maintained by the cognizant PREVMED personnel in a "miniblock" configuration. Refer to local Preventive Medicine Departments or NAVENPVNTMEDUs for suggested equipment and supply needs specific to the AO.

2. PREVMED personnel must carry their own equipment and supplies on all operations. Do not expect Preventive Medicine Departments or units located in the vicinity of the deployment to have sufficient supplies and equipment to support your operation.

Section II. WATER SUPPLY SANITATION IN THE FIELD

9-8. Importance of Potable Water. Safe water, in sufficient quantities, is essential to every living organism. Insufficient quantity or quality of water is not only debilitating to the individual but will have a significant impact on unit operational readiness. Water which is not properly treated and disinfected can spread bacterial diseases such as cholera, shigellosis, typhoid, and paratyphoid fever. Untreated water can also transmit viral hepatitis, gastroenteritis and parasitic diseases such as amoebic dysentery, giardiasis and schistosomiasis.

9-9. Responsibilities.

1. Unit commanders are ultimately responsible to ensure there are sufficient quantities of safe water for their personnel. Commanders must take actions necessary to maintain an adequate supply of potable water. Such actions include properly treating raw water supplies to remove unacceptable levels of organic and inorganic substances and harmful microbes, and enforcing water discipline. Furthermore, commanders must ensure that their personnel are familiar with the dangers of consuming untreated water and know the proper methods for disinfecting their personal drinking water supplies if necessary.

2. Engineers are responsible for providing sufficient potable water for the population to be served. This includes selecting sources of raw water and construction, operation, and maintenance of all the structures and facilities used for collection, treatment, and distribution of potable water. The treatment process usually includes one or more of the following processes: coagulation, sedimentation, filtration, and disinfection. Although engineers will not normally deliver water to units in the field, they do establish, operate, and maintain water points where potable water is provided.

3. The medical department advises the commanding officer on water quality issues. This entails assisting the engineers in selecting water sources, surveying the potable water system, conducting routine bacteriological examination of the potable water supplies, testing the water for halogen levels and informing engineers of water quality and type of treatment required. The need for chemical analysis of field water supplies is made on a case by case basis by assigned medical and engineer personnel.

4. All personnel must be familiar with, and follow, proper water discipline. This includes consuming only water that has been properly treated and conserving and protecting the potable water supply. Every individual is responsible for ensuring that potable water does not become contaminated from careless or improper handling.

9-10. Sources of Water.

1. All water sources in the field should be considered unsafe until they have been evaluated and approved by the medical department.

2. Water maybe obtained from various sources in the field including rivers, streams, ponds, lakes, wells, ice, snow, oceans, etc. In choosing a raw water source, consider the following factors:

a. Quantity. Will the source provide an adequate supply of potable water for all hands for the expected length of stay? See paragraph 9-14 for computation of water requirements.

b. Quality

(1) Is the water free of significant contamination such as sewage, naturally occurring toxic elements or compounds or chemical, biological, or radiological (CBR) warfare agents?

(2) Is the water objectionable due to turbidity, color, odor, or taste?

(3) Is the water source protected from possible organic contamination by sewage fallout or runoff from latrines, showers, motor pools, etc.? Are there sources of inorganic contamination by mining wastes or runoff, etc.?

(4) Can the water be treated adequately with the resources available?

c. Accessibility. Is the source accessible to water purification and transport equipment?

3. Potential Sources of Water

a. Existing public water systems. These are the easiest and, in most cases, the safest sources because this water has been treated to some extent. This does not, however, preclude the necessity for evaluating the water and requiring additional treatment to make it safe.

b. Surface water. Surface water includes lakes, rivers, streams, and ponds. This source is usually more accessible than other sources and capable of supplying adequate quantities; however, water quality can be a problem. In lakes and ponds, place the intakes as far from shore as possible and neither too close to the bottom nor too near the surface to avoid picking Up mud and other debris. In rivers and streams, collect the water as far from known sources of contamination as possible.

c. Ground water. Ground water (wells and springs) is usually less contaminated than surface water. However, it is sometimes difficult to determine what quantities are available, The use of ground water by combat personnel is usually limited to existing wells and springs. Ground water sources must be located at least 100 feet from all existing sources of contamination and situated so that the drainage is away from the well or spring.

d. Salt water. When a salt water source is used the water must be desalinated and disinfected before it is consumed. Desalinization is usually accomplished with a reverse osmosis water purification unit (ROWPU) and the water is disinfected after desalinization.

e. Other sources. Rain, snow or ice may be used in circumstances when other sources are not available. This water will also require disinfection, particularly when large quantities are stored for later use. A more detailed discussion of water sources is presented in Chapter 5 of this manual.

