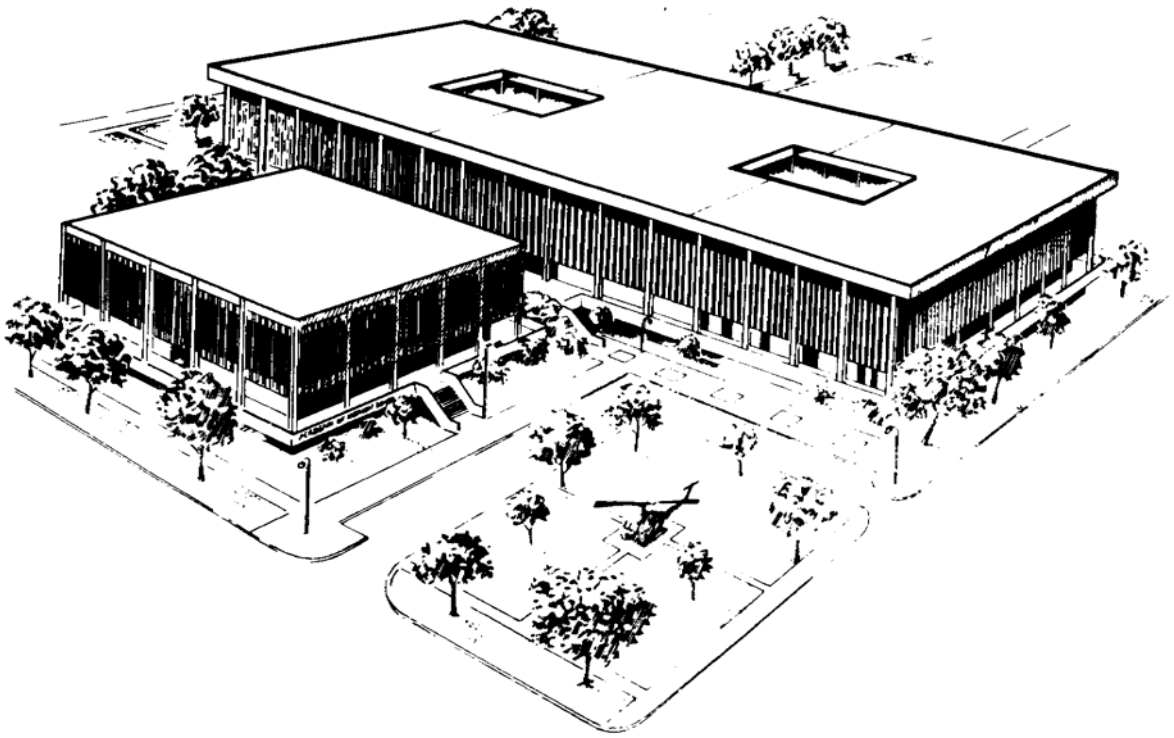
U.S. ARMY MEDICAL DEPARTMENT CENTER AND SCHOOL
FORT SAM HOUSTON, TEXAS 78234-6100



ENVIRONMENTAL HEALTH INSPECTIONS AND SURVEYS II

SUBCOURSE MD0166 EDITION 100

DEVELOPMENT

This subcourse is approved for resident and correspondence course instruction. It reflects the current thought of the Academy of Health Sciences and conforms to printed Department of the Army doctrine as closely as currently possible. Development and progress render such doctrine continuously subject to change.

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CLARIFICATION OF TRAINING LITERATURE TERMINOLOGY

When used in this publication, words such as "he," "him," "his," and "men" are intended to include both the masculine and feminine genders, unless specifically stated otherwise or when obvious in context.

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CORRESPONDENCE COURSE OF
THE ARMY MEDICAL DEPARTMENT CENTER AND SCHOOL

SUBCOURSE MDO166

Environmental Health Inspections and Surveys II

INTRODUCTION

Army facilities must provide personnel with sanitary and safe environments. Sanitary inspections and surveys are an effective tool for ensuring that facilities carry out sanitation and safety measures. The preventive medicine specialist frequently is charged with conducting environmental health inspections and therefore must be knowledgeable of the rules and regulations governing sanitation at the various facilities. Subcourse MDO164 presents the sanitary standards and health issues for troop housing, barber and beauty shops, and mobile home parks. This subcourse, MDO166, will discuss the health issues involved in swimming areas, child development service facilities, ice plants and miscellaneous institutions, such as public use facilities, housing, and public schools. Each lesson deals with a specific institution and presents a discussion of Army standards, a sample checklist and the public health issues associated with the facility. For those facilities not governed by formal regulations, there is a discussion of important health issues, health hazards, and items to inspect.

This subcourse consists of 4 lessons:

Lesson 1. Inspect Swimming Areas.

Lesson 2. Inspect Child Development Service Facilities.

Lesson 3. Inspect Ice Plants.

Lesson 4. Inspect Miscellaneous Facilities.

You will be awarded 6 credit hours for the successful completion of this subcourse.

Texts and materials furnished: In addition to this booklet, you are furnished an examination answer sheet and an envelope.

You must furnish a #2 pencil.

We suggest that you follow these study procedures:

--Read and study each lesson assignment carefully.

--Work the lesson exercises for the first lesson, marking your answers in this booklet. Refer to the text material as necessary.

--When you have completed the exercises to your satisfaction, compare your answers with the solution sheet located at the end of the lesson. Check the references for your incorrect answers.

--After you have successfully completed one lesson, go on to the next and repeat the above procedures.

--When you feel confident that you have mastered the study materials, complete the examination. We suggest that you work the examination by first marking your answer in this booklet. Then when you have completed the exercises to your satisfaction, transfer your responses to the examination answer sheet and mail it to the AMEDDC&S for grading.

--The grade you make on the examination will be your rating for the subcourse.

--No postage is required.

A Student Comment Sheet is located at the back of the examination booklet. It can be returned with your examination answer sheet. As you study the subcourse, you may wish to make suggestions or criticisms that will help us to improve the quality of the subcourse.

Be sure your social security number is on all correspondence sent to the AMEDDC&S.

LESSON ASSIGNMENT

LESSON 1	Inspect Swimming Areas.
LESSON ASSIGNMENT	Paragraphs 1-1 through 1-27.
TASKS TAUGHT	081-91S-5113--Perform the pH test on water. 081-91S-5114--Determine free available chlorine residual in a water source. 081-91S-5118--Collect bacteriological samples from natural bathing areas. 081-91S-5130--Collect bacteriological samples from a swimming pool. 081-91S-5131--Inspect swimming facility bathhouse. 081-91S-5132--Inspect a swimming pool. 081-91S-5133--Perform inspection of a natural bathing area.
LESSON OBJECTIVES	After completing this lesson, you should be able to: 1-1. Identify the authorities responsible for swimming pool sanitation and their duties. 1-2. Identify the main diseases and disease-causing organisms found in swimming areas. 1-3. Identify the chain of command for inspections of swimming areas. 1-4. State the types of swimming pools. 1-5. Identify the sanitary standards for swimming pool fixtures and the swimming pool environment. 1-6. Calculate bather load.

1-7. Identify basic concepts in acid-base pool chemistry: ions, acids, bases, neutral substances, and the pH scale.

1-8. Identify the effect of pH on swimming pool operations.

1-9. Identify the chemicals used to control pH.

1-10. Identify the basic concepts of swimming pool chlorination: Chlorine; free available chlorine; combined available chlorine; total chlorine; and chlorine sources.

1-11. Identify the procedures for the handling and maintenance of chlorine gas containers and filtration equipment.

1-12. Identify the problems and controls of algae growth.

1-13. Identify required accident prevention measures at swimming pools.

1-14. Identify the procedures for conducting a swimming pool inspection and the items on the sample checklist.

1-15. Identify the procedures involved in performing bacteriological studies and the tests for pH and free available chlorine.

1-16. Identify the primary diseases of natural swimming areas.

1-17. Identify the classification system for natural waters.

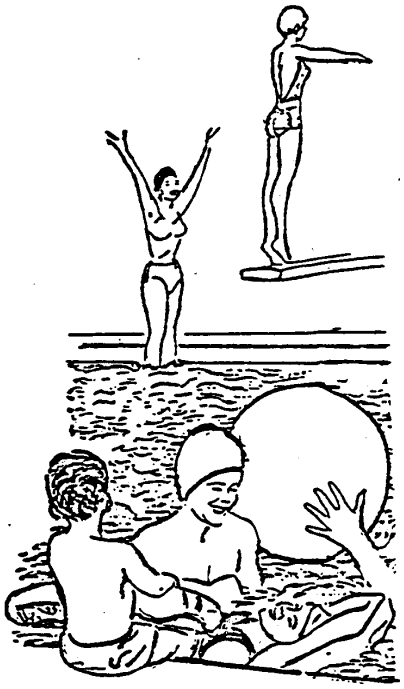
1-18. Identify measures taken to prevent accidents at natural swimming areas.

SUGGESTION After completing the lesson assignment, complete the exercises at the end of this lesson. These exercises will help you to achieve the lesson objective.

LESSON 1

INSPECT SWIMMING AREAS

Section I. GENERAL INFORMATION



1-1. INTRODUCTION

AR 40-5 does not provide specific standards for the sanitary operation of swimming areas. AR 40-5 states that swimming areas are to be operated in accordance with TB MED 575. Section I of this lesson presents general information on swimming areas. In addition, Section II of this lesson deals with the chemical treatment of swimming pool water, algae control, bacteriological sampling, and inspection procedures and tests. Section III discusses sanitary standards and health factors associated with natural bathing areas.

1-2. AUTHORITIES RESPONSIBLE FOR SANITATION IN SWIMMING AREAS

Several authorities are responsible for maintaining sanitation in swimming areas.

a. The Surgeon General sets standards of water sanitation and quality.

b. The post commander enforces these standards. The post commander may authorize swimming areas for recreational use. The commander has overall responsibility for the safety and sanitation of all swimming areas under his control.

c. Chief of Engineers handles the design, construction, operation, and maintenance of swimming pools and equipment. The Surgeon General and the Chief of Engineers must approve any changes from accepted standards.

1-3. HEALTH PROBLEMS IN SWIMMING AREAS

a. Swimming pools or bathing beaches generally do not present major health hazards. However, water polluted by the excrement, urine, and discharges of bathers can cause disease.

b. The three MAIN health problems caused by improperly maintained swimming areas are intestinal infections, respiratory diseases, and eye-ear-nose-infections. Fungus diseases and certain helminth (worm) diseases can also result from swimming areas.

(1) Bacteria and protozoa present in urine and feces cause intestinal diseases, such as dysentery and typhoid fever. Bacteria are also responsible for respiratory diseases, such as colds, sinusitis, and infectious sore throat.

(2) The fungi usually cause superficial conditions of the skin, hair, and nails.

(3) Natural bodies of fresh water can carry the worms (helminths) that cause a serious parasite disease called schistosomiasis. These parasites enter the body through the skin or the alimentary tract.

(4) In addition to diseases, poorly operated or hazardous swimming areas can cause accidents and even death.

1-4. INSPECTION OF SWIMMING AREAS

a. The post commander relies on the medical authority to inspect swimming areas and to recommend corrections of unsanitary conditions or practices.

b. The medical authority then may authorize a preventive medicine specialist to make a sanitary inspection of post swimming areas. In order to conduct a worthwhile inspection, the preventive medicine specialists must know the local swimming facilities, any possible health hazards associated with these facilities, and the methods for operating and maintaining swimming areas.

c. If the inspection indicates that disease or any other hazard to troops exists at post swimming areas, corrective measures are taken immediately. If necessary the Commander may have to close the swimming area.

Section II. SWIMMING POOLS

Part 1. Sanitation Standards for Swimming Pools.

1-5. TYPES OF SWIMMING POOLS

a. **Recirculation with Filter**. In this type of pool, water is withdrawn from the pool, filtered, disinfected, and returned to the pool. This is the only type approved for new construction.

b. **Flow-through Pools**. In this pool a continuous supply of fresh water enters at one end of the pool and an equal amount of dirty water flows out of the other end. Sanitation is maintained by regulating the number of bathers using the pool and by the quantity and quality of water flowing through the pool.

c**. Fill and Draw Pools**. These pools are filled, used until the water is dirty, then emptied and refilled with clean water. It is difficult to maintain fill and draw pools in good sanitary condition. Therefore, these pools are not recommended for Army use.

d. **Wading Pools**. These are artificial pools with a maximum depth of 36 inches, for use by children. Infections are more easily transmitted in wading pools than in larger pools. This is because young children are more likely than adults to urinate or defecate in the water and to drink or get the contaminated water into their mouths. These pools should be small and have a continuous flow of treated water that gives a complete change of water every 2 hours. Overflows should be of the open type, extend completely around the pool, and return to the filtration system. Treatment may be separate or in conjunction with the main pool.

e. **Spray Pools**. These are also artificial pools for children; treated water is sprayed into these pools but is not allowed to pond. Used water is either discharged or is returned to the filtration system. These pools are without the sanitary defects or hazards of wading pools and are quite safe when operated in a sanitary manner. Conversion of wading pools to spray pools is easy and highly recommended. When done, the spray pipe should rise vertically for a distance of 3 to 5 feet and be capped with a spray nozzle.

1-6. THE SWIMMING POOL ENVIRONMENT

The pool location and surroundings should not increase pollution. Any material entering a pool can pollute the water. In particular, materials that carry contaminants or that are contaminants raise the chlorine demand and dosage; if the dosage is not increased, the chlorine residual will be reduced and the bacteria count will rise. An inspector should observe the pool site and surroundings when conducting an inspection.

a. **Trees and Shrubbery**. Trees and shrubbery make a pool area look attractive but may contribute to pollution. When leaves, blossoms, bird feces and insects fall into the pool water, the sanitary hazard outweighs the natural beauty.

b. **Pool Site**. The top of the pool should be well above the surrounding ground level and located where dirt, dust, leaves, and other debris will not be carried into the water.

1-7. CONSTRUCTION AND DESIGN OF SWIMMING POOLS

The following paragraphs deal with the physical aspects and design of swimming pools. Although some construction features are common to all pools, the discussion focuses on the recirculation-with-filter pool. The recirculation-with-filter pool is the only type approved for new construction and will become more and more common.

a. **Pool Construction**.

(1) Pool surfaces should be smooth and should not have cracks or joints (with the exception of structural expansion joints). Earth and sand bottoms are not acceptable.

(2) The pool walls and bottom should be light in color. This improves visibility and appearance. White, light blue, and aqua blue are excellent colors for this purpose. Dark colors, on the other hand, absorb light, restrict vision, and hide dirt deposits.

b, **Depth Markings**. Pools should have water depth plainly marked. Vertical markings should be located on the pool walls at or above the water surface. They should also be marked on the edge of, the deck beside the pool. The following specifications apply to depth markings:

(1) These areas must be marked:

(a) The points of maximum and minimum depth.

(b) The break between shallow and deep water.

(c) Intermediate 1-foot increments of depth.

(2) Markings should occur at least every 25 feet.

(3) The numbers should be at least 4 inches high and of contrasting colors.

(4) The pool outlet should be plainly marked in contrasting colors.

c. **Bather Load**.

(1) Overcrowding of a pool can create a health problem. The bather load is a way to determine whether the pool is overcrowded or not. The maximum bather load is based upon 27 square feet of pool surface for each bather at the pool. A good estimate is that only three-quarters of the total number of swimmers will be in the water area at one time. This allows 36 square feet of water area for each person actually in the pool. The inspector can easily check whether the bather load is acceptable by calculating the bather load for the pool undergoing the inspection and then comparing it to the standard of 36 square feet per person actually in the pool.

(2) To check the bather load, multiply the pool length by the pool width to find the pool area. Then divide the area by 3/4s of the bathers present, and compare the result with the standard.

(3) The following is an example:

> The pool size is 63 feet wide and 82 feet long. There are 146 bathers present.
>
> Multiply length by width to find the pool area in square feet.
>
> 63 X 82 = 5166 square feet.
>
> Find 3/4s of 146 to determine the number of bathers actually in the pool at one time.
>
> 3/4 X 146 = 110.
>
> Divide the area by the number of bathers in the pool at one time.
>
> 5166 ÷ 110 = 47 (after rounding off)
>
> The bather load is 47 or 47 square feet of water area for each person in the pool. This is well above the allowance of 36 square feet of water area per person actually in the pool. The bather load in this example is acceptable.

d. **Inlets and Outlets**. When inspecting inlets and outlets, the primary hazards to look for are cross-connections, defective circulation of chlorinated water, and rough surfaces or other defects that endanger the health of bathers.

(1) Inlets. Inlets allow fresh or treated water to enter the pool. Inlets should be located to produce uniform water circulation and to maintain a uniform disinfectant residual throughout the pool. See figure 1-1 for inlet location.

(a) Circulation system inlets should be flush with pool walls pool. Each inlet should either be designed as an adjustable opening or be provided with an individual valve that adjusts water volume to obtain the best circulation.

(b) Where the incoming water (influent) is from a potable water system, cross-connections should be eliminated. This is done by pumping makeup water from a pump suction well or by admitting water to the pool with an air gap connection.

(c) Inlets should be placed at approximately 20-foot intervals around the pool. Each inlet should either be designed as an adjustable opening or be provided with an individual valve that adjusts water volume to obtain the best circulation.

(2) Outlets. These are provided at the deepest point to permit the pool to be completely and easily emptied in about four hours. See figure 1-1 for outlet location.

(a) Openings should be covered by a grating which bathers cannot remove easily. The minimum width of grate openings should be one-half inch; they should be designed to prevent swimmers' hands and feet from being caught. Openings of the gratings in the floor of the pool should be at least four times the area of the discharge pipe. Otherwise, gratings must have sufficient area so that the maximum velocity of the water passing through the grating will not exceed 1 ½ feet per second

(b) Multiple outlets, spaced not more than 30 feet apart or more than 15 feet from sidewalls are authorized for pools with deep water.

(c) Direct connections to sewers should be avoided. All drains from the pool to sewers should be constructed with an air-break to prevent sewage from backing up into the pool.

e. **Overflow Gutters and Skimmers**. These are designed to remove portions of the circulating water and to return the water to a filter unit.

(1) Overflow gutters. Overflow gutters should extend completely around the pool and serve as a handhold except at steps or recessed ladders in the shallow area. Gutters should be able to continuously remove the recirculating water and return it to the filter. Figures 1-1 and 1-2 show the location and appearance of gutters.

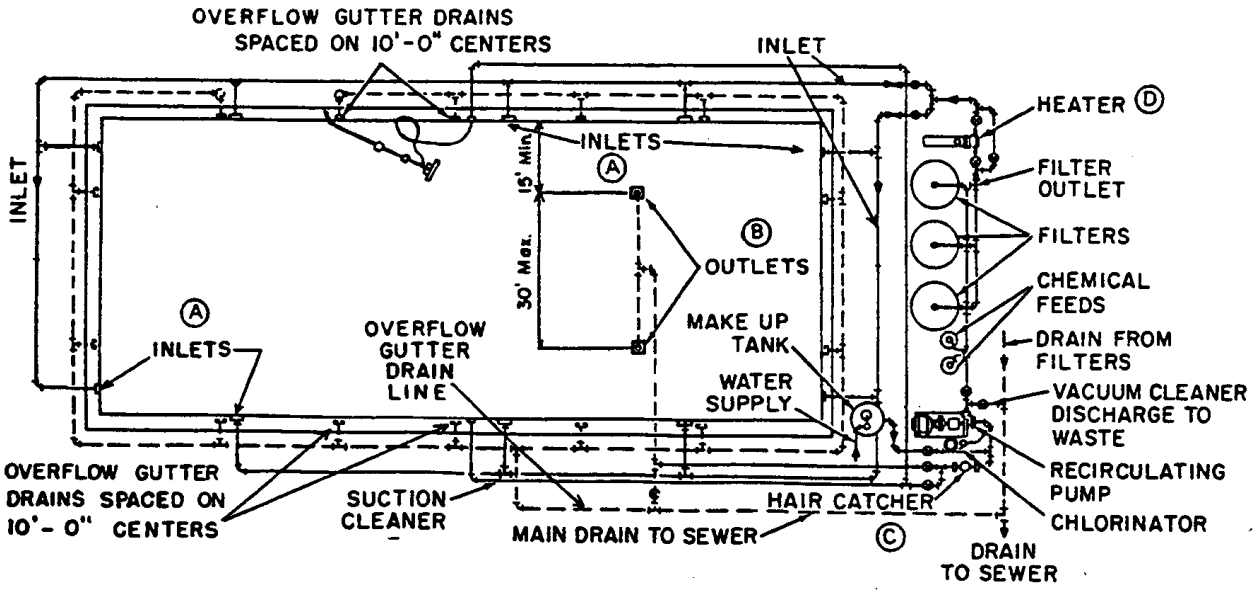


Figure 1-1. Diagram of the major construction features of a swimming pool.

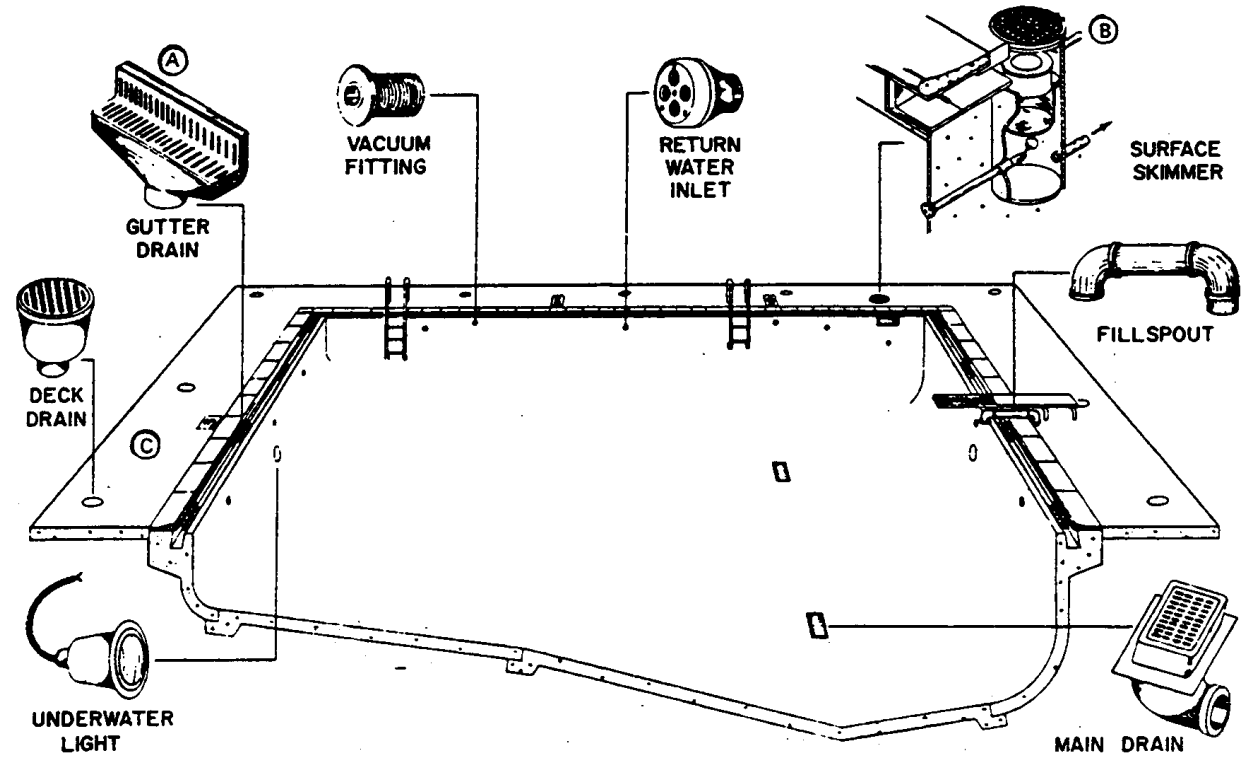


Figure 1-2. Swimming pool fittings.

