GA)

A septic tank and drain field facility provides sewage treatment for human waste at isolated facilities where an extension of the central sewer collection system would not be economically sound. The planning of a septic tank and drain field will include a concrete or protected steel tank and a drain field system including headers, laterals, open joint clay or concrete pipe, gravel, ditching, and land acquisition. The requirements for a septic tank and drain facility will be determined by an engineering survey.

- 831 39 RADIOACTIVE WASTE HANDLING BUILDING (SF)
831 40 RADIOACTIVE WASTE HANDLING FACILITY (EA)

No planning criteria for Category Codes 831 39 and 40 are currently available. Each facility requires individual justification.

831 41 HAZARDOUS WASTE STORAGE AND TRANSFER FACILITY (SF)

The requirement for this facility is the result of the necessity to ensure that the transfer and storage of hazardous wastes will meet the Federal Criteria mandated by Title 40 of the Code of Federal Regulations (CFR), Parts 260 thru 266 as well as complying with OPNAVINST 6240,3 Series, which implements the requirements of the Resource Conservation and Recovery Act (PL 94-580) (42 USC 6901-6987), the Clean Water Act (PL 92-500), and the Navy Hazardous Materials Environmental Management Program by expanding controls on hazardous materials management in order to protect the environment. It is the intent of Congress and the Policy of the President, (Executive Order 12088), that naval activities comply with these requirements to the same extent as any other entity or person.

Hazardous waste is any substance that cannot legally be disposed of in a normal sanitary landfill or into a refuse incinerator designated to handle municipal type refuse or cannot be discharged into a sanitary sewerage system. This facility is not intended to handle certain hazardous materials such as radioactive or ordnance wastes, for which other category codes have been designated. Any hazardous material can become a waste after having served its intended purpose, after exceeding its shelf life, by becoming contaminated, or by having been spilled. However, hazardous materials that have served a primary purpose and/or are excess to their primary user may have a secondary use. Such recyclable materials, though "excess" or "waste" to one organization, are not considered waste if their disposition is to a secondary user. By elimination, a hazardous waste is a non-reusable material that must be treated and/or disposed of in a specially designated facility that meets the regulatory requirements of the Resource Conservation and Recovery Act (RCRA) of 1976 (PL 94-580). It might be noted that sludges generated from treatment facilities may also be hazardous wastes.

There are basically two types of facilities to handle hazardous waste; a short-term storage facility, where materials are stored for periods of less than 90 days and a long term storage facility where materials are stored for more than 90 days. The short-term facility does not require a permit to operate, but is required to meet all packaging and labeling requirements and to date the receipt of hazardous wastes. The requirements for short-term facilities are given in 40 CFR 262.34. The long term facility is subject to the requirements of 40 CFR, parts 264 and 265 and the permit requirements of 40 CFR, part 122.

The design requirements set forth in NAVFAC DM-5.13 are mandatory for the long term facility and desirable for the short-term facility. It has been assumed that covered storage will be required to minimize the run-off from the facility and that the run-off will be packaged. In climate where run-off will not create a problem, open storage is acceptable and category

code 831-41, Hazardous Waste Storage Area, may be used. The modification of existing facilities is an acceptable alternative to the construction of new facilities.

The square footage requirements for this facility is directly related to the Hazardous Waste Management Plan that must be filed by every identified activity handling this type of material in accordance with OPNAVINST 6240. This plan must indicate the type of hazardous waste collected, the rate of accumulation and the frequency it will be removed from the activity in accordance with prescribed procedures. The selection of a short-term facility vs a long term facility is dependent upon the permits requested by the activity for the disposal of said waste. Definitive drawings for these typical facilities have been prepared and are indicated on NAVFAC Dwg. Nos. 1404293 and 1404294 which are part of DM 5.13 Hazardous Waste Storage and Transfer Facilities.

Prior to planning and establishing hazardous waste storage and transfer facilities, any actions must be cleared with the cognizant NAVFAC EPD which has the responsibility for area-wide coordination of the Navy Hazardous Materials Environmental Management program.

Siting. A buffer zone of 150 meters (500 feet) shall be provided between the facility and the nearest inhabited area, stream, body of water, or critical mission areas such as ammunition, POL, or flammable stores.

Both of the facilities will have space allocated for the following type functions: laboratory, operation room office/lunchroom, enclosed loading dock and storage for the following kinds of waste: reactive, unknown, acid, general, organic, oxidizer and caustic.

831-42 HAZARDOUS WASTE STORAGE AREA (SY)

The requirements for this facility are similar to those for category code 831-41, Hazardous Waste Storage and Transfer Facility. This type of storage facility is acceptable in climates where run-off will not create a problem. A buffer zone of 150 meters (500 feet) shall be provided between this facility and the nearest inhabited area, stream, body of water, or critical mission area such as ammunition, POL and inflammable stores. However, this facility may be located in the proximity of the Hazardous Waste Storage and Transfer Facility when it is used to augment it.

Segregation of Material. The danger involved in the storage of hazardous material are not measured solely by the quantity of material stored, but also by its sensitivity to reaction with one type of material with another. Tables showing compatibility relationship can be found in NAVFAC DM 5.13, Table 2, "Compatibility of Hazardous Waste Categories."

Planning Procedures:

1. Determine the number and types of hazardous waste to be stored and their compatibility.
2. Determine rate of accumulation by past records.

3. Determine length of storage required (i.e. less than 90 days, etc.).

4. Item 1, 2 and 3 determine maximum number of drums to be stored at any given time. Note: Not all drums will be filled and sometimes more than one drum will be required for any given type of waste.

5. Criteria: Use 2.1 gross square yards per drum stored when each 55 gallon drum is stored in clusters of 4 per pallet or area.

Example: Given: 24 drums in six clusters, four per cluster.
Determine: size and configuration of concrete pad.

A typical layout for this type of facility would be a concrete pad 23.0 ft. long and 19.5 ft. wide. An 8.0 ft. access aisle in the middle of the 19.5 ft. wide pad would provide room for the forklift truck to deposit and retrieve pallets which are orientated at a 45 degree angle to the aisle. Each four foot square pallet would support four drums and the apex of each pallet would be three feet from the adjacent pallet. The centerline of the aisle would also serve as the high point of the slab so that any accidental spillage of the waste would not react with any of the surrounding material.