9-11. Water Treatment.

1. Water treatment is the process of purifying water to make it potable. It may include one or all of the following processes:

a. Aeration, coagulation, flocculation (clarification), and filtration to remove suspended solids.

b. Reverse osmosis to remove suspended and dissolved matter including organic and inorganic contaminants.

c. Disinfection to eliminate microbial contaminants too small to be removed by filtration.

2. Equipment Used to Purify Water:

a. Two examples of equipment currently in use are:

(1) The ROWPU is the most common field purification system in use. This versatile unit will produce potable water from contaminated sources including fresh, brackish, or sea water. The finished water must be disinfected to eliminate viruses and protect the water from microbial contamination. Figure 9-1 illustrates a typical ROWPU setup. Figure 9–2 shows a basic water flow diagram through the various components of the ROWPU.

(2) The ERDLATOR is a transportable quick-response water purification system capable of aerating, clarifying, filtering and disinfecting contaminated water.

b. Routine inspection of units such as these should include checking the location of raw water intake and backwash filter waste. Ensure the intake is located away from sources of contamination and sediment and is upstream from waste water. Leaks, cross connections and other sources of contamination should be inspected for and guarded against. Engineering personnel use gauge readings to ensure the unit's components are operating properly. Medical personnel should familiarize themselves with normal readings for the type of unit in use. Table 9-2 lists normal and trouble point readings for the 600 Gallon per Hour ROWPU.

3. Disinfection. Disinfection destroys harmful organisms (pathogenic viruses, bacteria, and protozoans) present in the water by exposing them to specific concentrations of disinfecting agents or to heat. The basic procedures for disinfecting water are given below. These procedures may be modified in the field environment by the unit medical department to adapt to the local conditions or circumstances. Such factors as the quality of the water source, diseases endemic to the area of operation,

ROWPU FIELD SET-UP

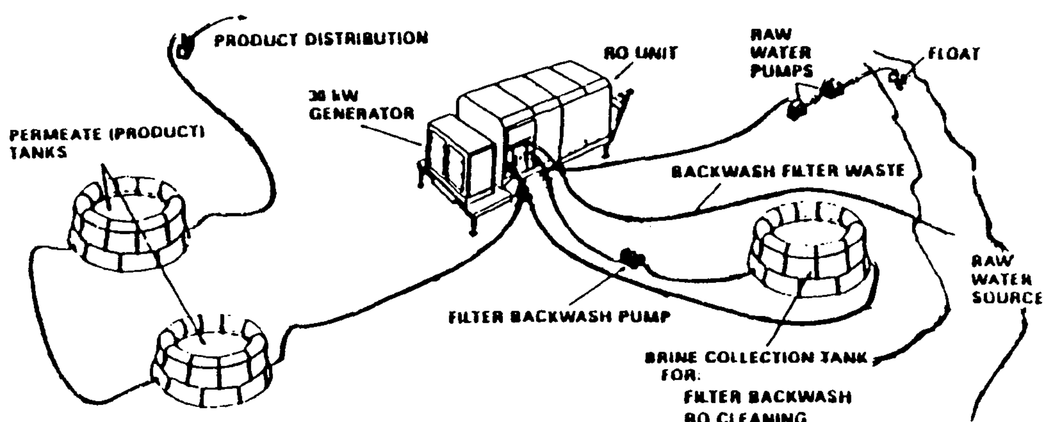
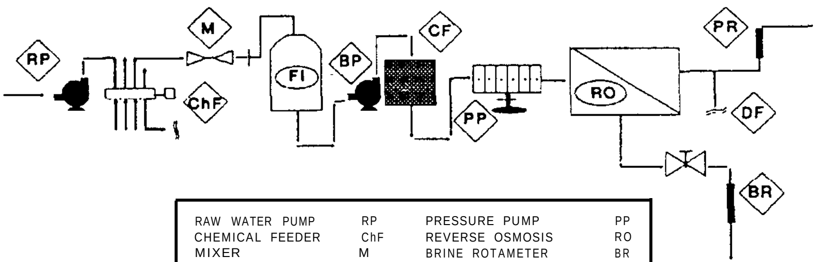


Figure 9–1.