(2) Skimming devices. When used in place of overflow gutters, at least one skimming device should be provided for each 500 square feet of surface area. These skimming devices are built into the pool walls. They should develop sufficient velocity on the water surface to bring floating oils and wastes from the entire pool into the skimmer. Figure 1-2 shows the location and appearance of skimming devices.

(a) Each skimmer should be provided with an easily removable and cleanable basket or screen through which all overflow water must pass. The basket serves to collect debris.

(b) Recessed automatic surface skimmers must comply with the standards of a nationally recognized testing agency, such as the National Sanitation Foundation. The agency's seal of approval on the filter fulfills this requirement.

f. **Steps and Ladders**. Steps or ladders should be provided at the shallow end of the pool and on each side of the deep end.

(1) Steps and ladders should be designed so that bathers do not slip. They should have a minimum tread of 12 inches and a maximum rise of 10 inches.

(2) Ladders should be made of corrosion-resistant material and have nonslip treads. Handholds must be installed firmly enough to be stable and not move. The clearance between the ladders and the pool walls should not be more than 5 inches nor less than 3 inches.

(3) If the pool has steps or step holes, they should be readily cleanable and arranged to drain into the pool to prevent dirt accumulation. Step holes should have a minimum tread of 5 inches and a minimum width of 14 inches.

(4) When steps, step holes, or ladders are located within the pool, a handrail must be provided. The handrail should be at the top of the steps, step holes, or ladders and extend over the edge of the pool deck.

(5) Platform or diving board steps should be of corrosion-resistant material, easily cleanable, and have a nonslip design. Handrails should be provided for all steps and ladders leading to diving boards that are more than 1 meter above the water. Platforms and diving boards over 1 meter high should be protected with guardrails.

g. **Decks and Surrounding Areas**. The pool deck should be at least 5 feet wide, have a nonslip surface and completely surround the pool. The area should be completely fenced in and have the entrance and exit through the bathhouse. The deck and neighboring areas should be designed to keep surface drainage out of the pool.

h. **Diving Area**. Diving platforms and supports for spring-boards should be rigidly constructed, have nonslip surfaces, and be properly anchored to ensure stability.

(1) There should be at least 15 feet of unobstructed head room above all diving boards and platforms. A horizontal separation of at least 10 feet should be provided between diving boards and sidewalls; this may be reduced to 8 feet for surface boards.

(2) The maximum safe elevation of diving boards and platforms above the surface of the water relates to the depth of the water and the width of the pool. This relationship is shown in Table 1-1.

Height of board or platforms	Minimum water depth at end of board and 12 feet beyond	Minimum pool width at end of board and 12 feet beyond
0-6 feet	8 ½ feet	20 feet
6-9 feet	10 feet	30 feet
more than 9 feet	11 ½ feet	30 feet

Table 1-1. Water depths and pool widths required for various diving board heights.

i. **The Recirculation System**. The function of the recirculation system is to filter and disinfect the entire volume of pool water in 8 hours or less; a water turnover must occur at least 3 times in 24 hours. The recirculation system consists of water conditioning and disinfecting equipment as well as pumps, piping, and filters.

(1) Pumps should have sufficient capacity to provide the required number of turnovers of pool water. Pumps should also be capable of providing flow adequate for backwashing filters.

(2) Pipes should be made of a nontoxic material that is resistant to corrosion, capable of withstanding operating pressure, and easily cleaned and repaired. A sump or blow off should be provided at the lowest point of the system to remove rust and sediment accumulations. Outlets should be readily accessible for obtaining water samples before and after treatment.

(3) The recirculation system should include a readily accessible hair strainer to reduce the amount of hair, lint, and filaments of other material that reaches the filters. Hair strainers are located on the suction side of the pumps and require cleaning once a day.

(4) Vacuum cleaners, either built-in suction cleaners or portable suction cleaners, are used for cleaning pool bottoms or walls. The discharge wastes are emptied into the scum gutter or walk drain.

(5) The water in indoor pools should be maintained between 70°F and 78°F and be about 5°F cooler than the air temperature. A heater controlled by a thermostat is recommended. The heater should be able to warm all or part of the recirculating water and have a fixed thermometer in the recirculation line at the heater outlet and another thermometer near the pool outlet. Figure 1-1 shows the location of the heater.

(6) A rate-of-flow indicator, reading in gallons per minute, should be installed on the pool return line. The purpose of this device is to show the rate of recirculation and backwash. The indicator should be capable of measuring flows at least one and one-half times the normal flow rate. It should also be easy to read and accurate within 10 percent of the true flow of the pool.

1-8. BATHHOUSES AND SHOWER FACILITIES

a. **Bathhouses**. A bathhouse should be provided next to each swimming pool. The bathhouse should consist of dressing rooms, clothing storage facilities, toilets, and showers. Floors should be made of nonslip material and have coved corners and intersections between floors and walls. All facilities should be kept clean. Floors should be scrubbed daily and disinfected with a 50-ppm chlorine solution as needed to control fungi. Floors should be well drained with no pooling of water. Wet vacuuming should be used if floor drains are not adequate.

(1) Dressing rooms. Floors should slope about one-quarter of an inch per foot toward drains. Walls and partitions should be made of smooth, easily cleanable, and impervious materials; walls and partitions are to be without open cracks or joints. Surfaces should be painted. Dressing compartment partitions should stand at least 10 inches above the floor or rest on continuous raised masonry or concrete bases at least 4 inches high. Lockers should be well ventilated and rest on 4 inch high solid masonry bases or on legs, with the bottom of the locker at least 10 inches above the floor.

(2) Showers. One showerhead should be provided for every 30 persons of each sex. The total number of showerheads is based on this figure and the maximum bather load. All showers should be provided with plenty of soap and hot water, and shower valve arrangements must totally prevent the accidental scalding of bathers. A central automatic mixing valve is recommended. If only tempered water is supplied, it should have a temperature of 90°F to 110°F. Showers should be positioned in the bathhouse so that bathers must pass through the showers on their way to the pool.

b. **Shower Facilities in Place of Bathhouses**. Pools without bathhouses should have outdoor showers at the pool entrance and exit. Bathers should be required to shower before entering the pool area. Bathers frequently avoid showers, yet they are a source of contamination for the pool waters.

1-9. WATER CLOSETS AND URINALS

a. Adequate toilet facilities at all pools should be provided separately for male and female bathers. The maximum bather load should determine the total number of fixtures required. There should be at least one water closet for each 20 women bathers and one water closet plus one urinal for each 40 men bathers.

b. In addition to the above fixtures, “wet toilets” should be provided for wet bathers and should be located next to the shower rooms as follows: one “wet toilet” for men consisting of one water closet and one urinal; and one “wet toilet” for women consisting of one water closet for 100 bathers or less. For situations of over 100 bathers, an additional water closet should be furnished for both the men and women’s “wet toilets.” These facilities should be placed so that bathers using them must pass through the shower before entering or re-entering the pool.

c. Toilet facilities for spectators and other nonbathers are also required.

d. Lavatories should be provided on the basis of one per 40 persons of each sex.

e. Footbaths are prohibited. In past years, it was thought that footbath solutions would destroy fungi causing athlete’s foot. Now it is known that this practice only spreads fungi from diseased to healthy feet.

f. Dressing, toilet, and shower rooms should have either natural or artificial ventilation to prevent odors and to dry areas which have become wet because of bathers. Indoor pools should be ventilated to prevent the accumulation of moisture above the pool and condensation on cold surfaces.

1-10. SPECTATOR AREA

When a spectator area is provided, it should be separated from the bathing area and have its own entrance.

Part 2. Chemical Treatment of Swimming Pool Water.

NOTE: In addition to checking the condition of pool equipment, buildings and surroundings, the inspector must examine and understand basic swimming pool chemical and disinfection procedures. Pool pH is discussed first as it relates to most other aspects of pool chemistry. This is followed by a discussion of chlorine which is used as a disinfectant in swimming pools.

1-11. ACID-BASE POOL CHEMISTRY

a. **Ion**. An ion is an electrically charged particle. When a compound separates into ions, it is said to ionize. The process of ion formation (ionization) is critical in acid-base pool chemistry.

b. **Acid**. An acid is a compound that ionizes to produce an excess of hydrogen ions. A base is a compound that ionizes to produce an excess of hydroxyl ions. A neutral compound ionizes to produce an equal number of hydrogen and hydroxyl ions and is neither an acid nor a base. Water is an example of a neutral compound.

c. **pH**. The symbol pH is an expression of how acidic or alkaline (basic) a substance is. The values for pH range from 0 (very acidic) to 14 (very basic). The pH values relate inversely to the hydrogen ion concentration of a solution: the higher the pH value, the lower the hydrogen ion concentration and the less acid and the more basic is the substance. Pure water has a pH value of 7, which is neutral. A pH value below 7 indicates an acid solution, and a pH value above 7 indicates a basic solution.

d. **Effect of pH on Swimming Pools**. Swimming pools must maintain a slightly basic pH value between 7.2 and 8.4. The pH is not a measure of the amount of acid or base in a solution but measures only how much is ionized. Thus, a solution could contain a large amount of a unionized compound that would not affect the pH until it is ionized. The pH of swimming pool water affects pool operation in several ways. In particular it has an effect on the efficiency of chlorine, which is added to pool water as a disinfectant.

(1) Effect on bacterial kill rate. The percent of chlorine that remains in pool water in its most effective form for killing bacteria depends upon the pH. As the pH value rises and the water becomes more basic, chlorine becomes less effective as a disinfectant. Refer to paragraph 1-12e for a more detailed discussion of this relationship.

(2) Eye irritation. Generally, a pool with a pH of a 7.6 to 8.0 causes the least eye irritation. If the water is too acidic or too basic, eye irritation results.

(3) Corrosion of pipes and deterioration of mortar. If the pH is allowed to remain at 7.0 or below, the water can corrode metal pipes and can act as an acid in dissolving mortar and concrete in the pool walls.

(4) Algae growth. Water with a low pH may encourage growth of algae. A pH of 8.0 will tend to inhibit this growth. Maintaining required chlorine levels would also inhibit the growth of algae.

e. **Factors Affecting pH**.

(1) Gaseous chlorine lowers pH drastically.

(2) Sodium and calcium hypochlorite tend to raise the pH moderately. Lithium hypochlorite, cyanurates, bromine, and iodine have little effect on pH.

(3) Makeup water added to the pool may affect the pH, depending on the pH of the new water.

(4) Windblown dust, debris, and contaminants brought in by bathers may cause sudden changes in pH.

f. **Control of pH**.

(1) Chemicals used to raise pH.

(a) Sodium carbonate (soda ash) and lime [$Ca(OH)_2$] are the chemicals most commonly used.

(b) Sodium hydroxide, though somewhat more dangerous to handle, is often used to raise the pH in pools.

(c) Sodium bicarbonate can raise the pH if the pH is low.

(2) Chemicals used to lower pH.

(a) Sodium bisulfate is recommended as a safe and effective chemical for lowering pH.

(b) Hydrochloric acid (muriatic acid) is commonly used, though dangerous to handle.

(c) Sulfuric acid (dilute) is used occasionally but is not recommended.

g. **Figure**. Figure 1-3 shows the pH scale and the effect of pH values on swimming pool operations.

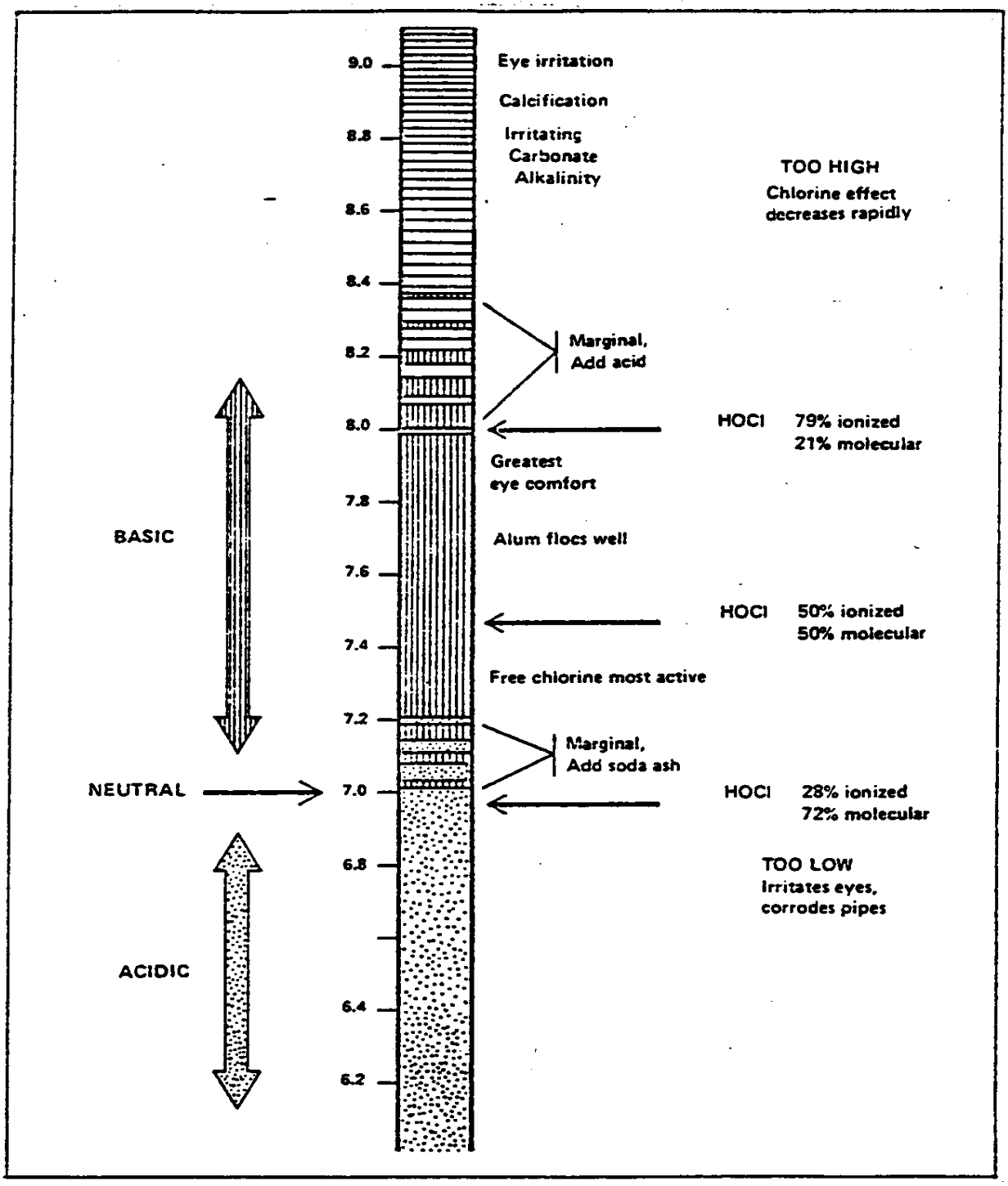


Figure 1-3. The pH scale and the effects of pH on swimming pool operations.

1-12. CHLORINATION

a. **Chlorine**.

(1) Chlorine is the most commonly used chemical to kill bacteria in pool water. At room temperature and pressure, chlorine is a heavy green gas with a characteristic odor. Chlorine is extremely poisonous, and safety precautions must be followed when handling it.

(2) When chlorine is added to water, two acids are formed: hydrochloric acid (HCl) and hypochlorous acid (HOCl). Hydrochloric acid is a useless by-product of chlorination. It is neutralized by adding soda ash (1.25 to 1.5 pounds of soda ash for each pound of chlorine). Hypochlorous acid, on the other hand, is the active disinfecting agent. Hypochlorite (OCl^-) is also formed and serves as a disinfecting agent.

b. **Free Available Chlorine**.

(1) Hypochlorous acid is extremely effective in killing bacteria. Hypochlorite ion kills bacteria more slowly. HOCl is 80 to 100 times more effective as a bactericide than is OCl^-. The pH of the pool water determines the proportion of the HOCl to OCl^-. The higher the pH of the pool water (the more basic), the less there is of hydrochlorous acid. For example:

> At a pH of 7.0, the acid is 72 percent molecular.
> At a pH of 7.5, the acid is 50 percent molecular.
> At a pH of 8.0, the acid is 21 percent molecular.

This is why chlorine is much less effective at killing bacteria at a high pH. Figure 1-4 shows the relationship between pH values and the presence of hypochlorous acid in molecular form.

(2) Hypochlorous acid and hypochlorite ion are called “free” chlorine. Some of this chlorine combines with matter in the water and some of it remains uncombined. The portion of hypochlorous acid and hypochlorite ion that remains uncombined is called “free available chlorine” or sometimes “free residual chlorine.” It is the free available chlorine that is critical for killing bacteria. Free available chlorine disperses in bright sunlight, in high temperatures, and when water is agitated.

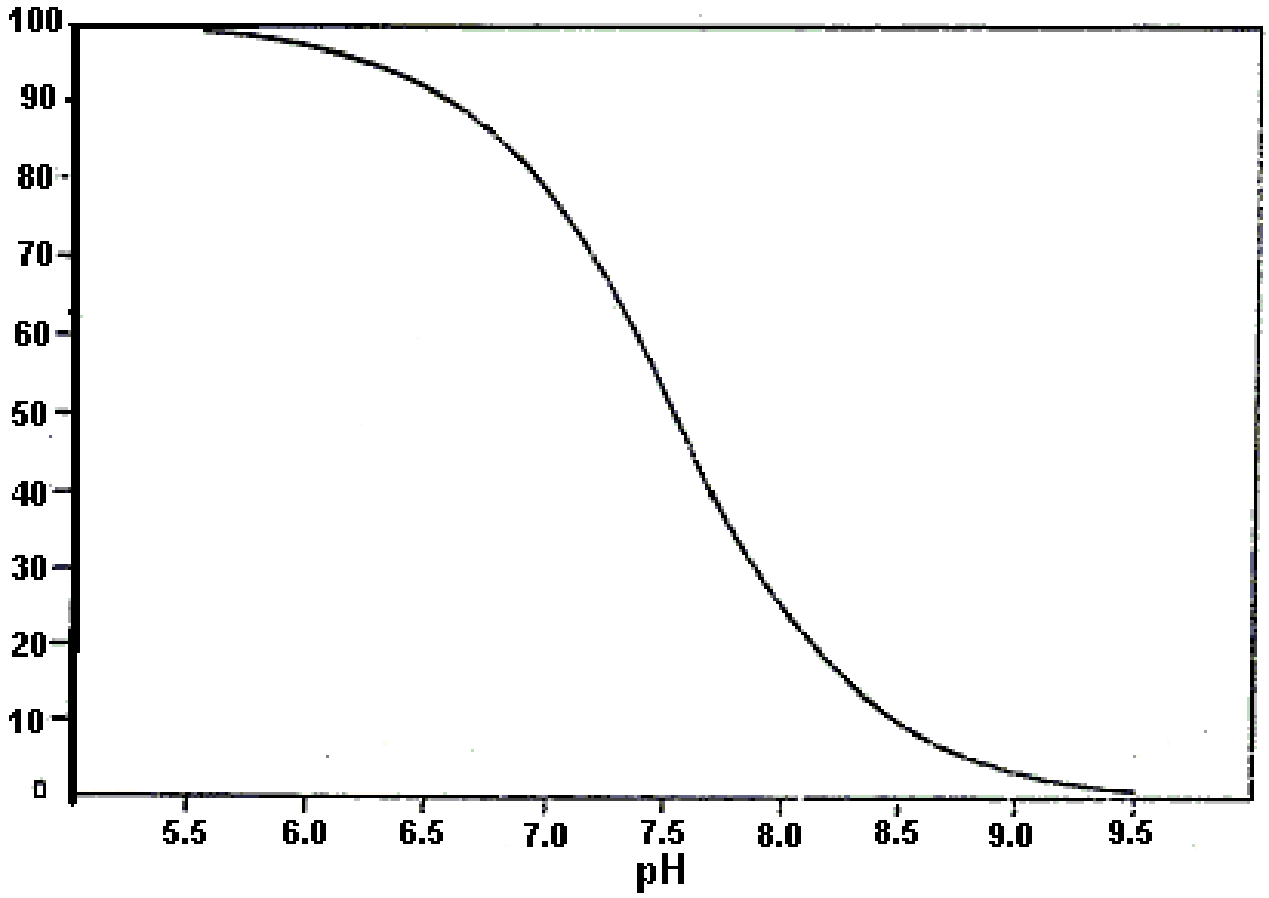


Figure 1-4. Percent of hypochlorous acid (molecular form) at varying pH.

c. **Combined Available Chlorine**. The chlorine oxidizes organic matter, such as urine, and some inorganic substances. In this process, ammonia results and the chlorine reacts with the ammonia to form compounds called chloramines. If this process goes to completion, the ammonia is completely oxidized. If, however, there is too much hypochlorous acid to complete the reaction, partially oxidized chloramines remain in the water. This combination of chlorine and ammonia (chloramines) is called combined available chlorine. Chloramines can kill bacteria, but 60 to 100 times slower than free available chlorine. Combined available chlorine does not disperse as rapidly as free available chlorine when exposed to sunlight or when water is agitated. Because of this, some pool operators add ammonia on hot, sunny days. This, however, is not an acceptable practice.

d. **Total Chlorine**. The amount of free available chlorine and combined available chlorine is called total chlorine. When chloramines exist, water can be held to bacteria-free standards by keeping the total chlorine at a concentration of 2.0 to 2.5 ppm (parts per million). This practice is undesirable, however, because chloramines cause eye irritation and produce unpleasant chlorine odors.

e. **Desirable Chlorine Levels**. When you test for chlorine, it is important to test for free available chlorine (FAC), not just total chlorine. Free available chlorine is measured in milligrams per liter (mg/1). As mentioned previously, the amount of free available chlorine required depends on the pH. When the pH is 7.2 to 7.6, the required free available chlorine is 0.4 to 0.6 mg/1. When the pH is 7.8 to 8.4, the required free available chlorine is 1.0 to 2.0 mg/1.