832 SEWAGE AND INDUSTRIAL WASTE - COLLECTION

This basic category includes collection systems and lines including pumping stations for sewage and industrial waste, and collection of storm drainage in combined storm and sanitary sewer systems.

832 10 SANITARY SEWER (LF)

A sanitary sewer system collects, transports, and pumps sanitary sewage. Planning for the sanitary sewer system will include piping, fittings, pumps, lift stations, and accessories. An sanitary sewer collection system will be required at all Naval installations and it will be based primarily on the population. The requirements will be determined by an engineering survey.

832 20 COMBINED SEWER (LF)

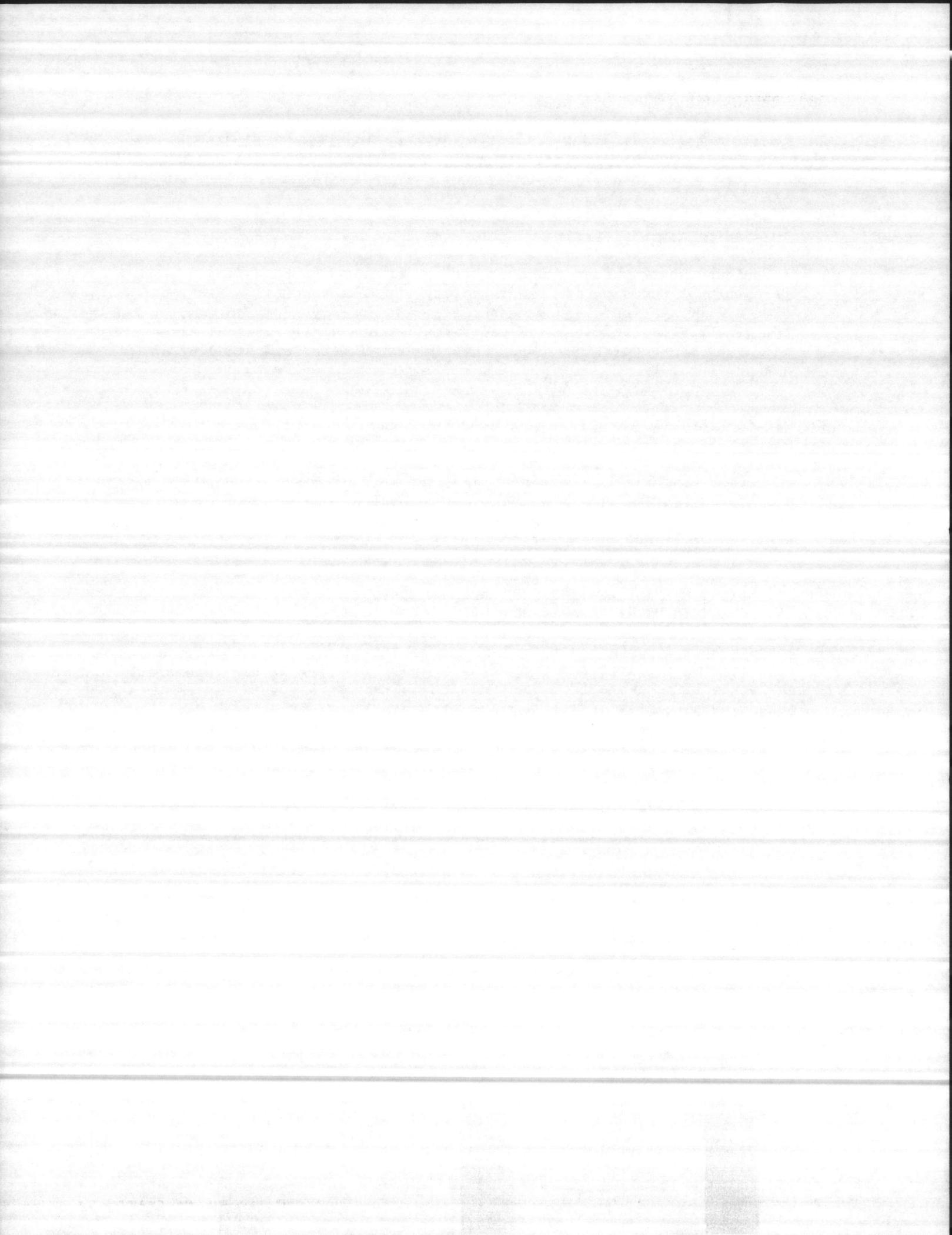
Combined sewers have been used for the collection of both sanitary sewage and storm drainage into one system. They were used as an expedient in old antiquated systems that have not been renovated, and are being eliminated. Do not consider using combined sewers for both sanitary sewage and storm water at new installations.

832 29 SEWAGE PUMPING STATION SHED/SHELTER (SF)

832 30 SEWAGE/INDUSTRIAL WASTE PUMPING STATION (GM)

A sewage pumping station is a facility used to move sewage through mains to a treatment plant, to serve where a gravity system is not feasible, and/or to lift sewage from one level to another in a gravity system. A sewage pumping station will include at least a sump or storage well and a structure to house pumping equipment, automatic controls, and hose facilities for cleaning the tanks. The capacities and other requirements for sewage pumping stations will be determined by an engineering survey.