600 GALLON PER HOUR ROWPU

BASIC FLOW SHEET



RAW WATER PUMP	RP	PRESSURE PUMP	PP
CHEMICAL FEEDER	ChF	REVERSE OSMOSIS	RO
MIXER	M	BRINE ROTAMETER	BR
FILTER	FI	DISINFECTION FEED	DF
BOOSTER PUMP	BP	PRODUCT ROTAMETER	PR
CARTRIDGE FILTER	CF		

600 Gal/h ROWPU (Ieometric layout view)

Figure 9-2.

diseases experienced within the unit, and the integrity of the unit water system must be considered.

a. Chlorination. Chlorination is the most common method of disinfecting potable water. Sufficient chlorine is added to the water to achieve the desired free available chlorine (FAC) residual after a 30 minute contact time.

(1) Chlorine is available in several forms:

(a) Calcium hypochlorite, 65-70% (HTH). This is the preferred agent because it comes in granular form, has a long shelf-life and is readily available from the Navy stock system. It comes in convenient units including 100 lb drums, 3.75 lb containers, 6 oz bottles or 1 gm ampules.

(b) Sodium hypochlorite (5%) or (10%). This is a liquid solution (household bleach) and may be used in lieu of HTH. However, it is less convenient to handle, takes larger quantities to achieve the same concentration of FAC, and has a much shorter shelflife than HTH.

(c) Chlorine gas (in compressed gas cylinders). This is the most common form used by municipal

600 Gal/H ROWPU
GAUGE READINGS, NORMAL AND TROUBLE POINTS

INDICATOR GAUGE	NORMAL READING	TROUBLE POINT READING
1. Cartridge Filter	1 to 20 psid	Over 20 psid
2. Multimedia Filter	O to 10 psid	5 psid over first reading, or over 10 psid
3. Raw Water Flow	27 to 33 gpm	Drop to 25 gpm or less
4. Brine Flow	16 to 24 gpm	Below 15 gpm
5. Product Water Flow		
a. Salt Water	6 to 12 gpm	Above 12.0 gpm
b. Brackish water	Up to 13.5 gpm	Above 13.5 gpm
c. Fresh Water	Up to 13.5 gpm	Above 13.5 gpm
6. R. O. Pressure psi		
a. Salt Water	800 psi or less	Above 900 psi
b. Brackish Water	500 psi or less	Above 600 psi
c. Fresh Water	500 psi or less	Above 600 psi
7. R. O. Vessels	50 to 100 psid	Above 100 psid
8. TDS of Product Water	Below 1500 ppm	Above 1500 ppm

Table 9-2.

Chlorine Dosage Calculator

The figures on the following charts give the "dosage rate" for chlorination. The quality of water, e.g. the organic and inorganic materials present, will affect final chlorine residual. The amount of chlorine required to react with and be absorbed by these materials is called the "chlorine demand". The chlorine absorbed or neutralized has no disinfectant value, so it is necessary to add enough chlorine (adequate dosage rate) to satisfy the "chlorine demand" and still provide FAC. The FAC is the active disinfecting agent and is the chlorine reading determined with the calorimetric test kit.

For 5% Liquid Sodium Hypochlorite

Quantity (Gal) \ PPM:	1	5	25	50	100	200
50,000	1 Gal.	5 Gal.	25 Gal.	50 Gal.	100 Gal.	200 Gal.
25,000	2 Qt.	10 Qt.	50 Qt.	25 Gal.	50 Gal.	100 Gal.
10,000	26 Oz.	1 Gal.	5 Gal.	10 Gal.	20 Gal.	40 Gal.
5,000	13 Oz.	2 Qt.	10 Qt.	5 Gal.	10 Gal.	20 Gal.
2,000	6 Oz.	26 Oz.	1 Gal.	2 Gal.	4 Gal.	6 Gal.
1,000	3 Oz.	13 oz.	2 Qt.	1 Gal.	2 Gal.	4 Gal.
500	2 Oz.	7 oz.	1 Qt.	2 Qt.	1 Gal.	2 Gal.
200	1 Tbsp.	3 Oz.	13 Oz.	26 Oz.	52 Oz.	103 Oz.
100	2 Tsp.	2 Oz.	7 Oz.	13 Oz.	26 Oz.	52 Oz.
50	1 Tsp.	1 Oz.	4 Oz.	7 Oz.	13 Oz.	26 Oz.
25		1 Tbsp.	2 Oz.	4 Oz.	7 Oz.	13 Oz.
10			1 Oz.	3 Tsp.	3 Oz.	6 Oz.
5			1 Tsp.	5 Tsp.	2 Oz.	3 Oz.