REMEMBER	
Amount of chlorine (Cl) required depends on pH	
pH--7.2-7.6	Cl—O.4 to 0.6 mg/l
pH--7.8-8.4	Cl—l.0 to 2.0 mg/l

f. **Sources of Chlorine**. Chlorine for use in pool sanitation can be obtained as a gas, solid, or liquid.

(1) Gas chlorine. Pure chlorine gas can be purchased directly in steel cylinders. The chlorine is compressed into a liquid and reverts to its gaseous state as it is released from the tank. The Army generally uses gas chlorine.

(2) Calcium hypochlorite, Ca (OCl_2). Calcium hypochlorite is a white granular compound, often sold in tablet form. It is 70 percent available chlorine by weight, and remains stable if kept cool and dry.

(3) Sodium hypochlorite NaOCl. Sodium hypochlorite is a clear, slightly yellow liquid solution and in commercial form is 12 to 15 percent available chlorine. The liquid can be fed directly into the pool. It is not as stable as the dry compounds. It should be stored in a cool, dark place, and should be used within 30 days.

Part 3. Swimming Pool Equipment.

NOTE: Swimming pool equipment must be handled carefully so that it works effectively and is not a safety hazard. The inspector must ensure that the equipment is being handled and maintained correctly.

1-13. CHLORINE GAS CONTAINERS

a. **Storing Chlorine Containers**. Containers of chlorine gas must be handled with care to prevent the escape of dangerous chlorine gas. Figure 1-5 shows a typical chlorine gas container.

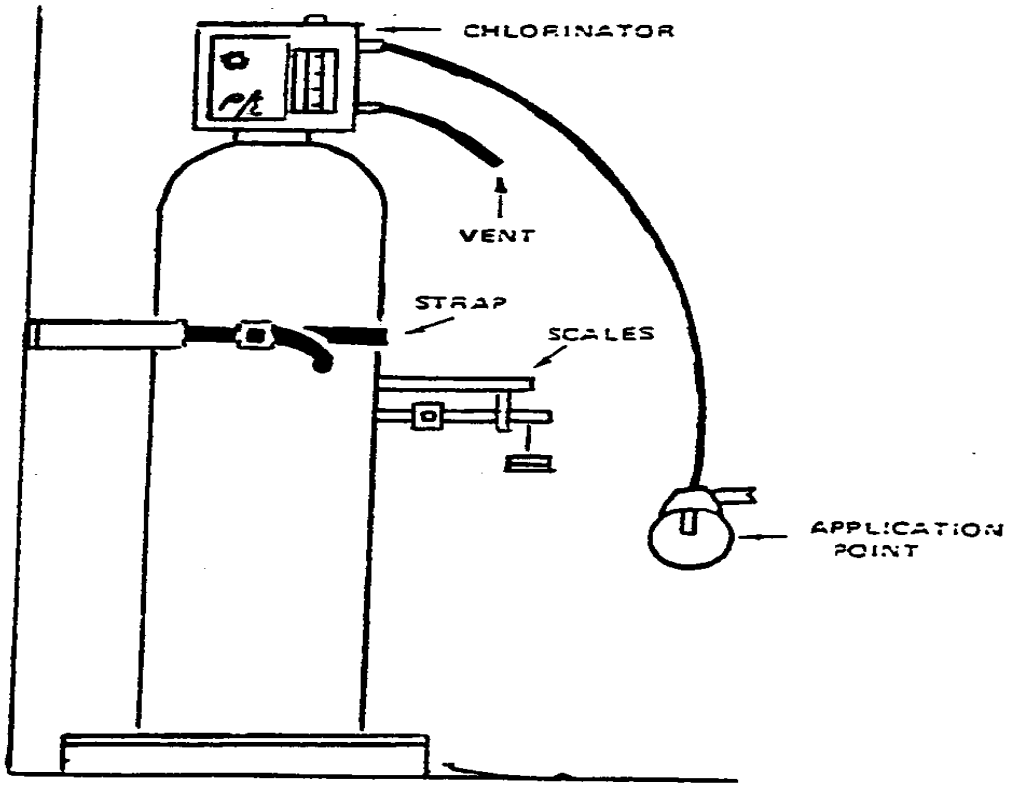


Figure 1-5. A chlorine gas cylinder.

(1) Safety plugs. These containers have fusible plugs that will melt at 160°F; they should be stored under cover in areas away from excessive heat. They should be separated by a wall from heaters such as pool heaters.

(2) Below ground storage. Since chlorine gas is heavier than air, chlorine should not be stored or used below ground level.

(3) Tank in us. The chlorine tank or cylinder in use must be firmly held in an upright position in a recessed sump, wall hung strap, or similar device. This is done to prevent it from being knocked over and releasing chlorine gas.

(4) Tanks in storage. Full or empty cylinders in storage must be similarly held in an upright position with the protective cap in place.

b. **Transporting Cylinders**. Cylinders should never be moved or stored unless the protective cap is in place.

c. **Connection from Cylinder to Chlorinator**.

(1) Temperature considerations. If the temperature of the chlorine cylinder is higher than the chlorine feed lines, chlorine can condense in the lines. Condensation can be prevented by reducing the pressure with a pressure-reducing valve. In no case should supply lines be run along cold walls or exterior windows. If heat must be applied, it should be applied by heating the entire space. Localized heat should not be applied directly to the tank or lines.

(2) Pipe fittings and connections. New gaskets should be used on all connections. Piping systems should be well supported and adequately sloped to allow drainage; low spots should be avoided. A lubricating pipe dope suitable for chlorine should be used. Linseed oil and graphite, linseed oil and white lead, or litharge and glycerine (for permanent joints) may be used.

(3) Cylinder valve. The cylinder valve is opened by turning the valve stem one full turn in a counterclockwise direction. Special 3/8-inch square box wrenches should be used for turning the valve stem. A wrench longer than 6 inches should not be used. Leaks at this valve can be stopped by tightening the packing nut at the valve stem.

d. **Detecting Leaks**.

(1) A small piece of cloth soaked with ammonia and wrapped around the end of a short stick can be used to detect leaks. If chlorine gas is leaking, a white cloud of ammonium chloride will form. Commercial 26° Baume aqua ammonia should be used; household ammonia is not strong enough.

(2) Avoid contact of ammonia with copper or brass.

(3) Never use water on a chlorine leak. The corrosive action of chlorine and water always will make the leak worse.

e. **Ventilation**. High and low ventilation should be supplied for chlorine rooms. The suction point of exhaust fans should be located at or near floor level. A 2-minute air change should be provided. Switches for all ventilating fans should be provided outside of chlorine rooms even when an inside switch is installed.

f. **Determining When a Cylinder is Almost Empty.**

(1) Weight. One hundred pound cylinders and 150-pound cylinders will have lost their rated net content.

(2) Gas pressure. The gas pressure gauge will show a marked drop when a cylinder is empty.

(3) Observing the chlorinator. Visible vacuum type chlorinators (bell jar installations) will begin to bubble air, and other chlorinators will show erratic movements of rotameter dose indicators.

g. **Use of Gas Masks**. Gas masks must be provided at a point accessible to the operator in the event of an emergency. They are usually placed immediately outside the chlorine room door.

(1) Front-mounted or back-mounted gas masks equipped with a chlorine type canister may be used with low concentrations of chlorine in air.

(a) Oxygen depletion. This mask will give no protection in areas deficient in oxygen.

(b) Maintenance of canisters. Canisters should be replaced either even if they are not exhausted, when either of the canister's seals have been broken or when the expiration date on the canister has been exceeded.

(2) Self-contained breathing apparatus with a full-face piece and a cylinder of air or oxygen carried on the body is suitable for high concentrations of chlorine or depleted oxygen. The apparatus should be the pressure-demand type in which the pressure inside the face piece is positive during both inhalation and exhalation. The self-contained breathing apparatus is optional.

h. **Emergencies.**

(1) Emergency plan. In addition to the general emergency plan, a carefully devised plan specific for chlorine gas should be posted. Personnel should be drilled in executing the plan

(2) Human exposure. If a person has been exposed to chlorine gas, remove him to fresh air and seek medical assistance immediately.

1-14 FILTRATION EQUIPMENT

a. **Gravity Sand Filters**. The installation of this type of filter for swimming pools is no longer common practice. The principles of operation and maintenance are similar to those discussed under pressure sand filters.

b. **Rapid Pressure Sand Filters**.

(1) Operation. These filters are supplied with a filtering mat of coagulant material. They are operated 24 hours a day at 3 gallons per square foot per minute until the difference in pressure between the influent pressure gauge (incoming water) and the effluent pressure gauge (outgoing water) is in the range of 5 to 7 pounds per square inch. They should then be backwashed at the rate of 15 gallons per square foot per

minute (8 gallons per square foot per minute for anthrifilt media filters). The backwashing should be done about 5 minutes or until the backwash water appears clear for 2 minutes.

(2) Operational problems.

(a) Air binding. Short-circuiting of the filter inflow can be caused by air trapped in the top of the filter. An air release valve located in the top of the shell will release this air. Automatic or manual valves are available. When painting the filter unit, avoid painting any automatic valves.

(b) Mechanical loss of filtering mat. Shutting down for extended periods of time, such as during the night, prevents good operation based on filter design and results in a partial loss of the uniform filter mat.

(c) Inability to read pressure differential. High range gauges should be replaced with those that read in the range of the filter's operation. In general, gauges reading up to only 30 pounds per square inch are desirable. Another operational difficulty may be avoided by mounting gauges on the tops of filter lines. This prevents clogging with sediment.

(d) Rate of flow change through filters. With the pump running at the same speed, the flow of water through the filter will slowly decrease throughout the filter run. A rate of flow controller can be installed to deliver a constant 3 (or 2) gallons per square foot per minute through the filter.

(3) Filter media difficulties. Filters that are failing to produce a clear effluent should be inspected by removing the manhole cover and looking at the sand surface after backwashing.

(a) Clean sand surface. This indicates satisfactory operation.

(b) Dirty sand surface. This indicates unsatisfactory conditions. The filter should be backwashed slowly (test backwash) and the rising water observed.

(c) Water emerges evenly during test backwash. More water is needed for backwashing in this case. While an inadequate backwash pump may cause the trouble, temporary relief may be obtained by removing the top layer of sand and washing it in a lye (caustic) solution. Another technique is to wash the whole sand bed with caustic soda. One pound of lye per square foot of filter surface should be applied after the water has drained to within 2 inches of the sand bed surface. After 4 to 6 hours of soaking, the filter may be drained and then thoroughly backwashed.

(d) Water emerges unevenly during test backwash. This indicates obstructions in the filter bed or underdrains.

1 This might be caused by mud balls or accumulations of dirt and sand held together by organic growths. The common correction is to apply 2 ounces of calcium hypochlorite per square foot of filter surface and soak the medium as described above. Maintenance of adequate backwash rates and application of pool disinfectant chemicals ahead of the filters will probably prevent this difficulty from recurring.

2 Some success has been reported with the use of an acid bath for correcting clogged filters and under-drains. Two pounds of sodium bisulfate per square foot of filter area is added, and the filters are permitted to soak as described above. Thorough backwashing is critical after this treatment to prevent damage to the metal parts of the system.

3 Cementation of sand grains due to mineral compounds normally in the water or used in water treatment may prevent correction by these treatments. In this case the sand might have to be replaced.

4 Sodium hexametaphosphate may be fed into water to prevent the undesirable effects of excessive hardness. Dosing in the range of 5 ppm is generally accepted. One suggested technique for batch feeding is to add 10 pounds of the compound for each 250,000 gallons of pool capacity at the start and 2 pounds for each 250,000 gallons every other week.

c. **High Rate Sand Filters**.

(1) Operation. These filters contain only sand and should be operated 24 hours per day at the manufacturer's suggested rate (12 to 20 gpm per sq. ft.). When the filter differential pressure reaches 10 to 15 psi, dirt will have penetrated the sand to a depth of 6 to 10 inches. The high rate filters often operate at pressures up to 30 or 40 psi. At a 10 to 15 psi increase, backwashing is necessary for only a 2 to 4 minutes period at the same flow rate as the filtering process.

(2) Operational problems.

(a) Backwashing with water that is not clean may clog the openings in the tank collection manifold. This clogging will cause uneven filter and backwash flow. The sand must be removed and the openings physically cleaned if the clogging does not correct itself during the next filter run. Draining the pool by use of the backwash cycle will cause clogging of the precision openings. Failure to clean the openings will cause increased velocity, which will eat away the remaining openings. This leads to destruction of the manifold laterals.

(b) Automatic and continuous bleeding of air from the filter tank is essential.

(c) Inadequate backwashing will lead to reduced permeability of the sand and eventual channeling.

(d) In some cases where high rate sand filters have not removed turbidity satisfactorily, alum can be used. Alum leads to better water quality with no harmful effects.

Part 4. Algae Control in Swimming Pools.

1-15. GENERAL INFORMATION

These plant forms are brought into the pool by the wind, with the bathers, and with makeup water. If uncontrolled, they will grow abundantly in the presence of sunlight. They are found in the free floating and clinging varieties. The clinging type will embed itself into pores and crevices in concrete and is a more difficult type to treat. An inspector must ensure that Army pool operators control algae growth.

1-16. ALGAE CONTROL

a. **Objectionable Features of Algae**.

(1) Chlorine demand. Algae will create a high chlorine demand. Once they have become established in the pool, the maintenance of residual chlorine is difficult.

(2) Water turbidity. The increased turbidity in the pool due to algae is not only unattractive but prevents proper swimmer supervision.

(3) Slipping. Algae growths may increase pool accidents from bathers slipping on pool bottoms, sides, walkways, and ladders.

(4) Effect on bacterial growth. Algae protect bacteria from the effects of chlorine by creating high chlorine demand themselves and may actually encourage bacterial growth.

(5) Odor. Algae create odor problems, particularly when reacting with chlorine.

b. **Detecting Algae Growth Early**. Algae require carbon dioxide in order to manufacture food. In the process of removing carbon dioxide from water, there is a definite increase in the pH. This may be seen in a radical jump in pH (from 7.5 to 8.0 as an example) in several hours, before there is any noticeable growth in the water.

c. **Methods of Control**.

(1) Routine chlorination. The maintenance of free available chlorine in the pool at all times will help prevent the start of algae troubles.

(2) Pool shading. Since algae need sunlight for growth, shading the pool will deter growth.

(3) Temperature. Pool water at a temperature of less than 80° F will minimize the algae problem.

(4) Super chlorination. One of the most effective treatments is the development of 10-ppm free available chlorine in the pool during nonswimming hours. Excessively high residuals may be reduced to permit swimming by adding sodium thiosulfate to the water at the rate of 1.0 to 1.5 ppm for each 1.0 ppm of residual chlorine being removed.

(5) Pool scrubbing. As a last resort, the pool may be drained, and the bottom and sides scrubbed with a 5 percent hypochlorite slurry or copper sulfate solution to remove stubborn algae growths.

Part 5. Accidents and Hazardous Conditions.

1-17. ACCIDENTS AND DROWNING DEATHS

Accidents and drowning deaths are the most serious problems associated with swimming pools. A good inspector will ensure that dangerous conditions and practices are not present.

a. **Supervision and Use of Equipment**. Lack of effective bather supervision, coupled with improper construction, use, and maintenance of equipment are prime causes of accidents.

(1) Cracked or flaking concrete in the pool area is a possible hazard, since swimmers may trip or cut themselves.

(2) Pool ladders, diving board supports, diving towers, and lifeguard chairs should be periodically checked to determine that they are firmly anchored and in good condition.

(3) Ladders and diving equipment should be inspected for the presence of any foreign matter, which would make them slippery.

(4) After maintenance or inspection of moving parts or electrical connections in the equipment room, a safety check should be made. The purpose of the check is to ensure that all safety guards and electrical box covers are replaced and valves are properly tagged and positioned. Electrical circuits should be inactivated before working on any equipment.

(5) Where wetness or other conditions causing slippery walking surfaces occur; nonslip surface treatments should be applied.

b. **Elimination of Dangerous Conditions**. The following dangerous conditions should be eliminated:

(1) Poorly-drained, slippery floors and walks.

(2) Shower-valve arrangement capable of scalding (central automatic mixing valve is best).

(3) Leaking soap dispenser.

(4) Abrupt changes in the slope of the pool floor or underwater steps.

(5) Insufficient depth or area for diving.

(6) Excessively high, shaky, slippery diving equipment.

(7) No water-depth markings.

(8) Turbid (clouded) water (a body on the bottom at the deepest point should be easily visible from the pool edge).

(9) Pool drains, outlets, or other fixtures, which could hold a person under water.

(10) Electrical equipment capable of shocking (for example: underwater light fixtures should be grounded).

(11) Water slides poorly located.

(12) Projecting or unguarded pipes.

(13) Improperly vented chlorinators.

(14) Use of glass bottles in the pool area.

c**. Lifeguards**. One lifeguard who holds an American Red Cross Senior Lifesaving Certificate or equivalent should be on duty at all times when the pool is in use. The lifeguard should be located in a position where the entire swimming area can be observed. At least one guard for each 75 bathers is recommended. Pools with unusual features or large areas require additional lifesaving personnel.

d. **Lifeguard Equipment**. Elevated lifeguard platforms or chairs should be provided on the basis of one per 2,000 square feet of pool surface area. The items named in (1) through (4) below should be provided on the basis of one for every 2,000 square feet of pool surface area:

(1) One or more poles with a blunt hook at one end. Each pole should be longer than one-half the pool width and should be able to reach all sections of the pool floor. Preferably, the pole should be of bamboo or other suitable light material. There should be at least 18 inches between the tip of the hook and the tip of the pole.

(2) One or more "flutter boards," each approximately 1 foot by 3 feet by 2 inches, capable of supporting in water a weight of at least 20 pounds.

(3) One or more throwing-ring buoys with a maximum diameter of 15 inches and with attached 3/16-inch lines. The lines should be at least equal in length to the maximum width of the pool.

(4) A separate throwing rope which is at least one-half as long as the maximum width of the pool.

e. **Maintenance**. Lifesaving equipment should be kept in good repair and operating condition. The functions should be plainly marked, and the equipment should be readily available. No one should tamper with or use this equipment for any purpose other than the intended use.

f. **Safety Rules**. It is a good idea for basic swimming pool regulations to be posted. Figure 1-6 shows suggested pool rules.

1. Orders and instructions of pool attendants will be complied with by all bathers.
2. All bathers with long hair will wear bathing caps.
3. All bathers must take a shower bath with warm water and soap before entering the pool enclosure, and swimming suits will not be worn in the shower bath. Bathers leaving the pool to use the toilet are required to take a second shower bath before returning to the pool.
4. No running, scuffling, ducking, or other forms of horseplay are permitted.
5. Spitting, blowing the nose, urinating, or defecating in the pool is forbidden.
6. No food, bottles, or drinking glasses are allowed in the bathhouse or pool enclosure.
7. No person who has a respiratory or other communicable disease or disease discharge, who is wearing a bandage of any kind, or who is otherwise ill is permitted to enter the pool enclosure.
8. No person reported by the surgeon as having or as being a carrier of aninfectious disease is permitted to enter the pool.
9. No persons other than bathers who have complied with these regulations and those concerned with the operation of the pool are allowed within the pool enclosure.
10. General swimming is prohibited in the diving area while diving equipment is in use.

Figure 1-6. Suggested swimming pool rules.

Part 6. Swimming Pool Inspections and Surveys.

1.18. SWIMMING POOL INSPECTIONS

a. **General**. The routine inspection of swimming pools is basically an inventory of operations and maintenance procedures carried out at the pool. This inspection is not intended to evaluate the soundness of original or remodeled construction features. Detecting structural and equipment defects, which exist because of poor operation and maintenance, are, however, important goals of the inspection. Structural alterations due to changes in normal pool load or operation are also matters of concern in the routine inspection.

b. **Inspection Policies**.

(1) Frequency of inspection. TB MED 575 recommends that swimming pools be visited twice a week by preventive medicine personnel. If this is not possible, a minimum frequency of one visit every two weeks during the swimming season should be planned for outdoor pools. Indoor pools which are used all year and which do not have the heavy loading problem of outdoor pools might be inspected on a less frequent basis. These suggested intervals are for the average pool and less frequent or more frequent inspections might be in order for the unusual pool.

(2) Time of inspection. Inspections at times of least use and maximum use are most valuable. Operational problems, such as difficulty in maintaining disinfectant residuals, will necessitate review during high loading, while problems of backwashing procedure might be helped by inspection during low loading.

(3) Inspection routine. The most efficient technique is one that will permit a thorough inspection in the least possible time without retracing steps. One suggested technique is to review the service buildings first, proceed to the pool area and pool tank, and finish with an inspection of the equipment room or rooms. The pool manager or equipment operator should accompany you as you tour the facilities. This will increase the effectiveness of the inspection.

c. **Conducting the Inspection**. As you conduct the inspection, you will check that the standards presented in this lesson are being followed. This paragraph will not repeat each standard but instead will give general guidelines for inspecting pool areas.

(1) Service buildings. In this area, you will basically inspect dressing rooms, toilet rooms, shower rooms, and swimmer supervision. Typical items include checking showerheads for water temperature and flow.