832 40 INDUSTRIAL WASTE SEWER (LF)



833 REFUSE/GARBAGE (SOLID WASTE)

- 833 09 INCINERATOR BUILDING AND INCINERATOR (TN)
- 833 10 INCINERATOR - EXTERIOR (TN)

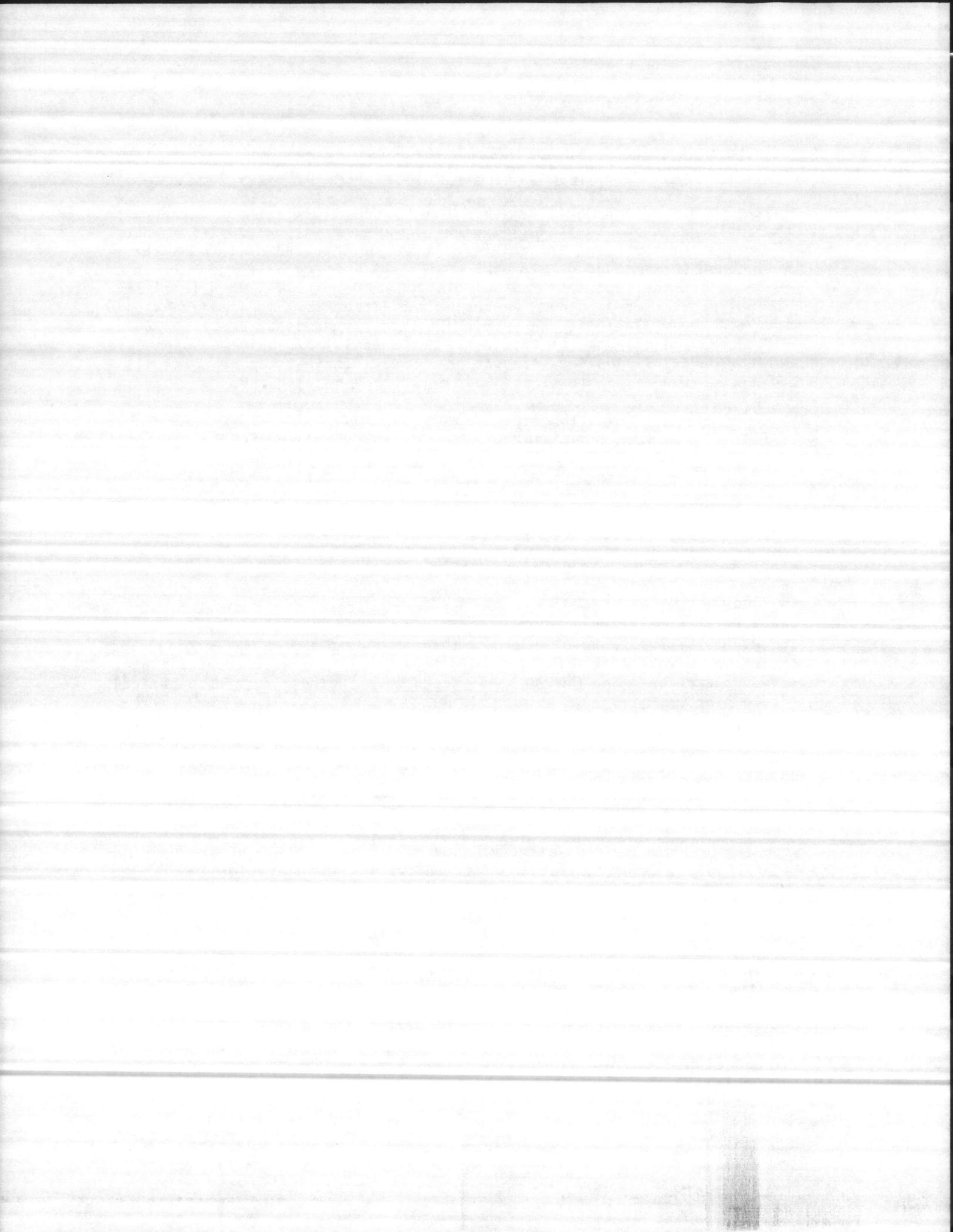
An incineratory is a facility for burning combustible refuse to reduce it to stable gases and inert solids. An incinerator may be justified when the refuse of the Naval installation cannot be disposed of in a sanitary fill; when such method of disposal would create an unhealthy condition or nuisance and the land is not available for such purposes; when local municipal facilities or other Government facilities for disposal are not suitable or available at reasonable prices; or when contract prices for collection and disposal of refuse are economically excessive as opposed to collection and disposal by station personnel. Incinerator capacity will not exceed the capacities listed for applicable populations.

<u>Population (military-civilian residing on station)</u>	<u>Incinerator capacity (tons per 8 hr day)</u>
Up to 2,000	5
2,001 to 4,000	10
4,001 to 6,000	15
6,001 to 8,000	20
8,001 to 10,000	25

The capacities, as shown, include 25 percent excess over average hourly needs to allow for irregularity in delivery of refuse to the incinerator. The planner should consider the merits of the dump and charge method where the refuse may be stored for periodic regular burning with resultant economy of operation. See NAVFAC DM-3, Mechanical Engineering, for technical information.

- 833 15 SANITARY/CUT-FILL DISPOSAL AREA (EA)
- 833 20 GARBAGE GRINDER BUILDING (TNO)
- 833 21 GARBAGE GRINDER (TNO)
- 833 30 GARBAGE STAND (EA)
- 833 40 GARBAGE HOUSE (SF)