For 10% Liquid Sodium Hypochlorite

Quantity (Gal) \ PPM:	1	5	25	50	100	200
50,000	2 Qt.	10 Qt.	50 Qt.	25 Gal.	50 Gal.	100 Gal.
25,000	1 Qt.	5 Qt.	25 Qt.	50 Qt.	25 Gal.	50 Gal.
10,000	13 oz.	2 Qt.	10 Qt.	5 Gal.	10 Gal.	20 Gal.
5,000	7 Oz.	1 Qt.	5 Qt.	10 Qt.	5 Gal.	10 Gal.
2,000	3 Oz.	13 Oz.	2 Qt.	1 Gal.	2 Gal.	4 Gal.
1,000	1.5 Oz.	7 Oz.	1 Qt.	2 Qt.	1 Gal.	2 Gal.
500	1 Oz.	4 Oz.	1 Pt.	1 Qt.	2 Qt.	1 Gal.
200	2 Tsp.	2 Oz.	7 Oz.	13 Oz.	26 Oz.	55 Oz.
100	1 Tsp.	1 Oz.	4 Oz.	7 Oz.	13 Oz.	26 Oz.
50		.5 Oz.	2 Oz.	4 Oz.	7 Oz.	13 Oz.
25		2 Tsp.	1 Oz.	2 Oz.	4 Oz.	7 Oz.
10		1 Tsp.			2 Oz.	3 Oz.
5					1 Oz.	2 Oz.

For 65 to 70% Granular Calcium Hypochlorite

Quantity (Gal) \ PPM:	1	5	25	50	100	200
50,000	10 Oz.	3 lb.	15 lb.	30 lb.	59 lb. 9 Oz.	119 lb. 4 Oz.
25,000	5 Oz.	24 Oz.	7.5 lb.	15 lb.	29 lb. 12 Oz.	59.5 lb.
10,000	2 Oz.	10 Oz.	3 lb.	6 lb.	12 lb.	23 lb. 13 Oz.
5,000	1 Oz.	5 Oz.	1.5 lb.	3 lb.	6 lb.	11 lb. 15 Oz.
2,000		2 Oz.	10 Oz.	19 Oz.	2 lb. 7 Oz.	4 lb. 13 Oz.
1,000		1 Oz.	5 Oz.	10 Oz.	20 Oz.	2 lb. 7 Oz.
500			3 Oz.	5 Oz.	10 Oz.	19 Oz.
200			1 Oz.	2 Oz.	4 Oz.	8 Oz.
100				1 Oz.	2 Oz.	4 Oz.
50					1 Oz.	2 Oz.
25						1 Oz.

Table 9-3.

water treatment plants. However, chlorine gas is not normally considered appropriate for field use.

(2) Procedures for Chlorinating With HTH

(a) First make a small amount of HTH con. centrate by dissolving a measured amount of calcium hypochlorite granules (sufficient to produce the desired residual for the total volume of water to be disinfected) in a clean container (canteen cup, bucket, etc.) of water. Stir the mixture thoroughly. *Note that not all granules will dissolve.* Allow undissolved granules to settle to the bottom of the container. Only the clear liquid concentrate (supernatant) is added to the water to be disinfected. Refer to table 9–3 for the correct amount of HTH to add.

(b) Next, pour the supernatant into the water to be disinfected. Provide sufficient agitation to promote thorough mixing. This is best accomplished by adding the supernatant to the water container Oyster bag, trailer, tanker, etc.) when it is partially filled, then proceed to fill the container to the desired level with additional water.

(c) The final step is to take a measurement of the resulting FAC 30 minutes after adding the chlorine. The reading should be at or above the required dosage. If it is not, add additional chlorine and recheck the level after another 30 minutes. Repeat the procedure until the desired level is obtained.