(2) Pool and pool area. The problems of pool surroundings, spectator control, pool structure, pool fittings, and water quality will be of major importance. Testing disinfection level and pH will be a routine procedure. See paragraphs 1-20 and 1-21 for pH and chlorine testing procedures. Other chemical tests of the pool water will

not be run routinely, but field kit testing for this purpose are available commercially. Clarity of the pool water is ordinarily tested by visual inspection, but a 6-inch black disc painted on a white background may be used. This device on the end of a stout cord is thrown into the deep end of the pool and observed from the pool edge. Bacteriological sampling, normally done at this time, is described in paragraph 1-19 of this lesson.

(3) Filter rooms. In this area, you will inspect the filtration, recirculation, and disinfection equipment. Items of concern should be the hair strainer, the chlorinator, and the chemical feed devices. At least once during the swimming season, and preferably at the beginning, the filter surfaces should be inspected. Routine inspection of the filters should include a check of the air release valves, flow rate indicators, pressure gauges, and condition of piping and tanks. Each inspection of this area must also include a review of all operational reports concerning the equipment. This often proves to be a most valuable tool in gaining an insight into the causes of operational problems.

(4) Summary and review of findings. You should make a summary of the defective items in the space under remarks on the inspection report (see figure 1-7). Refer to the items checked in the body of the report when you enter your remarks. In this way, the installation authorities are instructed on details of the defect and may be advised on how and when correction should be made. The report can be summarized in the office on another checklist similar to the one shown in figure 1-7. It gives a summary of the pool's operational conditions over a considerable period of time. Another valuable office record is a tabulation of sampling results. With this form a record may be kept of the chlorine, pH, and bacteriological sampling results from a pool over an entire swimming season. This record by itself serves as one good measure of a pool's operating efficiency.

1-19. BACTERIOLOGICAL STUDIES

a. **Bacteriological Sampling of Pool Waters.**

(1) Sample bottles. All sample bottles must be sterilized and treated with sodium thiosulfate to reduce the chlorine present in the water at the moment the sample is collected. If sodium thiosulfate were not used, the chlorine would act on the bacteria in the sample while it was being held or transported.

(2) Collection of samples.

(a) Time of collection. Samples should be collected when the pool is in use and preferably during periods of heaviest swimmer load. You should vary the hour of the day and the day of the week to obtain, over a period of time, a representative cross section of the sanitary quality of the pool.

SWIMMING POOL - INSPECTION REPORT

Name _____ Type _____

Address _____

Sir: An inspection of your swimming pool has been made this day and you are directed to correct conditions marked (X).

A. Pool Structure:
1. Floors, walls, runways ( )
2. Scum gutters, skimmers ( )
3. Ladders, stairs, step-holes ( )
4. Diving boards, floats, depth ( )
5. Inlets, outlets, circulation ( )
6. Piping ( )
7. Fencing ( )
8. _____ ( )

B. Supplemental Facilities
1. Food service ( )
2. Emergency equipment ( )
3. _____ ( )

C. Recirculation and Disinfection System
1. Filtration ( )
2. Hair strainer ( )
3. Disinfection ( )
4. Chemical feeders ( )
5. _____ ( )

D. Buildings, Galleries, Enclosures
1. Walls, floors, ceilings, partitions ( )
2. Lighting, heating, ventilation ( )
3. Plumbing, drainage ( )
4. Surroundings ( )
5. Appurtenances ( )
6. _____ ( )

E. Water
1. Disinfectant level____Mg/l ( )
2. Freedom from turbidity, debris, growths ( )
3. pH_____ ( )
4. _____ ( )

F. Showers, Toilets, Dressing Rooms
1. Clean, adequate, accessible ( )
2. Ventilation ( )
3. Hot, cold water ( )
4. Soap, towels ( )
5. Disinfection ( )
6. Lavatories ( )
7. Clothing Storage ( )
8. Refuse Containers ( )
9. _____ ( )

G. Records
1. Number of bathers ( )
2. Temperature of water ( )
3. Other operational data ( )
4. _____ ( )

H. Swimmer Control
1. Cleansing shower ( )
2. Supervision ( )
3. Open sores ( )
4. Placards displayed ( )
5. _____ ( )

Remarks: _____

Figure 1-7. A sample inspection checklist for swimming pools.

(b) Place of collection. It has been suggested that the pool be sampled at the shallow end to obtain water of the poorest quality in the pool. This is not necessarily true. The sampling point should be varied, but preferably near groups of swimmers. Do not have a swimmer collect a sample from the middle of the pool to avoid collection of heavily chlorinated return water. Avoid this problem by collecting samples at points between return water inlets.

(3) Technique of sampling.

(a) First carefully remove the cap and stopper from the bottle. Be careful not to touch the inner surfaces of the stopper.

(b) Hold the bottle near its base at a 45° angle.

(c) Fill the bottle in one slow sweep down and through the water. Be sure the mouth of the bottle is always ahead of your hand, and take care to avoid contamination from floating debris.

(d) Replace the stopper and the cap. Do not rinse the bottle in the pool or the sodium thiosulfate will be removed.

(4) Disposition of samples. The samples should be refrigerated immediately upon collection and held at less than 10°C during transport to the laboratory. The samples should be tested within 6 hours of collection. Pertinent data such as sampling time, location of the sample, sampler's identification, and desired analysis should accompany the sample.

b. **Bacteriological Analysis of Pool Waters**.

(1) Testing for coliform bacteria. The coliform organisms, most of which are harmless, are present in large numbers in the intestinal tract of man and other warm-blooded animals. The normal feces of man contain 100,000 to 1,000,000,000 coliform organisms per gram. Coliform organisms are easily tested for, and the test is sensitive. No appreciable quantity of fresh fecal material can be present in water and escape detection when the coliform test is properly carried out.

(2) Interpreting test results. TB MED 575 states that when the membrane filter procedure is used, not more than 15 percent of the samples may show more than 1.0 coliform organisms per 50 ml during any 30-day period.

(3) Example. A swimming pool has had 20 water samples taken for bacteriological analysis during the last 30 days. Two of the samples had coliform counts of 1.0 per 50 ml. Does this pool meet the standards for bacteria count?

(a) Answer: Yes.

(b) Reason: Before the standards are violated, up to 15 percent of the samples can show 1.0 coliform organisms per 50 ml. In this situation, 15 percent would be 3 samples (20 X .15 = 3). Three samples could have shown 1.0 per 50 ml. As only 2 samples had this count, the pool water is within the acceptable limits.

c. **Reasons for Bacterial Limit Violations**.

(1) Pool area and equipment.

(a) Structure of pool. The lack of a smooth inner pool surface contributes to the accumulation of foreign matter and microorganism growth.

(b) Disinfection. Inadequate disinfection devices, poor pool algae control, and entrance into the pool of foreign matter such as leaves and other organic matter will soon result in poor bacteriological reports.

(c) Water treatment equipment. Filtration equipment of inadequate design or size is a prime cause of poor water condition.

(2) Swimmer control. Failure to adequately clean showers for swimmers can result in poor bacteriological reports.

(3) Makeup water. Poor quality makeup water added to the pool will obviously result in the contamination of otherwise satisfactory water.

(4) Sampling procedures. Deviation from recommended sampling procedures could yield false results.

1-20. pH TESTING

a. Test Materials. Testing for pH is based on the ability of an indicator solution to change color in varying hydrogen ion concentrations. Adding a small amount of the indicator to a sample of pool water and then comparing the resulting watercolor with color standards allows you to quickly determine pH. Your determination should be accurate to within 0.5 pH units of the actual pH.

b. **Testing Technique**. You use this technique with the Army's standard test kit (FSN 6630-087-1838).

(1) Place the pH color disc in the comparator.

(2) Rinse the tubes with the water to be tested.

(3) Fill the tubes to the etched mark with the water to be tested.

(4) Place the tubes in the comparator.

(5) Fill the eyedropper to the etched mark (approximately 0.75 ml) with the pH indicator solution.

(6) Squirt the pH indicator solution from the eyedropper into the correct tube on the right. The other tube is present to show the natural color of the untreated water.

(7) Push both tubes down until the tips are flush with the top of the comparator.

(8) Match the color of the sample in the tube with the color on the disc. If the color does not match any of the discs, then estimate pH as accurately as possible.

(9) Record your results.

NOTE: If other commercial test kits are used, be sure to follow the specific instructions provided with the test kit.

1-21. TESTING FOR FREE AVAILABLE CHLORINE

a. **The DPD Test**. The test kit is the same kit used to test pH, FSN 6630-087-1838. The most accurate way to test for free available chlorine is a method using DPD (diethyl-p-phenylenediamine). Most Army kits now contain the materials for this test. The specific items in a test kit may vary with the manufacturer but the principle underlying the test remains the same. Like the pH test, the DPD test is based on the ability of an indicator (a reagent tablet) to change color when placed in water containing chlorine. The color is then compared with color standards. In addition to free available chlorine the test can also be used to test for combined available chlorine (chloramines) and total chlorine. However, as you are primarily interested in the amount of free available chlorine, that test is described in this lesson.

b. **Testing Technique**.

(1) Place about 1 ml of pool water in a test vial and add a reagent tablet.

(2) Crush the tablet into a powder, using a glass rod.

(3) Fill the test vial with pool water up to the mark.

(4) Place a cap on the test vial and shake until the powder is dissolved.

(5) Insert the test vial in the colorimeter block and compare with the color standards. Read the free residual chlorine directly in ppm.

(6) Record your results.

Section III. NATURAL SWIMMING AREAS

1-22. GENERAL

Bathing in streams, rivers, lakes, and salt waters presents special problems. This is because the sanitary quality of the water cannot be controlled as it can in swimming pools. Selection of a suitable bathing site, medical authority to inspect swimming areas. The medical authority may authorize an environmental health specialist to perform the actual inspection. The environmental health specialist must know the local swimming facilities, possible health hazards, and then, is the main way to ensure sanitation and freedom from dangerous pollution in natural bathing areas.

1-23. DISEASE HAZARDS

Organisms of the coliform group of bacteria, Entamoeba histolytica (a protozoa), and the helminths causing schistosomiasis are the three primary health hazards found in natural bathing waters. Since these three organisms are associated with human feces and urine, dangerous contamination may be caused by sewage from communities, military installations, individual dwellings, and other sources. In areas of the world where human waste is used as fertilizer, these diseases are particularly hazardous.

1-24. SANITARY SURVEY

A thorough sanitary survey including a bacteriological examination of each proposed swimming site is necessary. The results of the survey and the bacteriological examination enable the inspector to determine whether the site is acceptable. The specifics of bacteriological sampling are discussed in paragraph 1-19.

1-25. CLASSIFICATION OF NATURAL WATERS

Natural water is classified according to the number of coliform bacteria present in the sample. The classification system is shown in Table 1-2.

1-26. ACCIDENT PREVENTION

Drowning and accidents are a significant danger in natural bathing areas where safety features cannot be built in as they can for swimming pools. However, accidents can be reduced by following strict safety measures.

a. At least two lifeguard towers, four lifeguards, and one boat for each 1,000 feet of beach is recommended.

Classification	Average most probable numbers (MPN)/1OO ml or No. of coliform/100 ml of sample *	Remarks
	Inland (Fresh) Waters	
A	0 -- 50	Preferred, but not generally attainable.
B	51 -- 500	Average degree of contamination for inland streams free of fresh sewage pollution.
C	501 -- 1,000	Undesirable unless complete sanitary survey proves contamination harmless. May be dangerous if caused by fresh sewage.
D	Over 1,000	No swimming unless complete sanitary survey proves contamination harmless.
	Tidal (Salt) Waters	
A	0 -- 23	Preferred.
B	24 -- 240	Satisfactory.
C	Over 240	Unsatisfactory.

*When the membrane filter procedure is used.

NOTE: When using the membrane filter kit follow the instructions provided with it.

Table 1-2. Classification of natural swimming areas.

b. Marking signs and buoys should be placed to clearly mark the swimming area.

c. Lifesaving equipment and first aid kits should be readily available to lifeguards.

1-27. SUMMARY

a. AR 40-5 does not provide specific standards for swimming areas (pools and bathing beaches). Instead it refers to TB MED 575.

b. The primary authorities responsible for sanitation in swimming areas are:

(1) The Surgeon General who sets the standards of water sanitation and quality.

(2) The post commander who has overall responsibility for swimming areas and who enforces the sanitation standards.

(3) The Chief of Engineers who handles the design, operation, and maintenance of swimming pools.

c. Polluted water in swimming areas can transmit disease. The major diseases that are transmitted by contaminated water are intestinal infections, respiratory diseases, and ear-eye-nose infections. Fungal diseases can also be transmitted from polluted water. In some parts of the world natural bathing areas can harbor the helminth (worm) that causes schistosomiasis.

d. The post commander relies on the methods for operating and maintaining swimming areas.

e. There are five basic types of swimming pools:

(1) The recirculation-with-filter pool.

(2) The flow-through pool.

(3) The fill and draw pool.

(4) The wading pool.

(5) The spray pool.

f. Standards for swimming pools are stated in TB MED 575. Standards deal with the environment of the swimming pool, bathing load specifications, construction and design features, bathhouses, shower facilities, water closets, and spectator areas.

g. Acid-base pool chemistry is the foundation for other chemical procedures involved with swimming pools. This lesson presents a basic discussion of acid-base pool chemistry, to include:

(1) Definition of ion, acid, base and a neutral compound.

(2) Definition of pH, the pH scale, and the relation of the pH scale to hydrogen ion concentration.

(3) The ideal pH values for swimming pools (7.2 to 8.4).

(4) The effect of pH on swimming pool operation, especially on the effectiveness of chlorine as a disinfectant. It takes more chlorine to kill bacteria at a high pH level. The effect of pH on pipe and mortar corrosion, algae growth, and eye irritation is also discussed.

(5) Factors effecting pH.

(6) Chemicals used to control pH.

h. Chlorination is the most commonly used method of killing bacteria in swimming pools. This lesson discusses the following aspects of swimming pool chlorination:

(1) The characteristics of chlorine.

(2) The reaction of chlorine in water to form hydrochloric acid, hypochlorous acid, and hypochlorous acid and hypochlorite ion.

(3) Hypochlorous acid and hypochlorite ion.

(4) Free available chlorine.

(5) Combined available chlorine.

(6) Total chlorine.

(7) Sources of chlorine.

i. An inspector must ensure that swimming pool equipment is being handled and maintained correctly. The important features of chlorine gas containers and their care are discussed in this lesson. Commonly used filtration equipment, operational problems, and tests for adequate filter function are also discussed.

j. Another important item to inspect is algae control procedures. The unpleasant and dangerous features of algae growth, early detection, and control methods are presented in this lesson.

k. Accidents and drowning deaths are another problem in swimming pool operation. An inspector should determine that equipment is correctly used and maintained and that no dangerous conditions exist. Lifeguards and lifesaving equipment should be present according to standards.

l. The routine inspection is primarily a check on pool operations and maintenance procedures. Policies concerning the frequency, time, and method for conducting the inspection are discussed and a sample inspection checklist is shown.

m. The routine inspection includes bacteriological studies, pH testing, and testing for free available chlorine. Common tests for these items and testing techniques are described.

n. Natural bathing areas present special problems because they cannot be controlled as swimming pools can be controlled. Disease hazards come from three organisms: coliform bacteria, entamoeba histolytica, and the helminths causing schistosomiasis. In addition, accidents and drowning occur at natural swimming areas due to the lack of control.

o. Natural swimming areas must be surveyed carefully, including bacteriological sampling. The inspector can then determine whether the site is acceptable for swimming. Natural swimming areas are classified according to the number of coliform organisms present in the sample. An inspector must also check that safety measures, such as lifeguard requirements and the use of buoys, marking signs, and lifesaving equipment, are being followed.

Continue with Exercises

EXERCISES, LESSON I

INSTRUCTIONS: The following exercises are to be answered by marking the lettered response that BEST answers the question or BEST completes the incomplete statement or by writing the answer in the space provided.

After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers.

1. The _____ authorizes swimming areas for recreational use and the _____ is responsible for the design, construction, and maintenance of swimming pools.

2. The basic reference that sets the standards for swimming pool operations is _____.

3. Swimming areas do not usually cause disease. However, when diseases do occur, they are primarily transmitted by the _____ _____.

4. The three MAIN health problems caused by swimming areas are:

   a. _____.

   b. _____.

   c. _____.

SPECIAL INSTRUCTIONS FOR EXERCISES 5 THROUGH 9. Match the pool type in Column I with the letter of the correct description in Column II

	Column I	Column II
5. ___	Recirculation with filter pool.	a. A small pool with a maximum depth 36 inches for use by children. There is a continuous flow of treated water to produce a complete water change every two hours.
6. ___	Fill and draw pool.	b. A continuous supply of fresh water enters one end of the pool and an equal amount of dirty water flows out of the other end.
7. ___	Wading pool.	c. The only pool type approved for new construction.) Water is withdrawn from the pool, filtered, disinfected, and returned to the pool.
8. ____	Spray pool.	d. The pool is filled and used until the water is dirty. The pool is then emptied and refilled with clean water.
9. ____	Flow through pool.	e. An artificial pool for children. (Treated water enters the pool but does not pond.) Used water is discharged or returned to the filtration system.

10. Pools should have obvious water depth markings. Which areas of the pools are required to be marked?

    a. _____.

    b. _____.

    c. _____.

11. You are inspecting a pool that is 70 feet wide by 85 feet long. There are 160 bathers present. Is the bather load acceptable?

    a. Yes.

    b. No.

12. Below is a list of specifications for pool inlets, outlets, overflow gutters, and skimmers. Indicate to which item the specification applies by writing "inlet," "outlet," "overflow gutter," or "skimmer" after the specification. The terms may be used more than once.

    a. These devices allow fresh water to come into the pool and should be located to reduce uniform water circulation and a uniform disinfectant residual through out the pool. _____

    b. These devices should extend completely around the pool and generally serve as a handhold. _____.

    c. At least one of these devices is provided for each 500 square feet of surface area. _____.

    d. These devices should be provided at the deepest point in the pool to allow the pool to completely empty in about 4 hours. _____.

    e. These devices should be able to continuously remove the recirculating water and return it to the filter. _____.

    f. These devices should be provided with removable and cleanable baskets to collect debris. All overflow water should pass through the basket. _____.

    g. These devices should either be designed as adjustable openings or have Individual valves to adjust the water volume for the best circulation. _____.

    h. Openings of these devices should be covered with gratings. The width of the grating openings should be one-half inch; they should be designed to prevent swimmers' hands and feet from being caught. _____.

    i. These devices should create enough water surface velocity to bring in waste and oil from the whole pool. _____.

13. You are inspecting a swimming pool and observe that the pool ladders have a tread of 10 inches and a rise of 13 inches. The clearance between the ladder and the pool walls is 2 ½ inches. How would you rate this on the inspection checklist shown in figure 1-7 of the text?

    _____
    _____.

14. Make the following observations about an 8-foot diving board at a pool. Indicate if the condition observed is acceptable by writing "satisfactory" or "unsatisfactory" after the statement.

    a. The diving board and platform have nonslip surfaces. _____.

    b. The diving board has 16 feet of headroom._____.

    c. It is separated horizontally from the sidewalls by 6 feet. _____.

    d. The water depth at the end of the board and 12 feet beyond is 8 ½ feet. _____.

    e. The pool width at the end of the board and 12 feet beyond is 28 feet._____.

15. You are inspecting the dressing rooms in a pool bathhouse. Which of the following conditions would you consider to be unsatisfactory?

    a. The floors slope about ¼ of an inch toward the drain.

    b. The walls are made of smooth, easily cleanable material and are painted.

    c. The walls and partitions have no visible cracks.

    d. Lockers are resting on legs with the locker bottom 7 inches above the floor.

16. One showerhead should be provided for every _____ individuals of each sex; when the shower water supply is tempered, the temperature should be _____ °F to ____ °F.

17. Showers should be positioned so that bathers are required to:

    a. Pass through them before going into the pool area.

    b. Shower every time they leave the pool water.

    c. Shower immediately before leaving the pool area.

18. You are examining the recirculation system of an indoor pool and make the following observations. Indicate whether the observation is acceptable by writing "satisfactory" or "unsatisfactory" after the statement.

    a. Pumps are able to provide a complete water turnover 3 times in 24 hours. _____.

    b. A-rate-of-flow indicator is installed on pool return lines. It reads in gallons per minute and can measure flows up to one and a half times the normal rate. _____.

    c. There is a hair strainer located on the non-suction sides of the pump. The hair strainer is cleaned once per week. _____

    d. Pipes are made of a nontoxic material, which is easy to clean and repair. There are no obvious signs of corrosion. There is a sump located at the lowest point of the system. Outlets are accessible for water samples._____.

    e. There is a thermostat-controlled heater that maintains the water temperature between 65°F and 75°F. There is one fixed thermometer in the recirculation line at the heater outlet._____.

19. There should be at least one water closet for every _____ women bathers and one water closet plus a urinal for every _____ men bathers.

SPECIAL INSTRUCTIONS FOR EXERCISES 20 THROUGH 28. Match the definition in Column I with the letter of the appropriate term Column II.

	Column I	Column II
20. ____	An expression of how acidic or alkaline a substance is.	a. Acid b. Base c. pH
21. ____	One of the acids formed when chlorine is added to water. It is the most effective form of chlorine for killing bacteria. The percentage of this form of chlorine decreases as the pH value rises.	d. Neutral substance e. Free available chlorine
22. ____	A substance characterized by an excess of hydroxyl ions.	f. Combined available chlorine

23. ____ A substance characterized by an excess of hydrogen ions.

24. ____ A substance with an equal number of hydrogen and hydroxyl ions.

25. ____ The portion of chlorine that remains uncombined with matter in the pool water.

26. _____ One of the acids formed when chlorine is added to water. It is useless as a disinfecting agent.

27. _____ The amount of chloramines in pool water.

28. _____ One of the compounds formed when chlorine is added to water. It kills bacteria rather slowly.

g. Hydrochloric acid

h. Hypochlorous acid

i. Hypochlorite ion

29. The best pH range for swimming pools is _____.

30. Which of the following is <u>NOT</u> a true effect of pH on swimming pool operations?

a. A pool with a pH of 7.6 to 8.0 causes the least eye irritation.

b. It takes more chlorine to kill bacteria at a high pH level.

c. A high pH encourages the growth of algae.

d. A pH of 7.0 or below can corrode metal pipes and dissolve mortar and concrete.

31. List three chemicals used to raise pH and three chemicals used to lower pH.

Raise	Lower
a. _____	a. _____
b. _____	b. _____
c. _____	c. _____

32. The Army generally uses _____as a chlorine source.

33. You are evaluating the maintenance and handling of chlorine gas containers at a pool site. You observe the following:

Observation 1: Full chlorine gas containers are stored above ground and are firmly held upright with protective caps in place.