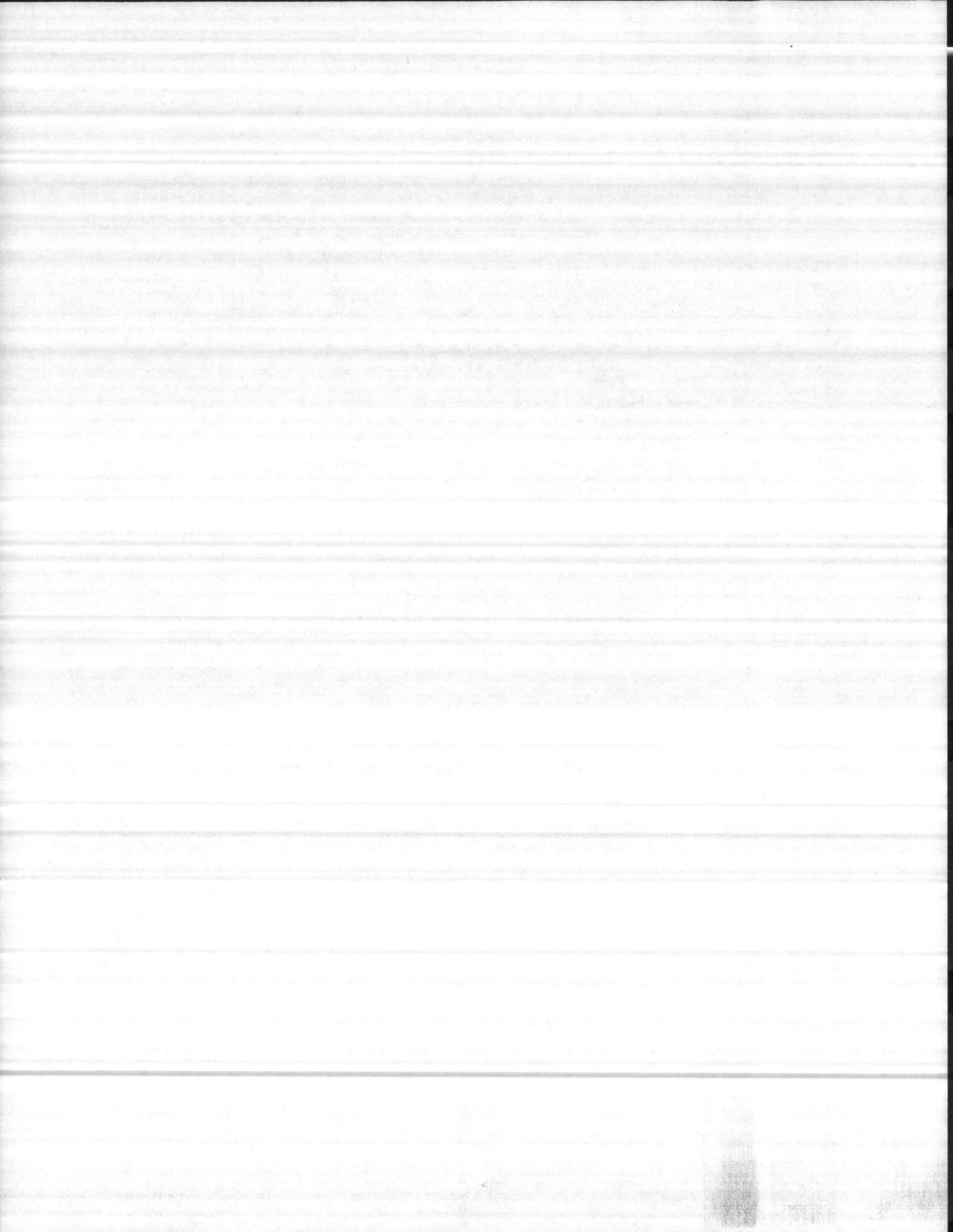
No planning criteria for Category Codes 833 15 through 833 40 are currently available. Each facility requires individual justification.



840 WATER

Water facilities at Naval installations shall provide sufficient quantities of potable water for domestic and industrial use; purification of raw water from deep wells, lakes, and rivers; storage of water in bulk storage tanks or reservoirs; and distribution of water to demand areas. The location of the supply sources may be determined by topographic maps, soil maps, climate data and, in some cases, geologic surveys. The selection of water sources must be consistent with economic considerations, such as gravity delivery if possible. Separate nonpotable water fire protective systems may be provided where applicable. Planning information is provided for the following facility groups:

- Code 841 Potable Water - Supply, Treatment, and Storage
- Code 842 Water - Distribution System, Potable
- Code 843 Water - Fire Protection
- Code 844 Water Supply/Storage - Nonpotable
- Code 845 Water Distribution System - Nonpotable



841 POTABLE WATER - SUPPLY, TREATMENT, AND STORAGE

841 09 WATER TREATMENT FACILITY BUILDING (SF)

841 10 WATER TREATMENT FACILITIES (KG)

Planning for the treatment of water will include, as applicable, screening, settling, coagulation and sedimentation, filtration, disinfection, softening, and aeration. The water treatment systems are normally planned in millions of gallons (MG) per day capacity and distribution is in linear feet (LF). The systems must be adequate to meet the domestic and industrial requirements, and to provide fire protection if a separate fire protection system is not provided. If separate nonpotable water protective systems are not provided, the capacity of the water supply system will be determined by the fire flow demand (see Code 843). Planning requirements for water treatment facilities will be based on the results of an engineering survey and an economic analysis to determine sources of water versus commercial or municipal supply. For water treatment methods see NAVFAC DM-5, Civil Engineering.

841 15 NUCLEAR REACTOR WATER TREATMENT FACILITY (KG)

No criteria for this facility are currently available.

841 20 SUPPLY MAINS AND PUMPING FACILITIES (PRETREATMENT ONLY) (LF)

These facilities transmit water from source to point of treatment or to the point of consumption. A pressure main will be needed if the water is pumped. However, if topography permits, a gravity system is planned. A twin conduit may be used to insure uninterrupted water supply. Important points to consider are, (a) the transmission pipe must have capacity for peak loads and future growth, (b) it must have durability to assure usefulness for many years without costly repair to replacement, and (c) it must usually carry raw, untreated water. Linear feet of pipe, types and capacities of pumps, quantities of water required for domestic and industrial use are determined by an engineering survey. See NAVFAC DM-5, Civil Engineering.

841 25 DESALINIZATION PLANT (KG)

No criteria for this facility are currently available.

841 30 STORAGE TANKS - ELEVATED, POTABLE (GA)

841 40 STORAGE TANKS - GROUND LEVEL, POTABLE (GA)

Water storage tanks for potable water are elevated or ground-level structures used to store bulk quantities of potable water. Elevated tanks for potable water provide both storage and static pressure for the distribution system. Ground-level tanks accommodate peak demand

requirements without affecting the capability of the source. The planning for potable water storage tanks will be based on the requirements determined by an engineering survey. These surveys will determine the capacities and pressures required for the water system. Elevated tanks will not be planned in the immediate vicinity of an airfield. Water uses which must be considered in estimating potable water requirements for shore installations are (a) domestic, (b) industrial, and (c) fire protection.