(3) Required Chlorine Residuals:

Water Source	*Required Chlorine Residual*
1. Public water supply systems of questionable quality	5.0 parts per million (ppm) FAC after a 30 minute contact time and maintain at a minimum of 2.0 ppm FAC throughout distribution system.
2. Engineering water points	5.0 ppm FAC at the standpipe or fill-hose.
3. Water tankers, trailers, bladders and cans	Maintain between 5.0 ppm and 2.0 ppm FAC when filled at an approved engineering water point. Maintain at 5.0 ppm FAC when used as a "source" for a distribution (piping) system.
4. Distribution (piping) system	Maintain 5.0 ppm FAC at the source and 2.0 ppm FAC at the spigot.
5. Lyster bags and canteens	Maintain at 2.0 ppm FAC when filling from an approved water source. Chlorinate to 5.0 ppm FAC initially and maintain at 2.0 ppm FAC when filling from an unapproved or raw water source.

b. Superchlorination. This process is used to disinfect water containers and distribution systems initially (before they are used) or when they have become contaminated. Superchlorination is accomplished by chlorinating the water in a container or distribution system to at least 100 ppm FAC and holding it in the container for 4 hours. During that time the FAC must not drop below 50 ppm. Otherwise, the process must be repeated. The words "Poison Do Not Drink" must be displayed clearly on all sides of the container or at all water outlets during the process. The procedures are:

(1) Make up a supernatant of HTH as discussed previously. Use sufficient HTH to chlorinate the total volume of the water container or distribution system to at least 100 ppm (a higher concentration may be desirable, depending on the extent of the contamination in the container, to ensure the residual does not drop below 50 ppm after the 4 hour contact time). Refer to Table 9-3 for the amount of calcium hypochlorite granules or sodium hypochlorite bleach to use for the volume of the container or water pipes to be disinfected. Figure 9–3 provides a formula for estimating volume of water in a pipe for use in a distribution system.

(2) Add the supernatant to the partially filled container or distribution system and add additional water to fill the container or pipes.

(3) Determine the resulting FAC using a DPD kit. The water sample must be diluted 1:10 with distilled water to be within the range the DPD kit is

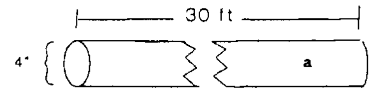
Formula for obtaining volume in different sized pipe

V = Gallons of fluid in a pipe

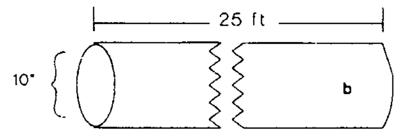
D = Diameter of pipe in inches

L = Length of pipe in feet

$V = D^2 \times .041 \times L$



a. $4^2 \times .041 \times 30$
$16 \times .041 \times 30$
$V_a = 19.68$ gal.



b. $10^2 \times .041 \times 25$
$100 \times .041 \times 25$
$V_b = 102.5$ gal

Figure 9-3.

designed to measure. Otherwise, the color quickly subsides or does not appear.

(4) Measure the FAC residual again after a 4 hour contact time. The FAC must be at least 50 ppm at this time. If the FAC is below 50 ppm the superchlorination procedure must be repeated.

(5) After superchlorination has been completed, drain the container or pipes, rinse them thoroughly and fill them with potable water from an approved source. In the event of scarce water supplies it maybe essential to use the superchlorinated water for drinking. If needed, the superchlorinated water may be dechlorinated with sodium thiosulfate or sodium bisulfite. However, large quantities of these agents may be required and the water must be dechlorinated as appropriate to protect the water from contamination.

c. Water Purification Tablets. Water purification tablets (NSN 6850–00-985–7166) are intended for disinfecting water contained in small containers such as canteens or water jugs. These tablets are usually composed of iodine and are available through the standard stock system in bottles of 50 tablets. These tablets are subject to deterioration in storage. Therefore, they must be inspected for signs of physical change before they are used. Otherwise, they may not disinfect the water! Iodine tablets which are completely yellow or brown or those which stick together or crumble easily are no longer effective and must be discarded or surveyed. Iodine tablets in good condition should be steel-gray in appearance. The procedures for disinfecting small quantities of water with these tablets are given below:

(1) Canteens

(a) Fill the canteen with the cleanest, clearest water available.

(b) Add two (2) iodine tablets to each canteen full of any type of water. Double these amounts for 2 quart canteens. Tincture of iodine 2% may be used in place of the tablets. Put 5 drops per 1 quart canteen of clean water or 10 drops if the water is cloudy.