Observation 2: The temperature of the cylinder is higher than the temperature of the feed lines.

Observation 3: The valve stem to the cylinder valve is opened with a wrench about 8 inches long.

Observation 4: High and low ventilation is provided. The suction point of the exhaust fan is located near floor level and a 2-minute air change is provided. There is an inside but no outside fan switch.

Observation 5: Gas masks are present. They are placed outside the chlorine room door where the operator can easily reach them.

Observation 6: A plan specific to a chlorine emergency has been devised, and pool personnel are periodically drilled in following the plan.

a. How would you rate observation 1 (satisfactory or unsatisfactory)? What recommendations would you make, if any?

_____
_____

b. Would you rate observation 2 as satisfactory or unsatisfactory? What recommendations would you make, if any?

_____
_____

c. Is the valve stem being correctly opened in observation three?

_____

d. How would you rate the ventilation system in observation four? Would you make any recommendations for improvement?

_____
_____

e. Observations 5 and 6 deal with safety measures. Are these safety measures satisfactory or would you make corrections?

_____.

34. A high rate sand filter has not removed cloudiness from the water successfully. What would you suggest to correct the problem?

_____

35. What is a way to detect algae growth before any noticeable change in the water?

_____

36. What effect does algae growth have on bacterial growth in swimming pools?

a. Algae growth basically has no effect on bacterial growth since nutritional needs differ.

b. Algae growth tends to decrease bacterial growth since algae feed on some forms of bacteria.

c. Algae growth protects bacteria from chlorine and may encourage the growth of some forms of bacteria.

37. A pool maintains free available chlorine at all times, is fairly well shaded, and has an average water temperature of 78° F. Is this pool likely to be threatened by algae growth? Why or why not?

_____
_____
_____
_____

38. Below are a list of conditions that you have found while conducting a swimming pool inspection. Indicate whether the condition could cause an accident by writing "hazardous" or "not hazardous" after the statement.

    a. The floors and walks are not slippery and are well drained. _____

    b. The pool floor has an abrupt slope. _____

    c. Not all underwater electrical fixtures are grounded. _____

    d. Drains, outlets, and fixtures are arranged to avoid trapping a swimmer under water. _____

    e. The shower has an automatic mixing valve. _____

    f. Some of the diving board ladders contain wet dirt and debris. _____

    g. The concrete surfaces in the pool area are smooth and show no cracks or flaking. _____

39. When a pool is in use, there should be at least _____lifeguard(s) on duty at all times who has/have an _____ or equivalent.

40. Name the basic lifesaving equipment that must be provided on the basis of one item for every 2,000 square feet of pool surface area:

    a. _____

    b. _____

    c. _____

    d. _____

41. TB MED 575 recommends that preventive medicine personnel ideally should check swimming pools:

    a. Once a month

    b. Twice a week

    c. Three times during the swimming season

42. Before performing bacteriological studies, the sample bottles should be sterilized and treated with _____. Samples should be collected when the pool is_____ and during _____. The preferred sampling point is near _____. The samples should be _____immediately upon collection and tested within _____hours of collection.

43. A swimming pool has had 25 water samples taken for bacterial analysis during the past 30 days; 6 of the samples had a coliform count over 1.0 per 50 ml. Does this pool meet the standards for bacteria count? _____

44. When performing the pH test, you basically:

    a. Collect a sample and allow a precipitate to fall out. The amount of precipitate indicates pH.

    b. Add an indicator to a sample and compare it with color standards.

    c. Collect a sample and add a standard chemical to allow the sample to separate into two layers. The color of the bottom layer indicates the pH.

45. You will use the DPD Test primarily to test for_____. The test can also be used to determine _____ and _____.

46. A lake in a foreign country is being considered as a swimming area for Army personnel.

    a. What are the three major disease hazards?
    _____
    _____
    _____

    b. What must be done to ensure that the site is not a health hazard?
    _____
    _____

47. You use the membrane filter procedure to determine coliform bacteria count for the lake described in exercise 46. The count is 750 coliform bacteria per 100 ml of the sample. What would you suggest be done?

a. Declare the water absolutely safe for swimming since the count is extremely low.

b. Declare the water undesirable and recommend additional and thorough surveys to prove the contamination harmless.

c. Prohibit swimming because the water is dangerously contaminated.

48. Accidents are a significant danger at natural swimming areas. Because of this, it is recommended that every 1,000 feet of beach have:

a. _____

b. _____

c. _____

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 1

1. Post commander; Chief of Engineers. (paras 1-2a, b)

2. TB MED 575. (para 1-1)

3. Excrement, urine, and discharges of bathers. (para 1-3a)

4. Intestinal infections.
   Respiratory diseases.
   Eye-ear-nose infections. (para 1-3b)

5. c (para 1-5a)

6. d (para 1-5c)

7. a (para 1-5d)

8. e (para 1-5e)

9. b (para 1-5b)

10. Points of maximum and minimum depth.
    The break between shallow and deep water.
    Intermediate 1-foot increments of depth. (para 1-7b(l)

11. a (The standard bather load is 36 square feet of water area for each person actually in the pool. In this case, the pool area is 5,950 square feet (85 x 70); 120 people are estimated to be in the pool at the same time (3/4 X 160). This allows approximately 50 square feet area of water area for each person in pool (5950) 120). This is well above the allowance of 36 square feet for each person actually in the pool. (para 1-7c))

12 a. Inlet. (para 1-7d(1))
   b. Overflow gutter. (para 1-7e(1))
   c. Skimmer. (para 1-7e(2))
   d. Outlet. (para 1-7d(2))
   e. Overflow gutter. (para 1-7e(1))
   f. Skimmer. (para 1-7e(2)(a))
   g. Inlet. (para 1-7d(1)(c)
   h. Outlet. (para 1-7d(2)(a))
   i. Skimmer. (para 1-7e(2))

13. As unsatisfactory under item A 3. You could then write a brief description of the problem in the Remarks Section. (para 1-7f(1), (2); figure 1-7; para 1-18c(4))

14. a. Satisfactory. (para 1-7h)
    b. Satisfactory. (para 1-7h(l))
    c. Unsatisfactory. (para 1-7h(l))
    d. Unsatisfactory. (Table 1-1)
    e. Unsatisfactory. (Table 1-1)

15. d (para 1-8a(1))

16. 30; 90°F to 110°F. (para 1-8a(2))

17. a (paras 1-8a(2); 1-8b)

18. a. Satisfactory (para 1-7i)
    b. Satisfactory (para 1-7i(6))
    c. Unsatisfactory (para 1-7i(3))
    d. Satisfactory (para 1-7i(2))
    e. Unsatisfactory (para 1-7i(5))

19. 20, 40 (para 1-9a)

20. c (para 1-11c)

21. h (para 1-12b(1))

22. b (para 1-11b)

23. a (para 1-11b)

24. d (para 1-11b)

25. e (para 1-12b(2))

26. g (para 1-12a(2))

27. f (para 1-12c)

28. i (para 1-12b(1))

29. 7.2 to 8.4 (para 1-11d)

30. c (para 1-11d(4))

31.

Raise	Lower
Sodium carbonate	Sodium bisulfate
Sodium hydroxide	Hydrochloric acid
Sodium bicarbonate (para 1-11f)	Sulfuric acid (para 1-11f)

32. Gas (para 1-12f(1))

33. a. Satisfactory, no recommendations. All specifications are met. (para l-13a(4))

    b. Unsatisfactory. This can cause chlorine to condense in he lines. You could suggest using a pressure-reducing valve to prevent condensation. (para 1-13c(l))

    c. No. A wrench longer than 6 inches should not be used. You would recommend using a shorter wrench. (para 1-13c(3))

    d. It would be rated unsatisfactory. There should be an outside as well as an inside switch. You would suggest installing an outside switch. (para 1-13e)

    e. They are satisfactory. No recommendations are needed. (paras 1-13g, h)

34. You would suggest using alum. (para 1-14c(2)(d))

35. Observe a sharp increase in pH. (para 1-16b)

36. c (para 1-16a(4))

37. No. A water temperature less than 800°F minimizes algae growth. Likewise,

    shading the pool and constantly maintaining free residual chlorine inhibit algae growth. (para 1-16c(1), (2), (3))

38. a. Not hazardous. (para 1-17b(l))
    b. Hazardous. (para 1-17b(4))
    c. Hazardous. (para 1-17b(10))
    d. Not hazardous. (para 1-17b(9))
    e. Not hazardous. (para 1-17b(2))
    f. Hazardous. (para 1-17a(3))
    g. Not hazardous. (para 1-17a(l))

39. One; American Red Cross Senior Lifesaving Certificate. (para 1-17c)

40. One or more poles with a blunt hook. (para 1-17d(l))
One or more "flutter boards." (para 1-17d(2))
One or more throwing ring buoys. (para 1-17d(3))
A throwing rope. (para 1-17d(4))

41. b (para 1-18b(l))

42. Sodium thiosulfate; in use, periods of heaviest swimmer load; groups of swimmers; refrigerated, 6. (para 1-19a(1), (2), (4))

43. No. According to TB MED 575, NOT more than 15 percent of the samples can show over 1.0 coliform organisms per 50 ml during any 30-day period. In this case, only 4 samples could show more than 1.0 coliform organisms (0.15 X 25 = 3.75 or 4). The 6 samples exceed the required limits. (para 1-19b)

44. b (para 1-20a)

45. Free available chlorine; combined chlorine; total chlorine. (para 1-21a)

46. a. Coliform organisms
Entamoeba histolytica
Helminths causing schistosomiasis. (para 1-23)

b. A thorough sanitary survey, including bacteriological testing, must be done. (para 1-24)

47. b (para 1-25; Table 1-2)

48. 2 lifeguard towers.
4 lifeguards.
1 boat. (para 1-26a)

END OF LESSON 1

LESSON ASSIGNMENT

LESSON 2	Inspect Child Development Service Facilities.
TEXT ASSIGNMENT	Paragraphs 2-1 through 2-7.
TASK TAUGHT	081-91S-5139--Inspect on-post child development service facilities.
LESSON OBJECTIVES	After completing this lesson, you should be able to:

2-1. Identify the standards for child development service facilities in accordance with AR 608-10.

2-2. Identify the items found on an inspection for child development service facilities.

2-3. Identify the authorities responsible for sanitation in child development service facilities.

2-4. Identify the main health problems in child development service facilities.

2-5. Identify the primary goal of child development service facilities.

2-6. Identify the role of the preventive medicine specialist in child development service facilities.

SUGGESTION After completing the lesson assignment, complete the exercises at the end of this lesson. These exercises help you to achieve the lesson objectives.

LESSON 2. INSPECT CHILD DEVELOPMENT SERVICES

Section I. SANITATION STANDARDS FROM AR 608-10

2-1. INTRODUCTION

Many Army installations offer child development services (CDS) for personnel. AR 608-10 sets standards so that children in these facilities receive adequate care and are protected from health hazards. The preventive medicine (PVNTMED) specialist is required to inspect these facilities and must know the regulations and standards for these institutions as well as potential problems and dangers.

2-2. SANITARY STANDARDS FOR CDS FACILITIES FROM AR 608-10

a. The sections of AR 608-10 that state critical standards for CDS facilities are presented in this regulation. You should be thoroughly familiar with these standards.

b. AR 608-10 states the following for CDS.

(1) This regulation (608-10) prescribes policies, procedures, and standards for establishing and operating CDS, formerly Child Support Services, at Army installation. The Preventive Medicine Specialist is required to inspect these facilities and must know the regulations and standards for these institutions as well as potential problems and dangers.

(2) This regulation applies to Active Army, Army National Guard, and the Army Reserve. It applies to all activities, contractors, individuals, and private

organizations that provide childcare services for children 4-weeks to 12 years old on property controlled by the U.S. Army worldwide.

(3) AR 608-10 presents standards for the protection of children under 12 years of age at CDS facilities. The facilities discussed DO NOT include elementary schools, high schools or medical clinics.

c. AR 608-10 states the following definitions of CDS Facilities.

(1) Definitions. The CDS center-based system is composed of programs offering child development services.

(a) Full-day program. The full-day program includes center-based services that meet the needs of working parents requiring childcare services 5 to 11 hours per day on a regularly scheduled basis. It will include program provisions for infants, toddlers, and preschool age children where demand exists.

(b) Hourly care program. The hourly care program includes center-based developmental services for children that meet the needs of parents requiring short-term child-care on an intermittent basis. It will include program provisions for infant, toddler, preschool age, and school age children where demand exists.

(c) Part-day program. These programs include center-based developmental services that meet the need of parents requiring childcare services on a regularly scheduled part-day or seasonal basis. Included are services such as part-day self-contained programs for children age 3-5 years, before and after school, summer programs for children ages 5-12 years, and specialized programs to meet unique local demands.

(2) Important points.

(a) Total enrollment of children in full-day programs may exceed up to 10 per cent of program capacity.

(b) Preschool programs may be provided as a separate service or incorporated into the preschool age category in the full-day program.

(c) A CDS facility is a building or part of a building used to provide supervised childcare on a daily or periodic basis when children are not in the custody of parents.

d. AR 608-10 states the following standards for emergency requirements in CDS facilities.

(1) Medical emergencies. Children who develop conditions after admission that require immediate medical attention will be brought to a medical facility for evaluation.

(2) Minor health problems. Children who develop minor health problems after admission will be handled in the following manner.

(a) Child development service personnel will notify the parent or parent-designee should the child become ill or injured during the time in care. Ill children will generally remain in the isolation area until such time as reasonable arrangements can be made for the child's release to the parent or parent-designee.

(b) If there is a question about the course of action to be taken, staff should refer to the health consultant.

(3) Medical care after admission.

(a) Parents will give consent on DA Form 5246-R for CDS personnel to take children for care, medical or dental, in an emergency-situation where the child's condition represents a serious or imminent threat to life, health, or well-being. Conscious efforts will be made to notify a parent prior to such action. However, treatment at an Army medical facility may be provided without additional consent under the provision of AR 40-3, para 2-245.

(b) Parents of children using service in extended hour family child care (FCC) homes where length of care exceeds 24 hours must provide a special power of attorney.

(4) Important points.

(a) In cases of emergency, parents or guardians must be contacted. Complete information is required for this purpose, to include: name, home and office telephone numbers, and any other appropriate telephone numbers.

(b) The Child Advisory Council will prepare an emergency medical care evacuation plan. All staff members must know the plan.

(c) Only emergency medical supplies will be on hand.

(d) Critical telephone numbers must be posted on each telephone.

(e) All medical supplies are to be kept out of reach of children.

e. AR 608-10 states the following standards for CDS buildings.

(1) Any building converted to or constructed as a CDS facility, or in which CDS are provided, will comply with requirements of the latest National Fire Protection Association (NFPA) No. 101, Life Safety Code, and other applicable portions of this regulation. For purposes of the NFPA code, CDS facilities will be categorized as Educational Occupancies.

(2) Facilities should be located away from areas of heavy vehicular traffic and in a setting where children's activities do not interfere with normal installation operations.

(3) All facilities will be located on the ground floor level, irrespective of building construction.

(4) Only lead free, nontoxic paint will be used in child accessible areas.

(5) Remember these important points.

(a) All CDS buildings must follow the latest requirements of the NFPA No. 101, Life Safety Code.

(b) Child development service facilities should be located where children's activities do not interfere with operations and away from busy traffic.

(c) Child development service facilities must be located on the ground floor.

(d) Only lead-free, nontoxic paint can be used in areas accessible to children.

f. AR 608-10 states the following requirements for indoor features at CDS facilities.

` (1) Hand washing facilities with soap, water, and disposable paper towels will be readily available. Hygienic hand washing habits will be practiced by staff and encouraged for children. Staff facilities will be located in the same room or area in which infant and toddler care takes place in addition to any other such facilities. When accessible to children, water temperatures will be controlled so as not to exceed 110°F. Common towels or face cloths are prohibited.

(2) A minimum of 35 square feet of useable indoor floor space for play (exclusive of corridors, toy-storage, sleeping areas, and similar nonuseable areas) will be provided each child over one year of age. At least 20 square feet of floor space will be provided for each child between six months and one year who are normally kept in a crib or playpen. Play areas should be effectively segregated by age group and activities provided commensurate with age group level.

(3) Separate rooms will be provided for sleep and play.

(4) A separate room will be provided for the isolation of children who become ill after arrival at the facility.

(5) Lavatory and toilet facilities will be located in proximity to playrooms, playground, and locker facilities. Separate toilet facilities should be available to and adjoining isolation rooms. Separate toilet facilities will be provided for boys and girls beyond the age of 5 years, and the staff. One flush toilet and lavatory will be provided per eight children 18 months-3 years, and 1 per 15 children over 3 years of age. Two flush toilets and lavatories per group of 25 to 30 preschool age children age 3-5 years. Toilets and other fixtures should be scaled to size of children. Approximately 50 percent of children's toilet should be pediatric size (10", mounted 19"-21" from the floor).

(6) All windows will be firmly screened to protect against falls but removable for emergency exits. All stairways will be protected by gates or similar restraints.

(7) Floor surfaces should provide safety and warmth and be readily cleanable in a manner which minimizes dust production and slippery conditions.

(8) Separate spaces for storing cleaning equipment and supplies will be provided. Detergents, solvents, and other supplies of potential danger will be inaccessible to children (preferably under lock). Poisonous and highly caustic materials such as drain cleaners will be prohibited from the facility.

(9) All electrical outlets will be of child safety type or covered when not in use. Extension cords will be approved by the fire marshal. Electrical appliances, fireplaces, radiators, heaters, fans, and similar articles will be effectively protected from child contact.

(10) Drinking fountains, when provided, will be equipped with mouth guard and angled jet and should be sized for children. Approximately 50 percent should be mounted 30" from the floor to preclude unnecessary use of steps or platforms.

(11) All rooms occupied by children will be equipped with approved heating and ventilating systems capable of maintaining a temperature of at least 68ºF in the winter and 78°F in the summer measured within one foot of the floor. At least three air changes per hour of outdoor air will be provided in play and sleeping areas, and adequate exhaust provided in toilets and lavatories. Humidity control (preferably steam manifold type maintained at 50-55 percent R.H.) should be provided in winter months to prevent drying of mucous membranes, which causes increased susceptibility to upper respiratory infection. When used, humidification

equipment will be monitored by medical authority to ensure against air-borne microbial contamination.

(12) Tables, chairs, and other furniture and fixtures will be appropriately scaled to meet the needs and size of children served. Play equipment will be carefully selected with regard to size, safety, and sanitation features and inspected daily prior to used. Toys that can be washed are preferable for infants and toddlers. Toys and other play equipment with sharp points or edges and those which are coated with toxic or flammable materials are prohibited. Paints and other materials for child handcraft will be water based, nonflammable, and nontoxic.

(13) Beds, cots/cribs, and playpens will be provided for children appropriate to age and size and will be placed at least three feet apart on all sides except when against a wall. Aisles will be unrestricted when beds, cots/cribs, or playpens are occupied. Mattresses will be provided with waterproof covers. Bed linen must be changed whenever beds/cribs are occupied consecutively by different children and as linen is soiled. Cribs, playpens, and other equipment as appropriate will be washed with a detergent solution daily. Lead-base paint, sharp projections, easily movable parts, and abrasive surfaces must be avoided. In conformance with FDA recommendations, spaces between crib slats should not be greater than two and three eighths inches to prevent infants from strangling.

(14) When provided by the facility, diapers will be disposable. Parents may provide either cloth or disposable diapers. Cloth diapers must be placed in plastic bags labeled with the child's name and returned to the parent. Diapers will not be laundered by childcare center personnel. Disposable diapers will be placed into tightly covered receptacles with plastic liners. Plastic liners will be closed and secured prior to being placed into an exterior refuse receptacle. Soiled diapers will not be sorted in play, sleep, or food service areas. Hand washing facilities will be conveniently located in areas where diapers are changed.

(15) Proper illumination in work and play areas will be provided to prevent eyestrain and accidents. A minimum of 30-foot candles of illumination is required in all play and activity areas; 100-foot candles of illumination will be provided in staff workspace and examining areas.

(16) All areas will be kept clean and in good repair.

(17) Remember these important points.

(a) Soap, water, and disposable paper towels must be available for handwashing.

(b) Water for children should not exceed 110°F.

(c) Common towels and face cloths are prohibited.

(d) Each child over 1 year must be provided with at least 35 square feet of floor space for play. Each child between 6 months and 1 year must be provided with at least 20 square feet of floor space.

(e) Play areas should be divided by age group.

(f) There must be separate rooms for sleep and play and a separate room to isolate ill children.

(g) Lavatories should be near playrooms, playgrounds, and locker facilities.

(h) Isolation rooms should have separate toilet facilities.

(i) Boys and girls above age 4 should have separate toilet facilities.

(j) Each 10 toilet-trained children will be provided with at least 1 split seat flush toilet and a washbasin.

(k) Approximately 50 percent of children's toilets should be of pediatric size.

(l) Windows and stairways must be protected by removable screens and gates.

(m) Floor surfaces and coverings should be safe, warm, nonslippery, and easily cleanable.

(n) Cleaning equipment and supplies will have separate storage spaces. Dangerous supplies should be out of reach of children. Poisons and highly caustic materials are prohibited.

(o) Electrical outlets should be childproof or covered; electrical appliances must be protected from child contact.

(p) Drinking fountains should be child-sized, and have a mouth guard and angled jet. Fifty percent of the fountains should be installed 30" from the floor.

(q) Rooms must maintain a temperature of 68°F in the winter and 78°F in the summer within one foot of the floor.

(r) At least three changes of outdoor air per hour must occur in play and sleeping areas.

(s) Exhaust must be provided in toilets and lavatories.

(t) Humidification must be provided in winter months.

(u) Humidification equipment should be monitored by the medical authority.

(v) Furniture, fixtures, and play equipment must be scaled to the children using them and be safe, sanitary, and inspected daily.

(w) Toys should not have sharp points or be coated with toxic or flammable materials.

(x) Washable toys are preferred.

(y) Cots, cribs, beds, and playpens should be sized for the children served; they must be placed at least 3 feet apart from each other on all sides.

(z) Mattresses must have waterproof covers.

(aa) Cribs and other similar equipment are to be washed daily with detergent solution.

(bb) Spaces between crib slats should be no greater than 2 3/8 inches.

(cc) The CDS facilities should provide only disposable diapers. Parents can provide either cloth or disposable diapers.