Domestic uses include drinking water, household uses, and lawn sprinkling. The average daily gallons per capita requirements for potable water for domestic uses are as follows:

Facility Type	Permanent Installations		Temporary Installations (w/no flush toilets)
	Tropic	Temperate	
Barracks			
Enlisted Men	150	150	75
Enlisted Women	190	175	90
Quarters	150	150	90
Hotels	110	100	-
Industrial Plants - (human consumption)			
Persons in one shift	50	50	25
Hospital (per bed)	200	200	100

Industrial uses include cooling, processing, flushing, issues to ships, lawn sprinkling, air-conditioning, and boiler makeup. Potable water requirements for industrial uses at permanent installations may be computed from the table below.

INDUSTRIAL WATER REQUIREMENTS
Potable Water--Permanent Installations

Use	Unit	Requirements		
		Min.	Avg.	Max.
Air Conditioning:				
With conservation	g.p.m./ton	-	0.05	0.10
Without conservation	g.p.m./ton	-	2.50	4.00
Cooling--diesel engines:				
With conservation	g.p.m./b.h.p.	-	0.01	0.02
Without conservation	gal./KWH	.25	0.33	.40
Cooling--steam power plants(1):				
With conservation	gal./KWH	1.30	0.80	1.70
Issue to ships (domestic uses):				
Single berth	g.p.m.	-	1,000(2)	-
More than single berth	g.p.m.	-	1,000(2)	2,000(3)

INDUSTRIAL WATER REQUIREMENTS (Continued)
Potable Water--Permanent Installations

Use	Unit	Requirements		
		Min.	Avg.	Max.
Laundries	gal./lb.	3	-	6
Lawn Sprinkling:				
Small lots	g.p.d./100 sq ft	16	-	32
Large areas	g.p.a.d.	7,000	-	14,000
Motor vehicle maintenance	g.p.d./car	30	-	50
Restaurants	gal./meal	0.5	-	40

- (1) Use as a guide only.
- (2) Up to 2,000 lineal feet of berthing length.
- (3) 500 gallons per minute for each additional 2,000 lineal feet of berthing length, but not exceeding 2,000 gallons per minute.

Fire Protection. Fire flow requirements for fire protection are listed under Code 843. See NAVFAC DM-5, Civil Engineering, and NAVFAC DM-8, Fire Protection Engineering, for technical information.

841 50 WELLS - POTABLE WATER (KG)

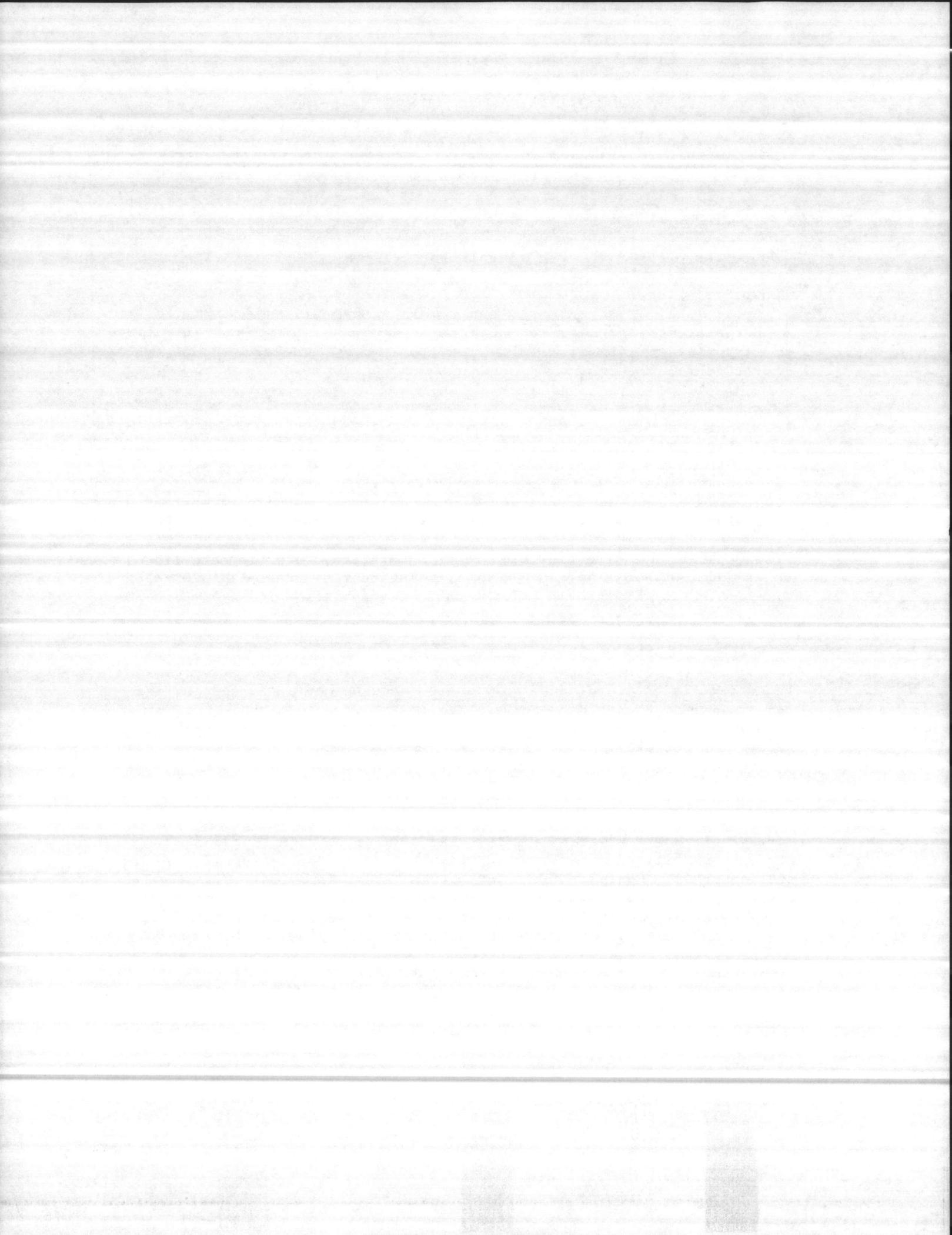
These facilities are planned only where adequate municipal sources are not available. More than one well may be required for an adequate water supply. No permanent installation is planned without knowledge of the underground strata.