(c) Place the cap on the canteen loosely. Wait 5 minutes, then shake the canteen vigorously, allowing leakage to rinse the threads around the neck of the canteen.

(d) Tighten the cap and wait an additional 30 minutes before using the water for any purpose.

(2) Five Gallon Cans

(a) Fill a 5 gallon container with the cleanest, clearest water available.

(b) Dissolve 40 iodine tablets in a canteen cup full of water to disinfect any type of water. Add this solution to the 5 gallon container of water and agitate the solution.

(c) Place the cap on the container loosely. Wait 5 minutes, then agitate the container vigorously, allowing leakage to rinse the threads around the neck of the can.

(d) Tighten the cap and wait an additional 30 minutes before using the water for any purpose.

d. Boiling. Boiling is a simple, effective method of disinfecting nonpotable water. Use the cleanest water available and bring it to a rolling boil for 2 minutes; then let it cool. This method is only practical for small containers of water such as canteens and it has several disadvantages:

(1) Fuel is required.

(2) It is time consuming. It takes a long time for the water to boil and then to cool.

(3) There is no residual substance in the water to guard against contamination.

9-12. Water Containers. The water standards discussed below apply to canteens, water jugs, lyster bags, bladders, trailers, tankers, water mains, hoses, piping systems and other vessels used to hold or convey potable water:

1. All containers used for the treatment, storage or distribution of water must be clean and clearly labeled "Potable Water. "

2. Interior surfaces must be constructed of smooth, nontoxic, noncorrosive materials and free from rust and chips. They must have tight fitting caps or lids which close securely. The gaskets must be easily cleanable.

3. Potable water containers must not be used for any other purpose and must be inspected, cleaned, and disinfected whenever necessary but not less than monthly.

9-13. Disinfection of Water Containers and Systems.

1. Mechanical cleaning and chemical disinfection must be accomplished when one or more of the following conditions exists:

a. Prior to placing a new container or system into service.

b. Prior to using containers or systems that have an accumulation of rust, scale, or sludge.

c. When there is evidence of contamination (human, animal, or chemical).

d. In extreme water emergencies, fuel oil containers can be converted for potable water use. In this event, special attention must be given in removing all fuel oil residues from these containers before disinfection and use. Containers whose contact surfaces are not readily accessible for inspection and cleaning (e.g., 5 gallon gas cans) must never be used for the storage of potable water. Also fuel oil hoses must never be used for potable water because of possible chemical reactions between the fuel and the rubber compounds within the hose.

e. Whenever system components have been dismantled or replaced for the purpose of repair or alteration.

2. Mechanical Cleaning Procedures

a. Drain the container or system.

b. Scrub the interior surfaces with a soft brush and a detergent solution taking care not to damage the interior lining. Be sure to scrub all gaskets, lids, and spigot openings.

c. High pressure water or steam should be used, if available, to rinse the container.

d. Open all valves, lids, taps, or spigots and allow the detergent solution to drain out through the system.

e. Rinse all surfaces thoroughly with potable water. Several rinsings may be necessary.

f. Superchlorinate the container or system as described in Article 9–11.3.b.

9-14. Water Quantity Requirements. Ensuring that personnel consume sufficient quantities of water is extremely important. This keeps them in good physical and mental condition to complete their mission. The daily water requirements for personnel in the field varies with a number of factors including the season of the year, geographical area, and the tactical situation. Dehydration can occur quickly in both extremely hot or cold climates if personnel don't drink plenty of water. Personnel in extreme environments must drink water even if they don't "feel thirsty." The minimum water consumption requirements under arid conditions to prevent dehydration is provided in Table 9-4. Slightly less water is required in temperate zones. A method for computing water requirements is provided in Table 9–5. A rule of thumb for the minimum amount of water required for advanced base medical facilities is 65 gallons per medical treatment bed per day.

9-15. Testing Requirements.