(dd) Cloth diapers must be placed in a plastic bag labeled with the child's name and returned to the parent.

(ee) Child development service personnel will not launder diapers.

(ff) Disposable diapers must be placed in tightly closed containers with plastic linings and then into outside refuse containers.

(gg) Soiled diapers must not be stored in areas where they could cause contamination (play, sleep, food service areas).

(hh) Play and activity areas require a minimum of 30-foot candles of illumination.

(ii) Staff work space and examining areas require at least 100-foot candles of illumination.

(jj) All facilities must be clean and in good repair.

g. AR 608-10 states the following requirements for outdoor features at CDS facilities.

NOTE: Not required for hourly group care.

(1) At least 100 square feet of outdoor play area per child is recommended. Play areas will be enclosed by fence of a type not easily climbed (horizontal slat fence is prohibited). Segregation of children by age group is encouraged. Effective supervision of all children at all times is required.

(2) Garbage and refuse containers will be tightly covered, vermin-proof and located away from the outdoor play area so as to be inaccessible to children. Culverts, drainage ditches, sewer accesses, and all similar hazards will be inaccessible to children.

(3) Play area surfaces should be selected to provide as safe a play space as possible. Desirable characteristics include the following: non-slippery when dry or wet, well drained, and nonabrasive. The surface under swings and climbing equipment requires special consideration to reduce injuries incident to falls.

(4) Play equipment must be selected with safety and sanitation consideration in mind. Proper size in relation to available space should be considered. When provided, swings will be of the rubber sling type or with light wooden seats and without heavy metal chains. All "S-hook" type fasteners will be tightly closed. There will be no openings on slides or other equipment capable of accepting a child's finger.

(5) Remember these important points.

(a) Each child should have at least 100 square feet of outdoor play area.

(b) The play areas should be enclosed by a fence that is not easily climbed.

(c) Children in play areas must be supervised at all times.

(d) Refuse and garbage containers must be tightly covered and vermin-proof.

(e) Refuse containers, sewers, drainage ditches, and similar construction must be inaccessible to children.

(f) Play area surfaces should be non-slippery, well drained, and nonabrasive.

(g) Play equipment should be selected for safety and sanitation.

(h) Swings should have rubber sling or wooden seats and no heavy metal chains.

(i) "S-hook" fasteners must be closed, and there should be no openings large enough for a child to insert a finger.

h. AR 608-10 states the following requirements for the water supply at CDS facilities:

(1) Water supplies will be from approved sources.

(2) Remember, water supplies must come from approved sources and follow Army regulations

i. TB MED 530 states the following requirements for food service at CDS facilities:

(1) Food service activities will comply with applicable portions of TB MED 530.

(2) Sack or bag lunches, if provided by the parent, must be labeled with child's full name, dated, and properly stored.

(3) Infant food and/or formula prepared or provided by the parent will be suitably labeled with the child's full name, dated, and accompanied by feeding instructions. Such food or formula will be properly stored. Preparation of infant formula at the center is prohibited. Commercially prepared formula may be used.

(4) Remember these important points.

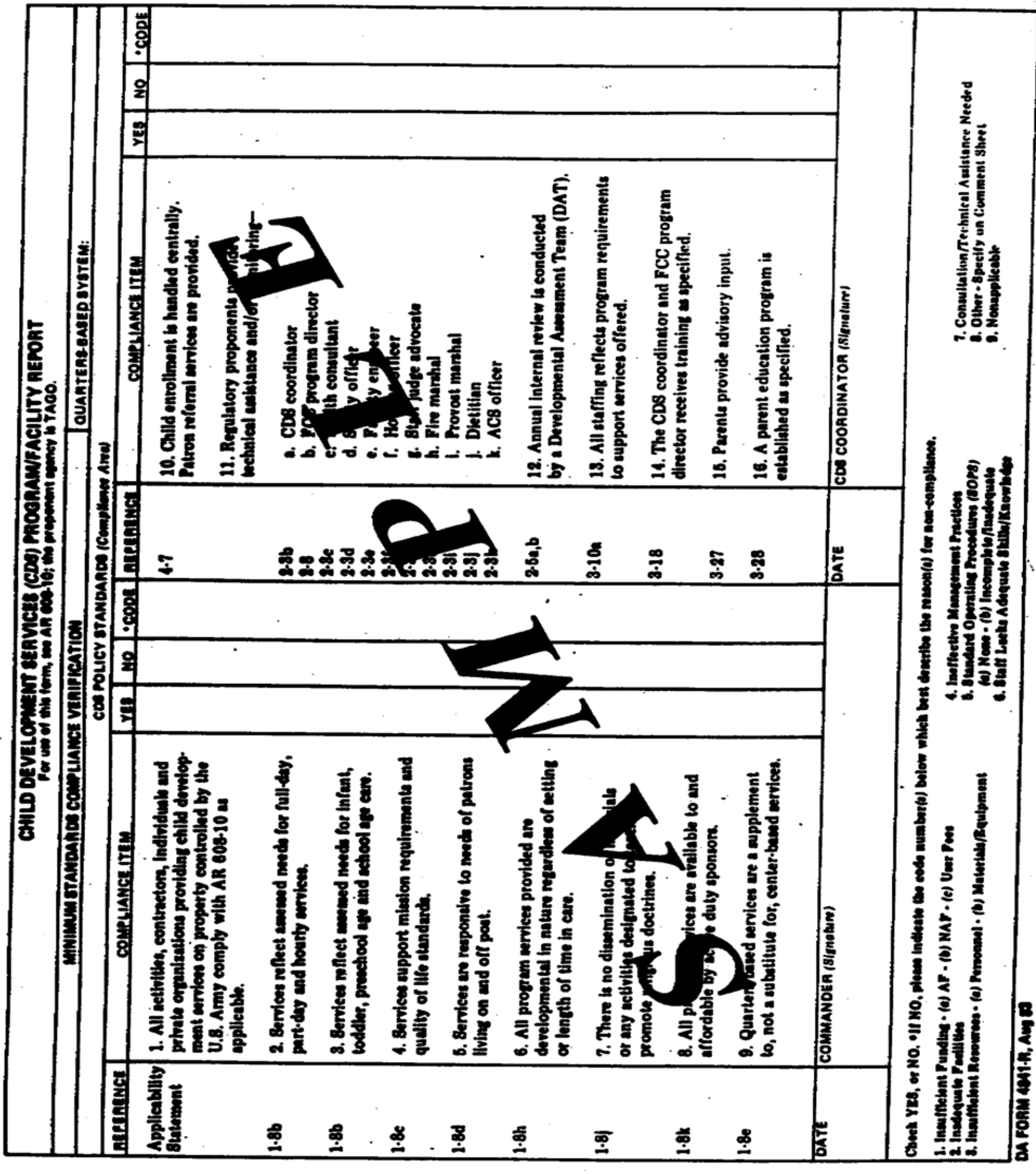
(a) Bag lunches must be labeled with the child's name, dated, and properly stored.

(b) Infant food or formula must be labeled with the child's full name, be dated, and have feeding instructions.

(c) Child development service facilities cannot prepare infant formulas.

2-3. SAMPLE CHECKLIST

Figure 2-1 (DA Form 4841-R) shows a sample checklist for CDS Facilities. As with other inspection checklists, you should not depend entirely on the checklist but base your observations on your knowledge of sanitation and safety at CDS facilities.



CHILD DEVELOPMENT SERVICES (CDS) PROGRAM/FACILITY REPORT
For use of this form, see AR 608-10; the proponent agency is TAGO.

MINIMUM STANDARDS COMPLIANCE VERIFICATION | QUARTERS-BASED SYSTEM:

CDS POLICY STANDARDS (Compliance Area)

REFERENCE	COMPLIANCE ITEM	YES	NO	*CODE	REFERENCE	COMPLIANCE ITEM	YES	NO	*CODE
Applicability Statement	1. All activities, contractors, individuals and private organizations providing child development services on property controlled by the U.S. Army comply with AR 608-10 as applicable.				4-7	10. Child enrollment is handled centrally. Patron referral services are provided.			
						11. Regulatory proponents provide technical assistance and/or monitoring—			
1-8b	2. Services reflect assessed needs for full-day, part-day and hourly services.				2-3b	a. CDS coordinator			
					2-8	b. FCC program director			
1-8b	3. Services reflect assessed needs for infant, toddler, preschool age and school age care.				2-3c	c. Health consultant			
					2-3d	d. Safety officer			
					2-3e	e. Facility engineer			
1-8c	4. Services support mission requirements and quality of life standards.				2-3f	f. Housing officer			
					2-3g	g. Staff judge advocate			
					2-3h	h. Fire marshal			
1-8d	5. Services are responsive to needs of patrons living on and off post.				2-3i	i. Provost marshal			
					2-3j	j. Dietitian			
					2-3k	k. ACS officer			
1-8h	6. All program services provided are developmental in nature regardless of setting or length of time in care.				2-5a,b	12. Annual internal review is conducted by a Developmental Assessment Team (DAT).			
1-8j	7. There is no dissemination of materials or any activities designated to [illegible] promote religious doctrines.				3-10a	13. All staffing reflects program requirements to support services offered.			
					3-18	14. The CDS coordinator and FCC program director receives training as specified.			
1-8k	8. All program services are available to and affordable by active duty sponsors.				3-27	15. Parents provide advisory input.			
1-8e	9. Quarters-based services are a supplement to, not a substitute for, center-based services.				3-28	16. A parent education program is established as specified.			

DATE	COMMANDER (Signature)	DATE	CDS COORDINATOR (Signature)

Check YES, or NO. *If NO, please indicate the code number(s) below which best describe the reason(s) for non-compliance.

1. Insufficient Funding - (a) AF - (b) NAF - (c) User Fees
2. Inadequate Facilities
3. Insufficient Resources - (a) Personnel - (b) Materials/Equipment
4. Ineffective Management Practices
5. Standard Operating Procedures (SOPS) (a) None - (b) Incomplete/Inadequate
6. Staff Lacks Adequate Skills/Knowledge
7. Consultation/Technical Assistance Needed
8. Other - Specify on Comment Sheet
9. Nonapplicable

DA FORM 4841-R, Aug 83

Figure 2-1. A sample inspection checklist for Child Development Services. (DA Form 4841-R).

CHILD DEVELOPMENT SERVICES (CDS) PROGRAM/FACILITY REPORT

For use of this form, see AR 608-10; the proponent agency is TAGO.

MINIMUM STANDARDS COMPLIANCE VERIFICATION | QUARTERS-BASED SYSTEM:

CDS POLICY STANDARDS *(Compliance Area) (Cont'd)*

REFERENCE	COMPLIANCE ITEM	YES	NO	*CODE	REFERENCE	COMPLIANCE ITEM	YES	NO	*CODE
4-1	17. The CDS coordinator and all program directors meet for policy coordination.								
4-7f	18. Written CDS program policies are available.								

SAMPLE

Check YES, or NO. *If NO, please indicate the code number(s) below which best describe the reason(s) for non-compliance.

1. Insufficient Funding - (a) AF - (b) NAF - (c) User Fees
2. Inadequate Facilities
3. Insufficient Resources - (a) Personnel - (b) Materials/Equipment
4. Ineffective Management Practices
5. Standard Operating Procedures (SOPS) (a) None - (b) Incomplete/Inadequate
6. Staff Lacks Adequate Skills/Knowledge
7. Consultation/Technical Assistance Needed
8. Other - Specify on Comment Sheet
9. Nonapplicable

DA FORM 4841-R, Aug 83

Figure 2-1. A sample inspection checklist for Child Development Services. (DA Form 4841-R) (Continued).

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CHILD DEVELOPMENT SERVICES (CDS) PROGRAM/FACILITY REPORT
For use of this form, see AR 608-10; the proponent agency is TAGO.

MINIMUM STANDARDS COMPLIANCE VERIFICATION	QUARTERS-BASED FCC SYSTEM:

PROGRAM MANAGEMENT STANDARDS (Compliance Area)

REFERENCE	COMPLIANCE ITEM	YES	NO	*CODE
3-12e	1. An FCC program director is provided to implement and manage the quarters-based care system.			
3-12f	2. An FCC outreach worker is provided for systems comprised of more than 30 FCC homes.			
3-12f	3. No FCC outreach worker's caseload exceeds 40 FCC homes.			
3-14c	4. Clerical support is provided to the FCC program director.			
1-8f	5. All family child care within Government quarters occurs in CDS certified FCC homes.			
3-16e	6. FCC provider receives ongoing written and oral CDS program and policy guidance.			
2-7b	7. There is a SOP for FCC provider and home certification procedures.			
2-8b	8. There is a SOP for the FCC system which includes provision for— a. Program compliance verification. b. Allegations and complaints. c. Noncompliance. d. Suspension or revocation process.			
4-4c	9. FCC providers carry personal liability insurance per local requirements.			

REFERENCE	COMPLIANCE ITEM	YES	NO	*CODE
	10. SOPs include provisions for—			
6-8a	a. FCC provider communication linkages.			
6-8b	b. FCC provider and CDS center linkages.			
6-8c	c. CDS services to FCC providers.			
6-8d	d. FCC special purpose homes.			
6-8e	e. FCC provider reporting procedures.			
3-19b	11. Each FCC provider receives annual training as specified.			
	12. Admission criteria is implemented as specified.			
2-1	13. Child placement data is centrally available to monitor FCC age group compositions.			
2-11	14. Child records are maintained as specified.			
2-12b	15. FCC provider records are maintained as specified.			
2-14d	16. Records are maintained on FCC home certification as specified.			
2-13 2-14	17. Program records and operations data are collected and maintained as specified.			
2-17	18. Reporting requirements to commands, MACOM and DA are met as specified.			

DATE	CDS COORDINATOR (Signature)	DATE	FCC PROGRAM DIRECTOR (Signature)

Check YES, or NO. *If NO, please indicate the code number(s) below which best describe the reason(s) for non-compliance.

1. Insufficient Funding - (a) AF - (b) NAF - (c) User Fees
2. Inadequate Facilities
3. Insufficient Resources - (a) Personnel - (b) Materials/Equipment
4. Ineffective Management Practices
5. Standard Operating Procedures (SOPS) (a) None - (b) Incomplete/Inadequate
6. Staff Lacks Adequate Skills/Knowledge
7. Consultation/Technical Assistance Needed
8. Other - Specify on Comment Sheet
9. Nonapplicable

DA FORM 4841-R, Aug 83

Figure 2-1. A sample inspection checklist for Child Development Services. (DA Form 4841-R) (Continued).

CHILD DEVELOPMENT SERVICES (*CDS*) PROGRAM/FACILITY REPORT

For use of this form, see AR 608-10; the proponent agency is TAGO.

MINIMUM STANDARDS COMPLIANCE VERIFICATION | **FCC PROVIDER/HOME:**

DEVELOPMENTAL STANDARDS (*Compliance Area*)

REFERENCE	COMPLIANCE ITEM	YES	NO	*CODE	REFERENCE	COMPLIANCE ITEM	YES	NO	*CODE
6-5	1. Adult/child ratios are maintained.				4-13	9. Daily indoor and outdoor activities are planned for all children.			
6-5	2. Child group sizes are maintained.				4-18	10. Child routines support growth and development patterns.			
6-5	3. Age composition of child groups is maintained.				4-12	11. Indoor play space and furnishings are arranged to allow developmentally appropriate child activities.			
4-15	4. The FCC provider— a. Nurtures and cares for children with affection. b. Uses appropriate caregiving techniques. c. Interacts directly with children in program activities. d. Role-models communication and social interaction skills. e. Fosters positive self-concept in children. f. Stimulates children's intellectual capabilities.				[illegible]	12. Adult size furnishings and equipment are adapted for child use when necessary.			
					4-[illegible]	13. Toys and equipment are appropriate to child age level, ability and interest.			
					4-14	14. Toys and equipment support types of program activities specified in 4-13.			
4-23	5. Constructive discipline techniques are used. No form of corporal punishment is utilized.				4-12 4-14	15. Toys, equipment and materials are accessible to children in a manner supportive of self-help initiatives.			
4-17	6. Night care requirements are met as specified.				4-25	16. Television operation is limited to programs specifically designed for children.			
4-16	7. Program practices reflect unique age group needs.								
6-9b	8. A sample written daily activity schedule is available to parents.								

DATE	FCC PROGRAM DIRECTOR (*Signature*)

Check YES, or NO. * If NO, please indicate the code number(*s*) below which best describe the reason(*s*) for non-compliance.

1. Insufficient Funding - (*a*) AF - (*b*) NAF - (*c*) User Fees
2. Inadequate Facilities
3. Insufficient Resources - (*a*) Personnel - (*b*) Materials/Equipment
4. Ineffective Management Practices
5. Standard Operating Procedures (*SOPS*) (*a*) None - (*b*) Incomplete/Inadequate
6. Staff Lacks Adequate Skills/Knowledge
7. Consultation/Technical Assistance Needed
8. Other - Specify on Comment Sheet
9. Nonapplicable

DA FORM 4841-R, Aug 83

SAMPLE

Figure 2-1. A sample inspection checklist for Child Development Services. (DA Form 4841-R) (Continued).

CHILD DEVELOPMENT SERVICES *(CDS)* PROGRAM/FACILITY REPORT

For use of this form, see AR 608-10; the proponent agency is TAGO.

MINIMUM STANDARDS COMPLIANCE VERIFICATION	FCC PROVIDER/HOME:

HEALTH STANDARDS *(Compliance Area)*

REFERENCE	COMPLIANCE ITEM	YES	NO	*CODE	REFERENCE	COMPLIANCE ITEM	YES	NO	*CODE
4-27	1. FCC provider and home occupants have met health requirements.				4-30e	11. Personal cleanliness procedures are followed as specified.			
4-28	2. Child health requirements have been met.				4-30f(1)	12. Soiled clothing/diapers are changed promptly.			
4-8b	3. Children are screened for illness upon daily arrival.				4-21e, f	13. Soiled diapers and clothing are stored as specified.			
4-29a	4. Denial of service to ill children is based upon specified criteria.				4-21c	14. Diaper changing areas are sanitized as specified after each use.			
4-29b	5. Readmission of children following illness is based upon specified criteria.				4-[illegible]	15. Training chair receptacles are emptied and sanitized after each use.			
4-29c	6. Medical care procedures for emergencies and minor health problems after admission follow specified criteria.				4-3[illegible]	16. Pets are free from disease, immunized as appropriate and sanitarily maintained.			
4-29d	7. Child medication is administered only as specified.				4-30f(2)	17. Toilet rooms and fixtures are sanitary and odor free.			
	8. Parents are notified in the case of—				4-30f(3)	18. Toys used by children under 36 months are washable and cleaned as specified.			
2-19a 2-19b 2-19c	a. Medical emergencies. b. Communicable diseases. c. Acute illnesses.				6-14d	19. FCC home areas occupied by children are maintained to meet local standards of orderliness and cleanliness.			
4-20	9. Nap and rest periods are provided for children as specified.								
4-30a(2)	10. Drinking water is available to children at all times.								

DATE	HEALTH CONSULTANT *(Signature)*	DATE	FCC PROGRAM DIRECTOR *(Signature)*

Check YES, or NO. *If NO, please indicate the code number(s) below which best describe the reason(s) for non-compliance.

1. Insufficient Funding - (a) AF - (b) NAF - (c) User Fees
2. Inadequate Facilities
3. Insufficient Resources - (a) Personnel - (b) Materials/Equipment
4. Ineffective Management Practices
5. Standard Operating Procedures (SOPS) (a) None - (b) Incomplete/Inadequate
6. Staff Lacks Adequate Skills/Knowledge
7. Consultation/Technical Assistance Needed
8. Other - Specify on Comment Sheet
9. Nonapplicable

DA FORM 4841-R, Aug 83

Figure 2-1. A sample inspection checklist for Child Development Services. (DA Form 4841-R) (Continued).

CHILD DEVELOPMENT SERVICES *(CDS)* PROGRAM/FACILITY REPORT

For use of this form, see AR 608-10; the proponent agency is TAGO.

MINIMUM STANDARDS COMPLIANCE VERIFICATION

FCC PROVIDER/HOME:

FOOD/NUTRITION STANDARDS *(Compliance Area)*

REFERENCE	COMPLIANCE ITEM	YES	NO	*CODE	REFERENCE	COMPLIANCE ITEM	YES	NO	*CODE
4-33	1. FCC provider is enrolled in USDA Child Care Food program.								
4-34a	2. Meals and snacks are provided appropriate to hours of service.								
4-32	3. Foods are served to help meet children's total nutrition needs.								
4-34c	4. USDA Recommended/Dietary Allowances are used as a guide to meal planning.								
4-34g	5. Menus are posted or available for parents.								
4-34f	6. Parental and physician desires concerning food practices are provided within program capabilities.								
4-35d	7. Food provided by parents is labeled with child's name and refrigerated if applicable. Feeding instructions are provided.								
4-19e	8. Infants are regularly held for feedings and bottles are not propped.								
4-19d	9. Infants are within sight of FCC provider while self-feeding.								
4-19a	10. Children are not forced to eat, and food is not used as a punishment or a reward.								
DATE	FCC PROGRAM DIRECTOR *(Signature)*								

Check YES, or NO. * If NO, please indicate the code number*(s)* below which best describe the reason*(s)* for non-compliance.

1. Insufficient Funding - *(a)* AF - *(b)* NAF - *(c)* User Fees
2. Inadequate Facilities
3. Insufficient Resources - *(a)* Personnel - *(b)* Materials/Equipment
4. Ineffective Management Practices
5. Standard Operating Procedures *(SOPS)* *(a)* None - *(b)* Incomplete/Inadequate
6. Staff Lacks Adequate Skills/Knowledge
7. Consultation/Technical Assistance Needed
8. Other - Specify on Comment Sheet
9. Nonapplicable.

DA FORM 4841-R, Aug 83

Figure 2-1. A sample inspection checklist for Child Development Services. (DA Form 4841-R) (Continued).

CHILD DEVELOPMENT SERVICES (CDS) PROGRAM/FACILITY REPORT

For use of this form, see AR 608-10; the proponent agency is TAGO.