841 51 RESERVOIR - POTABLE WATER (MG)

A reservoir has a greater capacity than a water storage tank and a sufficient quantity of water in reserve to insure an uninterrupted flow for station needs. Ponds or lakes may be used as reservoirs. Planning for reservoirs must be considered whenever a large natural source of water, or a municipal source is not available. Water storage facilities will be planned only at stations where an emergency might cause an interruption in the flow of the principal source or the principal source or the principal source is not adequate for normal usage. Planning requirements will be determined by engineering surveys. See NAVFAC DM-5, Civil Engineering, for technical information.

841 52 WATER CATCHMENT AREA (SY)

No criteria are currently available.



842 WATER - DISTRIBUTION SYSTEM, POTABLE

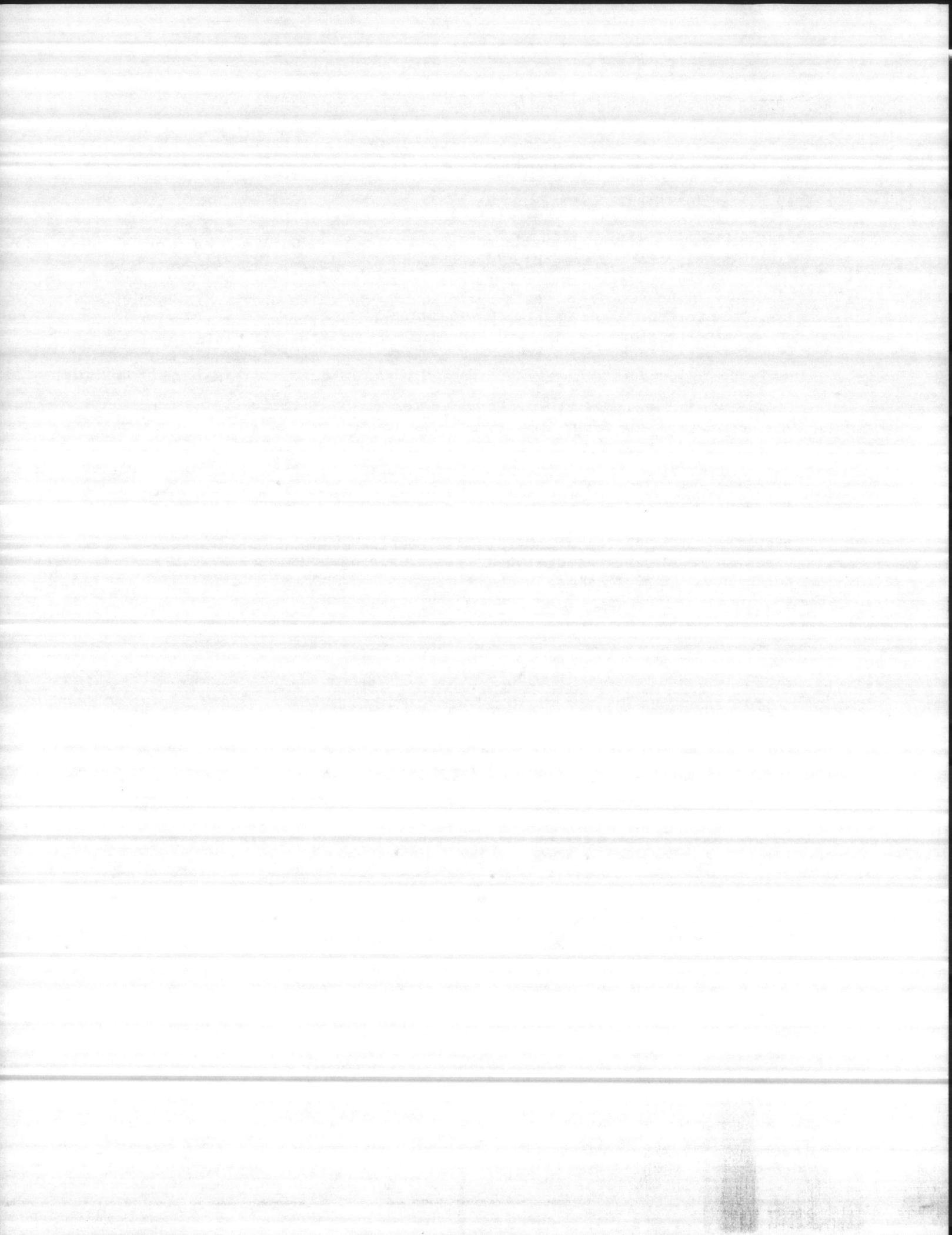
842 09 WATER DISTRIBUTION BUILDING/SHELTER, POTABLE (SF)

842 10 WATER DISTRIBUTION LINE, POTABLE (LF)

Potable water will be transmitted from a storage tank or a treatment plant to all station demand points through a pipeline. An engineering study of the pressures and quantities of water required at the demands points will serve as the basis for planning the sizes and lengths of pipe required for the water distribution pipelines. Planning for a potable water distribution pipeline will include requirements for piping, valves, pumps, connections, excavation, and backfilling. The pipeline shall be listed in linear feet (LF). See NAVFAC DM-5, Civil Engineering.

842 15 PUMPING STATION, ETC. - POTABLE WATER (GM)

This category code will include any additional pipeline facilities, such as water pumping stations. A water pumping station is required where increased water pressure is needed or to raise water from one level to another. An engineering survey will determine the need and also the capacity and size of the station. Water pumping stations capacities are given in gallons per minute (GM). See NAVFAC DM-5, Civil Engineering, for technical information.