1. FAC Testing

a. Determine the FAC residual of all water supplies at least daily. Tests should be performed on all engineering water points, tankers, trailers, bladders, lyster bags, and on representative samples from 5 gallon cans and distribution system spigots. In the latter instance, the sampling points must be varied from day to day and be representative of the entire lot of cans or the distribution system.

b. Record the results in the Medical Department Water Log and investigate the cause of any low readings. Report all significant findings to the unit engineer. Prompt action must be taken by the unit engineer to

DAILY WATER REQUIREMENTS
Multi-Service Water Consumption
for Arid Environment[a]

1. USAGE FACTORS	GAL/MAN/DAY	
	Marines	Navy
Drinking[b]	5.2	5.2
Hygiene [b] (Brushing teeth, shaving)	2.7	2.7
Centralized showers[b]	1.3	1.3
Food Preparation[b]	3.0	3.0
Vehicles	0.3	0.3
Medical[b]:		
Heat treatment (ice water)	1.0	1.0
Hospitals	65 gal/bed/day)	
Graves registration (50 gal/KIA)[c]	0.2	0.2
Laundry (6 lb/man/wk)	2.0	2.0
Construction [d]	1.5	1.5
Aircraft	0.7	5.2
Total Use	17.9	22.4
Waste/evaporation (10% of total)	1.8	2.2
Total	19.7	24.6

Notes:

a. For light work and normal salt intake.

b. Must be potable. All other water quality must be consistent with intended use,

c. Army accomplishes graves registration for all services within the theater of operations. (KIA = killed in action)

d. Dust control must be accomplished by means other than water.

2. Recommended Joint Planning Factor: 20 gal/man/day (Includes waste/evaporation factor but excludes requirements for decontamination, POWs, refugees, and civilians).

3. Decontamination requirements: Cannot be reduced to gal/man/day factor. The following can be used for planning purposes:

a. Combat troop-13 gal per decontamination application. (This need not be potable water.)

b. Major end items—200 gal per decontamination application. In addition, the following should be considered:

(1) Factors apply each time a person or piece of equipment requires decontamination due to the presence of persistent chemical agent.

(2) The factors assume that the contaminated units will apply sound decontamination principles.

(3) All personnel and equipment in a given unit are assumed to require decontamination if any one person or piece of equipment becomes contaminated.

(4) For many pieces of equipment, specific decontamination procedures and times have not been established, especially for aircraft, generators, communications gear, and crew-served weapons.

Table 9-4.

eliminate all sources of contamination or other factors contributing to the FAC dissipation and to restore the FAC to the appropriate levels addressed in Article 9-11.3.a.(3).

2. Bacteriological Testing

a. Field water supplies must be tested bacteriologically at least weekly following the procedures provided in Chapter 6 of this manual. Analysis must be accomplished on all engineering water points, tankers, trailers, bladders and lyster bags and representative samples of 5 gallon cans and distribution system spigots. Sample points must be varied to represent the entire lot of cans or the distribution system.

b. Record the results in the Medical Department Water Log.

c. Notify the unit commander of all positive results which indicated possible contamination and recommend that the container(s) or sampling point(s) in question be secured until disinfection and retesting can be performed.

d. Investigate to determine the source(s) of contamination and retest. The positive sampling point(s) container (s) or spigot (s) must remain secured until

SAMPLE METHODOLOGY FOR COMPUTING UNIT/FORCE WATER REQUIREMENT

1. Company (160 men)	
Drink + P. Hyg + Food + Veh = Unit Factor	**(5.2 + 2.7 + 3.0 + 0.3 = 11.2 G/M/D**
Unit Factor x Unit Str. = Co. Consumption	**(11.2 x 160 = 1792 gal/day)**
Consumption + 10% Waste = Co. Requirement	**(1792 + 179 = 1971 gal/day)**
2. Battalion (750 men)	
Unit Factor + Heat Treat = Bn Factor	**(11.2 + 1.0 = 12.2)**
Bn Factor x Bn Str = Consumption	**(12.2 x 750 = 9150)**
Consumption + 10% Waste = Hn Requirement	**(9150 + 915 = 10,065 gal/day)**
3. Brigade (3500 men)	
Bn Factor + Cent. Hyg = Bde Factor	**(12.2 + 1.3 = 13.5)**
Bde Factor x Bde Str = Bde Consumption	**(13.5 x 3500 = 47,250)**
Consumption + 10% Waste = Bde Requirement	**(47,250 + 4725 = 51,975)**
4. Division (16,000 men)	
Bde Factor + Hosp + Ldry + Grav + Constr = Div Factor	**(13.5 + 1.0 + 2.0 + 0.2 + 1.5 = 18.2)**
Div Factor x Div Str = Div Consumption	**(18.2 x 16,000 = 291,200)**
Consumption + 10% Waste = Div Requirement	**(291,200 + 29,120 = 320,320)**
5. Corps/Force (men)	
Navy Service Factor × Non self-sustaining Str = Reqt	(24.4. × ______ = (N))
USMC Service Factor × Non self-sustaining Str = Reqt	(19.5 × ______ = (MC))
Army Service Factor (incl. waste) × Army Str = Reqt	(17.2 × ______ = (A))
USAF Service Factor × Non self-sustaining Str = Reqt	(21.5 × ______ = (AF))