MINIMUM STANDARDS COMPLIANCE VERIFICATION | **FCC PROVIDER/HOME:**

FIRE PREVENTION STANDARDS *(Compliance Area)*

REFERENCE	COMPLIANCE ITEM	YES	NO	*CODE	REFERENCE	COMPLIANCE ITEM	YES	NO	*CODE
6-18	1. FCC homes meet the requirement of NFPA 101 except as modified by AR 608-10.				6-18g	9. Open fireplaces, portable combustion space heaters, and electric heaters are not used as a heat source in child activity areas.			
6-19a	2. Fire inspections are conducted annually and as required by local requirement.				6-19b	10. The FCC provider has been trained in evacuation procedures.			
6-18a	3. Housing units used for FCC homes are not located above the fourth floor in a multistory building.				6-19c	11. There is a contingency plan for evacuation of children from the FCC home.			
6-18b	4. Each floor level that is occupied by children in care has at least two separate exits to the outside, one of which may be a window.				6-19d	12. Documented fire drills involving all children are held at least once every month at different times of the day and upon enrollment of a new child.			
6-18c	5. In a dwelling of unprotected wood frame construction, every room used for sleeping, living, or dining purposes has at least two means of exit, one of which may be a window.				6-19f	13. Children are not left unaccompanied in the kitchen.			
6-18d	6. In a multistory building with open stairways where levels above the ground floor are used for care, there is a smoke detector on each floor in a shared stairway.				6-19e	14. The FCC provider does not smoke when engaged in caregiving practices, i.e. child feeding, diapering, dressing, rocking/holding.			
6-18e	7. There is a battery operated or hardwired smoke detector inside the FCC housing unit used for care.								
6-18f	8. There is an operable ABC multipurpose dry chemical extinguisher (minimum 2-3/4 pound) inside the FCC housing unit.								
DATE	FIRE MARSHAL *(Signature)*				DATE	FCC PROGRAM DIRECTOR *(Signature)*			

Check YES, or NO. *If NO, please indicate the code number(s) below which best describe the reason(s) for non-compliance.

1. Insufficient Funding - (a) AF - (b) NAF - (c) User Fees
2. Inadequate Facilities
3. Insufficient Resources - (a) Personnel - (b) Materials/Equipment
4. Ineffective Management Practices
5. Standard Operating Procedures (SOPS) (a) None - (b) Incomplete/Inadequate
6. Staff Lacks Adequate Skills/Knowledge
7. Consultation/Technical Assistance Needed
8. Other - Specify on Comment Sheet
9. Nonapplicable

DA FORM 4841-R, Aug 83

Figure 2-1. A sample inspection checklist for Child Development Services. (DA Form 4841-R) (Continued).

CHILD DEVELOPMENT SERVICES (*CDS*) PROGRAM/FACILITY REPORT

For use of this form, see AR 608-10; the proponent agency is TAGO.

MINIMUM STANDARDS COMPLIANCE VERIFICATION | FCC PROVIDER/HOME:

SAFETY STANDARDS (*Compliance Area*)

REFERENCE	COMPLIANCE ITEM	YES	NO	*CODE
6-21a	1. Safety inspections are conducted annually by regulatory proponents and as needed per local requirements.			
6-21b	2. The FCC provider insures FCC home interior spaces and outside activity areas are free of safety hazards and takes corrective action regarding same on a daily basis.			
6-6a	3. The FCC provider is in the home during all times children are in care per specified criteria.			
6-7	4. Children are supervised per criteria specified.			
6-13b	5. Children playing in unfenced child activity spaces under 5 years of age are accompanied by FCC provider.			
6-6e	6. There is a contingency plan [illegible] emergency care of children.			
6-20a	7. There is a telephone other [illegible] phone in [illegible] home.			
6-21f	8. Curren[illegible]ons are posted at each telephone to faci[illegible]te calling for ambulance, medical, fi[illegible] military police service.			
6-21c	9. Indoor program equipment, toys and materials are safe, durable, in working order and have a nontoxic finish.			
6-21c	10. Outdoor program equ[illegible] toys and materials are safe, durable, [illegible] order and have a nontoxic finish.			
6-20o	11. O[illegible]oor play space is free of hazards as spec[illegible]d.			
[illegible]	12. Crib [illegible] spaces are no greater than 2-3/8".			
6-[illegible]	13. Areas used for care of children are free of— a. Lead-based paint exceeding lead quantity standards. b. Loose asbestos particles from ceiling or pipe laggings. c. Ureaformaldehyde insulation. d. Exposed electrical wiring. e. Tripping hazards. f. Choking hazards.			
6-21g	14. Children are not permitted in rooms which have a furnace, domestic water heater, gas meter or open flame heater as specified.			
6-20c	15. All open windows in rooms used by children are securely screened, opened only from the top, or protected by a barrier.			

DATE	SAFETY OFFICER (*Signature*)	DATE	FCC PROGRAM DIRECTOR (*Signature*)

Check YES, or NO. *If NO, please indicate the code number(s) below which best describe the reason(s) for non-compliance.

1. Insufficient Funding - (a) AF - (b) NAF - (c) User Fees
2. Inadequate Facilities
3. Insufficient Resources - (a) Personnel - (b) Materials/Equipment
4. Ineffective Management Practices
5. Standard Operating Procedures (SOPS) (a) None - (b) Incomplete/Inadequate
6. Staff Lacks Adequate Skills/Knowledge
7. Consultation/Technical Assistance Needed
8. Other - Specify on Comment Sheet
9. Nonapplicable

DA FORM 4841-R, Aug 83

Figure 2-1. A sample inspection checklist for Child Development Services. (DA Form 4841-R) (Continued).

CHILD DEVELOPMENT SERVICES (*CDS*) PROGRAM/FACILITY REPORT

For use of this form, see AR 608-10; the proponent agency is TAGO.

MINIMUM STANDARDS COMPLIANCE VERIFICATION	FCC PROVIDER/HOME:

SAFETY STANDARDS *(Compliance Area) (Cont'd)*

REFERENCE	COMPLIANCE ITEM	YES	NO	*CODE
6-20d	16. Windows and doors leading to upper level balconies and porches are secured or locked at all times children are present.			
6-20e	17. Doors having direct outside egress are not left ajar without a protective barrier.			
6-20f	18. Door hardware is operable, free from dangerous protrusions and capable of being unlocked from either side.			
6-20g	19. Sliding glass doors are plainly marked at child eye level to avoid accidental impact.			
6-20i	20. Stairways used by children are lighted, free of all hazards, carpeted or have nonslip treads.			
6-20h	21. There is a barrier at the entry to any stairway accessible to children under 3 years of age.			
6-20l	22. Electrical appliances meet UL, NFPA or comparable host nation standards.			
6-20m	23. All electrical outlets are covered when not in use.			
6-20n	24. Heating elements have protective devices to prevent child contact.			
6-21d	25. Matches, power tools, detergents, solvents and cleaning supplies are kept in a secured area inaccessible to children.			
6-21e	26. Firearms and ammunition, other weapons, drugs, poisons, flammable or caustic materials, and insecticides are stored in locked cabinets or areas.			

Check YES, or NO. *If NO, please indicate the code number(s) below which best describe the reason(s) for non-compliance.

1. Insufficient Funding - *(a)* AF - *(b)* NAF - *(c)* User Fees
2. Inadequate Facilities
3. Insufficient Resources - *(a)* Personnel - *(b)* Materials/Equipment
4. Ineffective Management Practices
5. Standard Operating Procedures *(SOPS)* *(a)* None - *(b)* Incomplete/Inadequate
6. Staff Lacks Adequate Skills/Knowledge
7. Consultation/Technical Assistance Needed
8. Other - Specify on Comment Sheet
9. Nonapplicable

DA FORM 4841-R, Aug 83

Figure 2-1. A sample inspection checklist for Child Development Services. (DA Form 4841-R) (Concluded).

Section II. PUBLIC HEALTH ASPECTS OF CHILD DEVELOPMENT SERVICE FACILITIES

2-4. AUTHORITIES RESPONSIBLE FOR SANITATION IN CHILD DEVELOPMENT SERVICE FACILITIES

a. The post commander has overall responsibility for Army CDS facilities. The commander must ensure that regulations and standards are followed.

b. The health consultant monitors the health and safety aspects of CDS facilities. The medical authority also maintains liaison with civilian agencies to make sure that Army centers comply with state and local requirements.

c. The Child Care Advisory Council (the Council) also functions in the operation of CDS facilities. Each commander sets up a Child Care Advisory Council to establish and review the policy for post CDS facilities. The Council is particularly interested in those procedures not covered by AR 608-10.

(1) As a minimum, the Council will have representation from parents, the medical authority, the command, and the CDS facility administrative staff. When available, a child development educator will act as consultant to the Council.

(2) The policy established by the Council includes but is not limited to the following issues:

(a) Child development service facilities staff qualifications.

(b) Child admission policies. This includes health screening, minimum age requirements (usually six months), and attendance limits for each age group based upon space availability and staffing. Attendance limits for each age group will be conspicuously posted.

(c) Medical examination and immunization requirements for staff and children.

(d) Provision for organized age group activities.

(e) Policy and procedures for infant feeding. This includes handling formulas and bottles, and holding bottle-fed infants during feeding.

(f) Establishment of a fee schedule for CDS.

2-5. HEALTH PROBLEMS IN CHILD DEVELOPMENT SERVICES FACILITIES

The basic health problems in CDS facilities are the control of communicable diseases, especially childhood diseases (chicken pox, measles, and so forth.), and the prevention of injuries. This can clearly be seen in the standards of AR 608-10, most of which deal with either disease prevention measures or measures to avoid accidents (nontoxic paints; removing children from dangerous conditions or materials).

2-6. GOAL OF CDS FACILITIES INSPECTIONS

a. The primary goal of CDS facilities inspections is to ensure that these facilities maintain sanitary and safe conditions. The community health nurse and the PVNTMED specialist frequently work together to achieve this goal.

b. The health consultant or community health nurse makes periodic visits to CDS facilities. The nurse is primarily involved in giving professional consultation on various childcare matters, such as the prevention and control of childhood diseases and infant feeding.

c. The PVNTMED specialist often accompanies the community health nurse and provides assistance or conducts an inspection of the facility. Basically, the goal of the PVNTMED specialist is to determine whether any hazardous conditions exist at the facility and to recommend disease and injury prevention measures.

d. To this end, the inspector must utilize his own experience and information as well as knowledge of local regulations and AR 608-10 standards. The major controls against accidents and disease have already been discussed in Section I of this lesson and will not be repeated here.

2-7. SUMMARY

a. Poorly managed CDS facilities can cause disease and injury. The inspector must ensure that these facilities do not have unsafe or unsanitary practices or conditions.

b. AR 608-10 sets standards for CDS facilities. An inspector must know these standards. The standards cover the areas of:

(1) General information.

(2) Definition of CDS facilities.

(3) Emergency requirements.

(4) Facilities.

(5) Indoor features.

(6) Outdoor features.

(7) Water supply.

(8) Food service.

c. The inspection checklist for CDS facilities contains basic items that serve as guidelines for the inspection. A good inspector will utilize personal knowledge and experience in addition to the checklist.

d. Several authorities have responsibility for sanitation and safety at Army CDS facilities:

(1) The post commander has overall responsibility for CDS facilities at his post.

(2) The medical authority monitors CDS facilities and establishes liaison with civilian agencies.

(3) The Child Care Advisory Council establishes and reviews policy for post CDS facilities. The Council is particularly interested in aspects not covered in AR 608-10.

e. The basic health problems in CDS facilities are the control of communicable diseases, especially childhood diseases, and the prevention of injuries. The goal of CDS facilities inspections is to prevent these problems.

f. The PVNTMED specialist and the community health nurse frequently visit facilities together. The nurse is concerned with professional aspects of disease prevention and childcare. The PVNTMED specialist checks the CDS facilities for hazardous conditions and recommends preventive measures.

Continue with Exercises

EXERCISES, LESSON 2

INSTRUCTIONS: The following exercises are to be answered by marking the lettered response that BEST answers the question or BEST completes the incomplete statement or by writing the answer in the space provided.

After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers.

1. What is the basic goal of CDS facilities inspections?

   _____

2. List the major topics covered by the standards for child development service facilities in AR 608-10.

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

   f. _____

   g. _____

   h. _____

3. Which of the following is NOT included in the definition of child development services (CDS) from AR 608-10?

   a. A CDS or section of a facility that provides whole or part-time day care services when a child is not in custody of parents.

   b. A CDS or part of a facility that provides hourly or periodic CDS on a non-daily basis when a child is not in the custody of parents.

   c. A CDS or part of a facility that provides remedial training in reading and arithmetic, when a child is not in the custody of parents.

4. All buildings housing child development service facilities must follow the most recent requirements of _____Code; CDS facilities must be located on the _____floor.

5. CDS facilities should provide separate areas for:

   a. _____.

   b. _____.

   c. _____.

6. Which of the following is an INACCURATE standard for lavatory facilities at CDS facility?

   a. Boys and girls older than age 5 will have separate toilet facilities.

   b. Each 18 toilet-trained children will have at least 1 flush toilet and 1 wash basin.

   c. Isolation rooms should have separate toilets.

   d. Approximately 50 percent of the children's toilets should be child-sized.

7. Children over 1 year of age should have _____square feet of floor space for play.

8. Rooms in a CDS facility must maintain a temperature of _____ ºF in the summer and _____ °F in the winter within _____ foot (feet) of the floor, and play and sleeping areas must have a minimum of _____ changes of outdoor air per _____.

9. You are inspecting a CDS facility and make the following observations. Indicate how you would rate the observation on an inspection checklist by entering "Satisfactory" or "Unsatisfactory" after the statement. If you rate the observation as "Unsatisfactory," indicate why.

a. Removable screens are placed on all windows, and stairways are protected by gates.

_____
_____

b. Electrical outlets are of the child safety type, and electrical appliances are placed where children cannot reach them.

_____
_____

c. The facility is on the second floor of a building that is in good repair and not close to traffic. The floors are wooden with some splintering and pitting.

_____
_____

d. Cribs and beds are sized for children and are placed so that they are 3 feet apart from each other on all sides. Spaces between crib slats are about 2 inches.

_____
_____

e. The facility provides both disposable and cloth-diapers; it launders the cloth-diapers on a daily basis. Soiled diapers are stored in a closet in the sleeping area until they are discarded.

_____
_____

f. Detergent and dangerous cleaning materials are stored in a locked area that is inaccessible to children. Nondangerous cleaning supplies (brooms, mops, and so forth.) are stored in the food service area. Caustic items such as, drain cleaners are stored in a special locked cabinet.

_____
_____

g. Hand washing facilities for children have soap and water. Water temperature does not exceed 110°F. Disposable towels are provided.

_____
_____

10. What type of paints must be used in areas accessible to children?

    a. Lead-free, nontoxic.

    b. Washable, of a light color.

    c. Non-washable, childproof.

11. A CDS facility is required to contact parents or guardians in case of emergencies. What telephone information must be available for notifying parents or guardians?

    a. _____

    b. _____

    c. _____

SPECIAL INSTRUCTIONS FOR EXERCISES 12 THROUGH 16. Match the authority involved in the operation of post CDS facilities in Column I with the letter of the function provided by the authority given in Column II.

	Column I	Column II
12. ___	Child Care Advisory Council	a. Monitors the health and safety aspects of CDS facilities and coordinates with civilian agencies on state and local regulations.
13. ___	Health consultant	b. Establishes and reviews policy for CDS facilities especially those policies not covered
14. ___	Post commander	by AR 608-10.
15. ___	Preventive medicine specialist	c. Checks for any hazardous conditions and recommends improvements.
		d. Has overall responsibility for ensuring that standards are followed in the CDS facilities.
16. ___	Community health nurse	e. Consults professionally on child health issues, such as childhood disease control and infant feeding.

17. List the representatives who are on the Child Care Advisory Council.

    a. _____

    b. _____

    c. _____

    d. _____

    e. _____

18. The basic health problems in CDS facilities are the control of _____ _____ and the prevention of _____ .

19. You are inspecting the playground at a child development service facility. You observe that the area is enclosed by a fence with a smooth surface that is difficult to climb; each child has about 110 square feet of play area. Playground equipment has no sharp projections. Adult supervisors are present when children are on the playground. How would you rate this situation on the checklist in DA Form 4841-R?

    _____

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 2

1. To ensure that these facilities maintain sanitary and safe conditions. (para 2-1a)

2. General information
   Definitions
   Emergency requirements
   Buildings
   Indoor features
   Outdoor features
   Water supply
   Food service TB MED 530. (para 2-2b to 2-2i)

3. c (para 2-2c)

4. The National Fire Protection Association No. 101, Life Safety Code; ground. (para 2-2e)

5. Sleep
   Play
   Isolation of ill children. (para 2-2b)

6. b (para 2-2b)

7. 35 (para 2-2b)

8. 78ºF, 68ºF, 1 foot; 3, hour. (para 2-2b)

9. a. Satisfactory. (para 2-2f)

   b. Satisfactory. (para 2-2f)

   c. Unsatisfactory. Childcare centers must be located on the ground floor; floors should be safe and easily cleanable. Splinters could cause injuries, and pitting would collect dirt and make cleaning difficult. (para 2-2e, f)

   d. Satisfactory. (para 2-2f)

   e. Unsatisfactory. Childcare centers should provide disposable, not cloth, diapers. Soiled diapers must not be stored in play, sleep, or food service areas. (para 2-2f)

f. Unsatisfactory. All cleaning supplies are to be stored in separate and designated storage areas. Caustic materials are not allowed in the childcare center. (para 2-2f)

g. Satisfactory. (para 2-2f)

10. a (para 2-2e)

11. Name.
Home and office telephone.
Address. (Para 2-2d)

12. b (para 2-4c)

13. a (para 2-4b)

14. d (para 2-4a)

15. c (para 2-6c)

16. e (para 2-6e)

17. A representation from parents.
Representation from the medical authority.
Representation from the command.
Representation from the CDS facility administrative staff.
When available, a child development educator in a consultant capacity.
(para 2-4c(l))

18. Communicable diseases, especially childhood diseases; injuries. (para 2-5)

19. As satisfactory under para 2-4a, b, c (Army Design Guide DG 1110-3-143

and TM 5-803-N.)

END OF LESSON 2

LESSON ASSIGNMENT

LESSON 3	Inspect Ice Plants.
LESSON ASSIGNMENT	Paragraphs 3-1 through 3-7.
TASK TAUGHT	081-91S-5119--Collect ice samples for bacteriological analysis.
LESSON OBJECTIVES	After completing this lesson, you should be able to:

3-1. Identify the standards for ice plants in AR 40-5.

3-2. Identify the items found on an inspection checklist for ice plants.

3-3. Identify the process involved in ice manufacture.

3-4. Identify the equipment used in ice manufacture.

3-5. Identify the major health hazards associated with ice manufacture.

3-6 Identify controls against health hazards associated with ice manufacture.

SUGGESTION After completing the lesson assignment, complete the exercises at the end of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 3

INSPECT ICE PLANTS

Section I. SANITATION STANDARDS FROM AR 40-5

3-1. INTRODUCTION

The widespread use of ice for drinks and for refrigerating foods makes it a possible vehicle for the transmission of disease. AR 40-15 sets sanitary standards for the manufacture of ice. As a PVNTMED specialist (91S), you will conduct sanitary inspections of ice plants during your career in the Army. You must be thoroughly familiar with the requirements stated in AR 40-5 and be aware of health hazards involved in ice manufacture.

3-2. SANITARY STANDARDS FOR ICE PLANTS FROM AR 40-5

a. It is essential that the PVNTMED specialist (91S) know these standards. The section of AR 40-5 containing standards for ice plants are presented below.

b. AR 40-5 states these standards for the manufacture of ice (Appendix F, Ice Manufacture Sanitation).

(1) F-1. General. Waterborne disease can be transmitted by water, beverages, and raw food cooled by direct contact with contaminated ice. Contamination may occur through use of contaminated water, or through unsanitary manufacturing, storing, transporting, or handling practices.

(2) F-2. Requirements. The list below includes the minimum sanitary requirements for Army and commercial ice plants engaged in the manufacture, storage, and transport of ice intended for use by personnel under Army jurisdiction.

(a) Only potable water will be used in all phases of ice manufacture. This will include submersion or ice can spraying for cake removal and cleaning of ice cakes and ice contact surfaces.

(b) Cross connections between potable and nonpotable water systems are prohibited. Plumbing installation will be according to the requirements of the current National Standard Plumbing Code or local jurisdiction plumbing code, whichever is stricter.

(c) Surfaces of floors, walls, and ceilings of all rooms used for manufacture, processing, and storage of ice will be of smooth, impervious, nontoxic (under use conditions) construction. They will be kept clean and maintained in good repair.

(d) All ice plant equipment and utensils will be constructed of smooth nontoxic materials, kept clean and in good repair, and handled and stored in a sanitary manner.

(e) All can fillers, core-sucking devices, and drop tubes will be handled in such a manner as to prevent contamination. Freezing cans will be disinfected by steam or submerged for 2 minutes in a 100 parts per million (ppm) free available chlorine solution. When chemical disinfectants are used, a test kit or other device that accurately measures the ppm concentration of the disinfectant will be provided and used.

(f) Freezing tank covers will be designed and maintained to protect ice containers from splash, drip, and other contamination.

(g) Personnel will not enter the tank room or other areas where ice contacts a walking surface without wearing clean boots or shoe coverings provided expressly for this purpose.

(h) All air supplies for water agitation will be filtered to exclude dust, oil, and foreign material. Intakes should be arranged to minimize contamination.

(i) Ice will be stored on room or vault racks equipped with drains which are indirectly connected through an air gap or air break into a trapped and vented receptor.

(j) Employees may be required to have medical evaluations as determined by the medical authority.

(k) Only dedicated vehicles will be used for transporting ice. Vehicles will be operated and maintained to prevent contamination. Canvas containers or tarps will not be used unless provided with a sanitary single-service liner to completely protect the ice.

(l) An exception to (k) above is granted for transportation of packaged and/or containerized ice in enclosed, clean multiuse vehicles.

(m) The final product will meet with bacteriologic and chemical standards for potable water.

c. Ice manufacture.

(1) Sanitary requirements for ice manufacture are detailed in Appendix F. Additional requirements as outlined in the current Public Health Service Publication No. 1183, will be followed.

(2) Preventive medicine personnel will conduct sanitary inspections of ice manufacturing, storage, and distribution facilities; and will, in coordination with appropriate veterinary personnel, recommend approval of commercially operated plants. Approved commercial ice plants will be listed in the Directory of Sanitarily Approved Food Establishments for Armed Forces Procurements or in the locally approved establishment list (AR 40-657).

d. Points to remember.

(1) Food, water, and beverages which contact contaminated ice can transmit waterborne diseases.