843 WATER, FIRE PROTECTION

Fire protection requirements often dominate the plans of a water supply system. When the supply of fresh water is not adequate, salt water may be used. Since fire flow demands are usually greater than either the domestic or industrial demands, the capacity of the system will generally be determined by the fire flow demands. Fire flows are expressed in gallons per minute and are separate from the other water requirements. Normal fire flow demands are as follows:

Dwellings. The fire flow requirements for residential areas shall be as follows:

- Individual and duplex units--1 story--500 GPM
- Individual and duplex units--2 story--750 GPM
- Multifamily (3 or more) units--1 story--750 GPM
- Multifamily (3 or more) units--2 story--1,000 GPM

Light and Ordinary Hazards. In both light and ordinary hazard areas, the fire flow requirements for both hose streams and automatic sprinkler systems shall be as indicated in the table on page 843-3.

Special Areas. For areas of extra hazards and areas of special consideration, see requirements as listed in NAVFAC DM-8, Fire Protection Engineering. If the source demands are for a combination system then it must be of sufficient capacity to provide for the domestic, industrial, and fire flow requirements simultaneously. If the source of supply is unreliable, a storage system may be justified. Normally the most practical facility is the ground-level reservoir. Water storage requirements for fire protection are as listed in the following table:

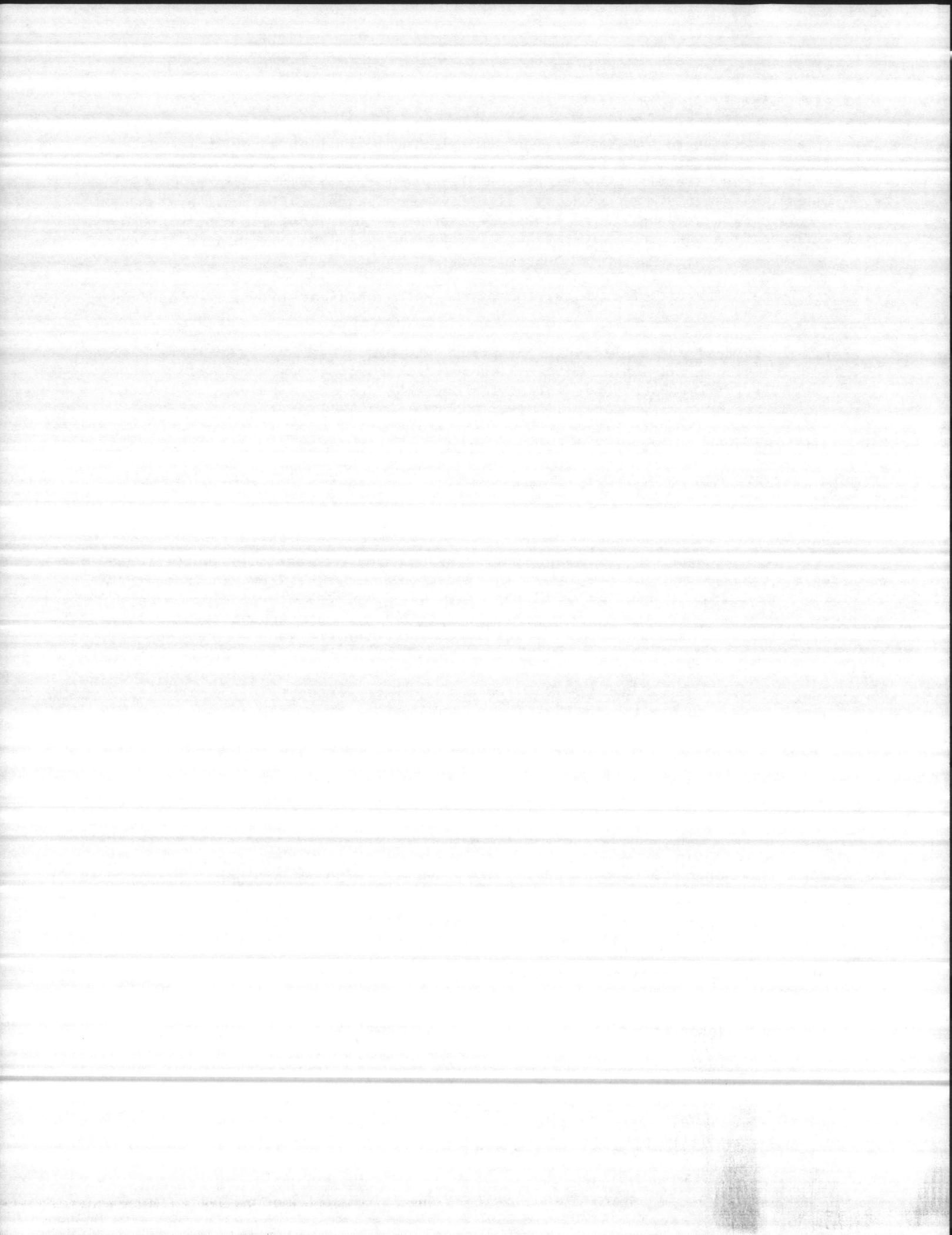
Water Storage Requirements for Fire Protection

<u>Fire Flow Demands (GPM)</u>	<u>Storage Requirements (hours)</u>	<u>Storage Requirements (gallons)</u>
Up to 750	1-1 1/2	66,500
Up to 1,250	2	150,000
Up to 1,750	2	210,000
Up to 2,250	2-2 1/2	338,000
Up to 3,000	3	540,000
Over 3,000	4	960,000

The Category Group 843 contains the following individual codes:

843 10 FIRE PROTECTION WATER PIPELINES (LF)

Fire protection pipelines are used exclusively for firefighting. Planning for protection pipelines includes hydrants, valves, connections, pumps, piping, excavating, and backfill. This facility is planned only when a nonpotable water fire protection system is necessary at large, or multimission activities. It may be planned where two separate maximum fire flows are needed, or where large quantities of water must be