N + MC + A + AF = Total Requirement for Force Support

Note: 1. Non self-sustaining strength = Number of personnel to support
2. Service Factor is outlined in Table 9-4

Table 9-5.

negative follow-up samples are obtained. Retesting requires 300 milliters of water be tested for each 100 ml original positive sample. Follow-up testing is accomplished as follows.

(1) In a distribution system, take a 100 ml follow-up sample from the original positive spigot, take one from within 5 outlets upstream of the original positive sample and one from within 5 outlets downstream. If the original positive sample was at the end of the distribution line, two samples will be collected downstream (within 5 outlets) from the original positive sampling site.

(2) Distribution systems with a single outlet, tankers, trailers, bladders, Lyster bags and 5 gallon cans will have three 100 ml samples taken from the original positive sampling site. When testing the three 100 ml samples from a single testing site, using the membrane filter technique, it is optional to filter each 100 ml through a single filter or the three 100 ml samples (300 ml) may be filtered through a single filter.

e. The water is considered safe to use when the set of follow-up samples are total coliform negative.

SAMPLE METHODOLOGY FOR COMPUTING UNIT/FORCE WATER REQUIREMENT

1. Company (160 men)	
Drink + P. Hyg + Food + Veh = Unit Factor	(5.2 + 2.7 + 3.0 + 0.3 = 11.2 G/M/D
Unit Factor x Unit Str. = Co. Consumption	(11.2 x 160 = 1792 gal/day)
Consumption + 10% Waste = Co. Requirement	(1792 + 179 = 1971 gal/day)
2. Battalion (750 men)	
Unit Factor + Heat Treat = Bn Factor	(11.2 + 1.0 = 12.2)
Bn Factor x Bn Str = Consumption	(12.2 x 750 = 9150)
Consumption + 10% Waste = Hn Requirement	(9150 + 915 = 10,065 gal/day)
3. Brigade (3500 men)	
Bn Factor + Cent. Hyg = Bde Factor	(12.2 + 1.3 = 13.5)
Bde Factor x Bde Str = Bde Consumption	(13.5 x 3500 = 47,250)
Consumption + 10% Waste = Bde Requirement	(47,250 + 4725 = 51,975)
4. Division (16,000 men)	
Bde Factor + Hosp + Ldry + Grav + Constr = Div Factor	(13.5 + 1.0 + 2.0 + 0.2 + 1.5 = 18.2)
Div Factor x Div Str = Div Consumption	(18.2 x 16,000 = 291,200)
Consumption + 10% Waste = Div Requirement	(291,200 + 29,120 = 320,320)
5. Corps/Force (men)	
Navy Service Factor × Non self-sustaining Str = Reqt	(24.4. × ______ = (N))
USMC Service Factor × Non self-sustaining Str = Reqt	(19.5 × ______ = (MC))
Army Service Factor (incl. waste) × Army Str = Reqt	(17.2 × ______ = (A))
USAF Service Factor × Non self-sustaining Str = Reqt	(21.5 × ______ = (AF))

N + MC + A + AF = Total Requirement for Force Support

Note: 1. Non self-sustaining strength = Number of personnel to support
2. Service Factor is outlined in Table 9-4

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negative follow-up samples are obtained. Retesting requires 300 milliters of water be tested for each 100 ml original positive sample. Follow-up testing is accomplished as follows.

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e. The water is considered safe to use when the set of follow-up samples are total coliform negative.

Section III. FOOD SERVICE IN THE FIELD

9-16. Importance of Sanitary Practices in the Handling of Food.

1. The conditions under which food is transported, stored, prepared, and served can have a direct bearing on the success or failure of a military mission. Consumption of food contaminated with disease causing microorganisms can result in outbreaks of foodborne illness and compromise the combat readiness of the unit. All personnel who handle food must maintain the highest stan-