Fire Flow Requirements

Height and Area (Sq Ft)	Unsprinklered		Sprinklered				
	Hose Streams		Hose Streams		Sprinkler Demand	Total	
	Fire Resistive, N.C. (Masonry) Ordinary, and Heavy Timber	Frame, N.C. (All Metal)	Fire Resistive, N.C. (Masonry) Ordinary, Heavy Timber	Frame, N.C. (All Metal)		Fire Resistive, N.C. (Masonry) Ordinary, Heavy Timber	Frame, N.C. (All Metal)
1 Story							
0 - 10,000	750	1,250	250	250	500	750	750
10,000 - 20,000	1,000	1,750	250	250	750	1,000	1,000
20,000 - 80,000	1,250	2,500	250	500	1,000	1,250	1,500
Multistory							
0 - 10,000	1,000	2,000	250	500	500	750	1,000
10,000 - 20,000	1,250	2,500	250	500	750	750	1,250
20,000 - 80,000	1,750	3,000	500	750	1,000	1,500	1,750

NOTES:

1. All one store buildings above 20 feet in height shall be classified as multistory.
2. Flows for hose streams shall be provided at 20 psi residual pressure.
3. Sprinkler demand requirements shall be based on a residual pressure at grade to provide a minimum pressure of 15 psi at the highest sprinkler.
4. In unsprinklered one story buildings, less than 1,000 square feet ground floor area, hose streams requirement of 500 gpm generally will be satisfactory.

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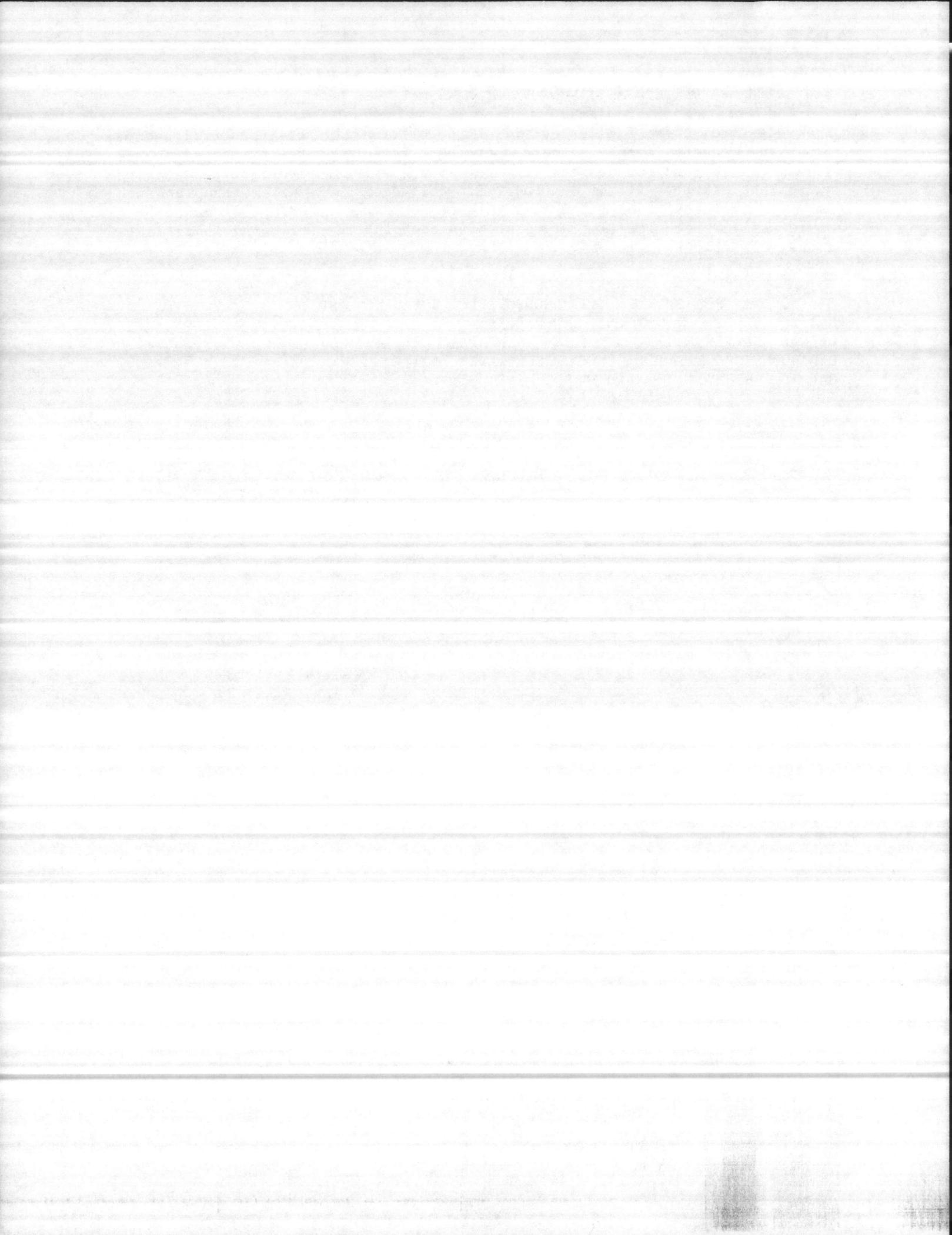
843-3



844 WATER SUPPLY/STORAGE, NONPOTABLE WATER

The water from these facilities will be used primarily for industrial purposes or as an emergency supply, should there be a failure of the principal source. When a requirement for nonpotable water source exists, firefighting water requirements usually will be combined with this group. Requirements planning for this facility group is similar to that for Category Group 841 and 843 where applicable. The Category Group 844 contains the following individual codes:

- 844 10 WATER SUPPLY/STORAGE (NONPOTABLE) BUILDING (SF)
- 844 20 WELLS - NONPOTABLE WATER (KG)
- 844 30 SUPPLY PUMPING STATION - NONPOTABLE WATER (KG)
- 844 40 STORAGE TANKS - NONPOTABLE WATER (GA)
- 844 50 RESERVOIRS - NONPOTABLE WATER (MG)



845 WATER DISTRIBUTION SYSTEM - NONPOTABLE

Facilities in this group support nonpotable water supply systems and are similar to those described under Category Group 842. This group contains the following individual codes:

- 845 10 PIPELINE BUILDING - NONPOTABLE WATER (SF)
- 845 20 PIPELINE - NONPOTABLE WATER (LF)
- 845 30 BOOSTER PUMP STATION - NONPOTABLE WATER (KG)