(2) Automatic ice machines eliminate many health problems in the handling of ice.

(3) The Army has minimum sanitary requirements for the manufacture, storage, handling, and transport of ice.

(4) Only potable water can be used for ice manufacture.

(5) Cross connections between potable and non-potable water systems are prohibited.

(6) Floors, walls, and ceilings used in ice plants should be smooth, kept clean, and in good repair.

(7) Ice plant equipment should be made of smooth, nontoxic materials. Equipment must be clean, in good repair, and stored in a sanitary manner.

(8) Can fillers, core-sucking devices, and drop tubes should be handled so as to avoid contamination.

(9) Freezing cans are disinfected.

(10) Freezing tank covers must be designed and maintained to protect ice containers from contamination.

(11) Personnel who enter the tank or similar areas must wear specialized boots or shoe coverings that are kept clean.

(12) Air supplies for water agitation should be filtered and the air intakes arranged to minimize dust.

(13) Racks for ice storage should have drains to prevent flooding and ice contamination.

(14) Ice plant employees are classified as food service personnel.

(15) Vehicles for ice transport must be operated and maintained to prevent contamination.

(16) Ice will routinely be sampled to evaluate compliance with appropriate physical, bacteriological, and chemical standards.

(17) Preventive medicine personnel are required to inspect ice facilities. They must approve commercial ice plants in coordination with Army veterinarians.

(18) Approved commercial ice plants must be listed in the Directory of Sanitarily Approved Food Establishments for Armed Forces Procurements or in a local list.

3-3. SAMPLE INSPECTION CHECKLIST

Figure 3-1 shows a sample checklist for ice plants. Again, when conducting the inspection, use your own knowledge and experience in addition to the items on the checklist.

ICE MANUFACTURING INSPECTION REPORT

Facility: _____ Date: _____
Location: _____
Manager: _____ Rating: _____

Item Inspected	S	U	Comments
1. Water Quality			
a. FAC in incoming water supply			
b. TAC in incoming water supply			
c. Samples taken from can filler			
d. Samples taken from core filler			
e. Samples taken from dip tank			
f. Samples taken from ice block			
g. Past records of bacteriological analysis indicate potable supply			
2. Construction			
a. Area enclosed			
b. Surfaces contacting ice smooth, easily cleaned, and in good repair			
3. Equipment			
a. Cans clean and in good repair			
b. Cans show no corrosion			
c. Cans sanitized prior to use			
d. Core sucking and filling devices stored in sanitary manner			
e. Filter present on air intake for bubbler . . .			
f. Air intake located to minimize contamination			
4. Handling, Storage, and Transportation			
a. Ice protected from contamination during handling			
b. Ice protected from contamination during storage			
c. Ice protected from contamination during transportation			

Inspector _____

Figure 3-1. A sample inspection checklist for ice plants.

Section II. PUBLIC HEALTH ASPECTS OF ICE PLANTS

3-4. THE MANUFACTURE OF ICE

a. Many of the health hazards associated with ice relate to the manufacturing process. As an inspector, you must be acquainted with the basic process and equipment used to make ice.

b. Ice is made in the following manner:

(1) Water is placed into large cans (approximately 1' X 1.5' X 4.25') called ice cans or freezing can. The cans are then immersed in tanks of brine. Either sodium chloride or calcium chloride may be used in the brine tanks.

(2) A refrigerant maintains the temperature of the brine below the freezing point of fresh water (6 °F to 18 °F). The refrigerant is a gas that is compressed, cooled, and then allowed to expand in pipes that contact the brine. Most commercial plants use ammonia as the refrigerant. Other refrigerants include carbon dioxide, butane, sulphur dioxide, and ethyl chloride. The choice of refrigerant depends on several factors: danger to life, corrosive action to metals, and the pressure required to condense the gas into a liquid.

(3) The ice cans are able to hold 300 to 400 pounds (36 to 48 gallons) of water. Usually a can filling tank is used to fill several ice cans at the same time. The filled ice cans are lifted by cranes and positioned in the brine tank. A thin copper pipe is placed in the center of each ice can and filtered air is bubbled through the pipe. The pipe is commonly referred to as the "air bubbler." It is important that the air bubbler not be contaminated. This is why filtered air is used. Because of the bubbling air, freezing begins at the sides of the ice can and continues toward the center. As the water freezes, impurities (including minerals) move to the center of the block.

(4) Before the center (core) freezes, the core water is removed and replaced with potable water. A pipe connected to a vacuum system is used for this purpose. This pipe is known as the "core sucker." Again, it is critical that the core sucker not become contaminated through contact with contaminated surfaces. The original core name is removed before it freezes to increase the clarity of the ice and to remove any unpleasant odors and tastes. The new core water is allowed to freeze.

(5) After 40 to 50 hours (approximately 1 hr/gallon of water), the ice cans are removed from the brine tank and placed in another tank, called a dip tank, to defrost the ice from the can. The ice is then put on a slide leading to the ice storage room.

(6) The process is repeated to produce more ice.

3-5. HEALTH HAZARDS

Since ice is frozen water, it can carry water-borne diseases. Freezing does not kill many waterborne pathogens; low temperatures even favor the longevity of some microorganisms. This, coupled with the frequent use of ice in food and drinks, makes it a vehicle for transmitting disease. However, because of controls during the manufacturing process, there are only a few cases where ice has been proven to transmit disease.

3-6. CONTROLS AGAINST HEALTH HAZARDS

Basic controls against the contamination of ice were presented in Section I of this lesson. The critical points will be reviewed in this paragraph.

a. **Water Quality**. The quality of the ice depends largely on the bacteriological and chemical condition of the water used.

(1) It may be necessary to soften the water to prevent the ice from having an undesirable color.

(2) Water used to manufacture ice should meet the chemical, physical, and bacteriological standards established in TB MED 576 as well as AR 40-5.

(3) Cross-connections between potable and non-potable water systems are not permitted. This includes submerged hose nozzles.

(4) A sanitary inspection should include water and ice samples for bacteriological analysis. The inspector should collect the samples at appropriate points within the plant; sampling points include water from the can filler, the core filler, the dip tank (thawing water) and the ice block. The instruments used in collecting an ice sample are a wide mouth jar that is sterile and capable of holding 100-ml of sample water, a sterile ice pick, and sterile tongs. An alcohol swab can be used to sterilize the ice pick and the tongs. Other sterilizing agents, such as chlorine may also be used. Use the ice pick to chip away ice from both the outside and the inside layers. Place the chips into the wide mouth jar. Be sure to avoid touching the ice. You may use the sterile tongs to insert the ice into the jar.

(5) In some cases, local and state health authorities require ice plants to obtain a certificate of water potability. These authorities may also require water samples to be taken. It is a good idea to review records pertaining to water quality during the inspection.

(6) Although this is not specified in AR 40-5, ice plants should have adequate handwashing and toilet facilities. These facilities are to be kept clean and in good repair.

b. **Facilities and Equipment**.

(1) All operations that concern the manufacturing, processing, and storing of ice should take place in an enclosed building that is kept in a sanitary condition. The ice and equipment must be protected from dust, dirt, rodents, insects, and any other sources of contamination. All rooms in which ice is handled must have floors, walls, and ceilings finished with easily cleanable materials and must be kept clean and in good repair.

(2) Equipment and utensils used in ice plants should be constructed for easy cleaning; they must be kept clean, in good repair and handled and stored in a sanitary manner. Materials that contact ice surfaces should be smooth, nontoxic, and relatively nonabsorbent. Cans used for ice manufacture should be maintained in leak-proof condition and be free of corrosion.

(3) Freezing tank covers should be designed to protect the ice containers from splash, drip, and other contamination.

(4) Only filtered air should be used for agitation of water. Air intakes should be located to minimize the intake of dust and other extraneous matter.

(5) Core sucking and filling devices should be stored and maintained in a manner that prevents contact with floor surfaces and other sources of contamination.

(6) Personnel who enter the tank room or any room or area where ice contacts a walking surface must wear clean, suitable boots or shoe coverings provided specifically for this purpose.

(7) Only potable water should be used for ice block removal operations.

(8) Ice, while being stored, transported, or delivered, should be protected from contamination by dust, dirt, or any other sources.

(9) Drains in storage vaults should prevent flooding of rooms with waste material.

(10) Vehicles used for transporting ice should have tight-fitting beds that are designed for easy cleaning; they should be kept clean and in good repair.

(11) Vehicles used for transporting garbage, rubbish, and infectious wastes should not be used for ice transport.

3-7. SUMMARY

a. The widespread use of ice in drinks and food refrigeration makes it a potential means of spreading waterborne disease. Most preventive medicine specialists will conduct inspections of ice plants during their careers.

b. AR 40-5 set standards for ice plants with the goal of ensuring that ice is manufactured in a safe and sanitary manner. The topics discussed in AR 40-5 are: building requirements; equipment maintenance; water requirements; personnel requirements; transport requirements; and inspection requirements.

c. A sample checklist for ice plants is included in the text. A preventive medicine specialist should be familiar with the items on the checklist and use the checklist as well as personal knowledge when evaluating the plant.

d. Many of the health hazards associated with ice can come from carelessness in manufacturing. The text presents a brief description of the manufacturing process and materials used in manufacturing.

e. Since ice is frozen water, the primary health hazard associated with ice is the transmission of waterborne diseases. Low temperatures do not kill certain microorganisms and can even favor the growth of some microorganisms.

f. To prevent the spread of waterborne disease, certain control measures are taken. Controls focus on water quality and proper design and maintenance of buildings and equipment.

Continue with Exercises

EXERCISES, LESSON 3

INSTRUCTIONS: The following exercises are to be answered by marking the lettered response that BEST answers the question or BEST completes the incomplete statement or by writing the answer in the space provided.

After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers.

1. What makes ice a potential health hazard?

   _____
   _____
   _____
   _____
   _____

2. According to AR 40-5 what is a way to reduce health problems associated with the handling of ice?

   _____

3. Only _____ water can be used for ice manufacture.

4. Ice plant employees are classified as _____ personnel.

5. Ice plants that have been approved by preventive medicine personnel and Army veterinarians must be listed in _____ or in _____

6. Which of the following is NOT stated in AR 40-5 as a standard for ice plant operations?

   a. The freezing cans should be disinfected by submerging them in a 100-ppm chlorine solution for two minutes or by steaming them.

   b. Ice must meet the same physical, bacteriological, and chemical standards as potable water.

   c. When entering the tank room, personnel must wear specialized clothing and a mask.

7. Below is a list of events that occur during the manufacture of ice. These events are out of chronological sequence. Each event is lettered. Arrange the events in chronological order by answering the questions below. Enter the letter of the appropriate event in the blank by each question.

EVENT A. The core water is replaced with potable water.

EVENT B. The ice is placed on a slide that leads to the ice storage room.

EVENT C. A “core sucker” is used to remove the core water.

EVENT D. A can filling tank is used to fill several ice cans with water at the same time.

EVENT E. Cranes lift the ice cans and place the cans in tanks of brine cooled by a refrigerant.

EVENT F. The ice cans are removed from the brine tank and placed in a dip tank to defrost the ice from the can.

EVENT G. The water freezes from the sides toward the center (core), with impurities moving toward the center.

EVENT H. Filtered air begins to bubble through a copper pipe placed in the center of each ice can.

EVENT I. The core is allowed to freeze.

a. What is the FIRST EVENT? _____

b. What is the SECOND EVENT? _____

c. What is the THIRD EVENT? _____

d. What is the FOURTH EVENT? _____

e. What is the FIFTH EVENT? _____

f. What is the SIXTH EVENT? _____

g. What is the SEVENTH EVENT? _____

h. What is the EIGHTH EVENT? _____

i. What is the LAST EVENT? _____

8. Freezing kills most waterborne pathogens, such as molds, bacteria, and other microorganisms.

    a. True

    b. False

9. You are inspecting an ice plant and make the following observations. Indicate how you would rate each observation by entering "Satisfactory" or "Unsatisfactory" after the statement. If you enter Unsatisfactory, briefly explain why.

    a. There are no cross-connections between potable and nonpotable water lines.

    _____
    _____

    b. Floor, wall, and ceiling surfaces are smooth and appear to be clean and in good repair.

    _____
    _____

    c. Some equipment appears to need repair. Some of the ice cans show signs of corrosion and leakage.

    _____
    _____

    d. Only filtered air is used for agitating water.

    _____
    _____

    e. Core-suckers are stored so that some surfaces touch the floor.

    _____
    _____

    f. Storage vaults have drains; some appeared plugged and there is moderate flooding in some of the storage areas.

    _____
    _____

    g. The plant has a certificate of water potability as required by local health authorities.

    _____
    _____

10. When conducting an inspection, you should take water samples for bacteriological analysis from:

    a. _____

    b _____

    c. _____

    d. _____

11. In general, water used to manufacture ice should meet the chemical, physical, and bacteriological standards set in _____and _____.

12. At times, the water used to make ice may be softened in order to:

    a. Ensure that the bacterial count is lowered.

    b. Prevent uneven freezing.

    c. Ensure more rapid freezing.

    d. Prevent an undesirable color.

13. You observe the following situation during an inspection of an ice plant. The trucks used to transport ice at this facility appear clean and in good repair. However, there are reports from employees that the trucks are used sometimes to transport garbage. How would you rate this situation on the checklist in Figure 3-1?

    _____

    _____

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES: LESSON 3

1. Since ice is frozen water, it is a good vehicle for transmitting water-borne diseases. Ice is commonly used for drinks and to refrigerate foods, and people can easily be exposed to any pathogens within the frozen water. (paras 3-1; 3-5; 3-7a, e)

2. To use automatic ice machines. (para 3-2d(2))

3. Potable. (para 3-2b(2)(a))

4. Food service. (para 3-2d (14))

5. The Directory of Sanitarily Approved Establishments for Armed Forces Procurements; a locally approved establishment list. (para 3-2c(2))

6. c. (para 3-2b(2)(g), (e), d(16))

7. a. Event D. (para 3-4b(3))
   b. Event E. (para 3-4b(3))
   c. Event H. (para 3-4b(3))
   d. Event G. (para 3-4b(3))
   e. Event C. (para 3-4b(4))
   f. Event A. (para 3-4b(4))
   g. Event I. (para 3-4b(4))
   h. Event F. (para 3-4b(5)
   i. Event B. (para 3-4b(5))

8. b (para 3-5)

9. a. Satisfactory. (para 3-6a(3))
   b. Satisfactory. (para 3-6b(1))
   c. Unsatisfactory. All equipment should be repaired. Ice cans should not leak and should not be corroded. (para 3-6b(2))
   d. Satisfactory. (para 3-6b(4))
   e. Unsatisfactory. Core-sucking devices must not be contaminated by contact with the floor or other surfaces. If the core-sucking device is contaminated, the ice will become contaminated. (para 3-6b(5))
   f. Unsatisfactory. Drains must be open to prevent flooding of storage areas. Flooding can cause contamination of the ice. (para 3-6b(9))
   g. Satisfactory. (para 3-6a(5))

10. Can filler.
Core filler.
Dip tank.
Ice block. (para 3-6a(4))

11. AR 40-5;TB MED 576. (para 3-6a(2))

12. d (para 3-6a(1))

13. As unsatisfactory under item 4c. You could then describe the problem in comments column. (para 3-6b(11); figure 3-1).

END OF LESSON 3

LESSON ASSIGNMENT

LESSON 4	Inspect Miscellaneous Facilities.
LESSON ASSIGNMENT	Paragraphs 4-1 through 4-15.
LESSON OBJECTIVES	After completing this lesson, you should be able to:

4-1. State the basic difficulty in inspecting miscellaneous facilities.

4-2. Identify the types of public use facilities.

4-3. Identify common items to inspect in public use facilities.

4.4. Identify special problems associated with specific public use facilities.

4.5 State the goal of public housing sanitary inspections.

4-6. Identify items to inspect in public housing.

4.7. State the goal of sanitary inspections of public schools.

4-8. Identify items to inspect in public schools.

SUGGESTION After completing the lesson assignment, complete the exercises at the end of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 4

INSPECT MISCELLANEOUS FACILITIES

Section I. PUBLIC USE FACILITIES

4-1. INTRODUCTION

a. During your career in the Army, you may be required to inspect a variety of post facilities. Unlike the other facilities discussed in this subcourse and in MD0164, these facilities have no formal or written standards to serve as a basis for inspections. The problems involved in these facilities are not addressed in AR 40-5 or other Army publications. Fortunately, many of these facilities have problems in common with institutions regulated by formal standards. In conducting your inspections, you must draw on your knowledge of those facilities with formal standards. Above all, your judgments must reflect a great deal of common sense.

b. There are three basic groups of miscellaneous facilities: public use facilities, family housing, and public schools. Section I of this lesson discusses public use facilities; Section II deals with family housing, and Section III handles public schools.

4-2. TYPES OF PUBLIC USE FACILITIES

Public use facilities include a variety of places that are frequented by the public, usually for recreation. Examples are theaters, bowling alleys, gymnasiums, and other recreational areas, such as parks and picnic areas.

4-3. GENERAL AREAS TO INSPECT

Although these facilities provide different services, there are certain common features that should be checked during an inspection. The following areas should be d evaluated:

a. The water source and distribution system.

b. Waste water disposal.

c. Restroom facilities.

d. Hazardous chemicals, operations, or physical structure.

e. Storage and disposal of solid waste.

f. Food service operations and vending units.

NOTE: Paragraphs 4-4 through 4-9 outline some of the items that you should check during an inspection of each area.

4-4. WATER SOURCE AND DISTRIBUTION

a. The water source should be checked to determine that contamination is not present. Whenever possible, connections should be made to a public water supply. When this is not possible, the local water supply should be tested to determine that it is safe and should be approved by the medical authority. The inspector should take bacteriological samples; these samples may indicate that chlorination is necessary. If the water is chlorinated, samples of free available chlorine and total available chlorine are necessary.

b. The inspector should ensure that there are no cross-connections with plumbing lines.

4-5. WASTEWATER DISPOSAL

a. An adequate and safe sewage system must be provided. Ideally, the sewage facilities should be connected to a public system. If not, sewage treatment facilities must be installed and approved by the medical authority.

b. Plumbing facilities must not create cross-connections or backflow connections.

4-6. RESTROOM FACILITIES

Restroom facilities should be kept clean, ventilated, and in good repair. There should be enough lavatories and hand-washing and bathing facilities to serve the patrons using the specific facility. Again, you should use common sense and awareness of the needs of the specific facility when making your evaluation. Theaters, for example, may have different restroom facilities than gymnasiums where shower facilities would be provided.

4-7. HAZARDOUS CHEMICALS, OPERATIONS, AND STRUCTURES

a. You should determine if patrons are exposed to hazardous chemicals that could cause poisoning, burns, or other health problems. This would include ensuring that both the storage and the actual use of these chemicals are safe.

b. Operations within the facility should be conducted in a safe and sanitary manner.

c. Likewise, you should examine the physical structure (the building and its layout) to uncover possible safety dangers, such as a fire hazard, and to determine that the building is well maintained and protected against insect and pest problems. Again, the focus of your investigation and the specific items you examine will vary with the type of facility being inspected.

4-8. DISPOSAL OF SOLID WASTE

a. The disposal of solid waste must be done in a manner that does not produce disease from contamination or infestation. In addition, the procedures for disposing of solid waste should not create fire, odor, or appearance problems.

b. Containers for solid waste should be adequate to handle the solid waste load of the particular facility. The containers should have tight-fitting lids and be durable, rust resistant, water tight, and nonabsorbent. They are to be kept clean and in good repair.

c. Solid waste containers should be stored in a manner that minimizes container damage and spilling. Containers should be located and maintained so that their storage does not create insect or rodent breeding problems.

d. The collection of solid waste at these facilities should occur frequently enough to prevent excessive accumulation and the resulting health problems.

4-9. FOOD SERVICE OPERATIONS AND VENDING MACHINES

Food service at public use facilities includes a variety of operations, from snack bars to vending machines. When inspecting these food service operations, follow the procedures for inspecting a regular food service facility. Pay particular attention to

temperature control of potentially hazardous food and to the sanitary practices of employees, particularly hand-washing.

4-10. SPECIAL PROBLEMS ASSOCIATED WITH PUBLIC USE FACILITIES

a. As previously mentioned, these public use facilities vary, which will present unique and special problems. The inspector must be aware of these problems. For example, gymnasiums and bowling alleys frequently have shoes available for public use. This could be a means for transmitting fungal diseases such as athlete's foot. However, it is not necessary to sanitize the shoes after use by each patron. Instead, check to see that foot powder is used and that the shoes are kept in a dry environment. This inhibits fungus growth and makes sanitization unnecessary. When inspecting parks and other outdoor recreational areas, examine the area for poisonous or noxious weeds and for any features that could be hazardous to the public. This would include water sources, sewage, and waste disposal.

b. The variability of public use facilities and the lack of written or formal standards present a challenge to the inspector. You are dealing with a "grey area" and must have thorough knowledge of sanitation and the specific facility undergoing the inspection in order to make accurate judgments.

Section II. FAMILY HOUSING

4-11. RESPONSIBILITIES FOR FAMILY HOUSING INSPECTIONS

a. Health standards for public housing are not covered in Army regulations. In fact, family housing issues are usually handled by Family Housing Services. Some posts may specify local health standards but this is not common.

b. Family housing inspections frequently result from complaints; normally an officer, not a 91S, responds to these complaints. An environmental health specialist (91S) usually gets involved in family housing problems when alone at a post. It is a good idea for the first sergeant of the individual possessing the house to be present when the environmental health specialist inspects the premises. This is done to establish regular military protocol and chain of command. Remember that the unit commander is responsible for overall sanitation and safety of his soldiers. Serious sanitation problems involving housing should be directed to the commander's attention.

4-12. PURPOSE OF FAMILY HOUSING INSPECTIONS

a. The basic goal of family housing inspections is to discover situations that are public health or safety hazards. A dirty or messy house or a house with many animals, for example, is not a public health hazard. Keeping large numbers of animals with animal fecal matter and waste on the floor could constitute a health hazard. Likewise,

you may be repelled by finding several cockroaches, but this does not create a public health problem.

b. When examining the house, also be alert to possible safety problems: fire hazards, the danger of carbon monoxide poisoning, empty self-locking refrigerators on the premises and dangerous weeds and plants are common examples of hazards to look for. If children live in an unsafe or unsanitary home, you might have to refer the problem to the community health nurse.

c. There is a fine line between what you consider an inadequate standard of living and an actual public health hazard. Because of this, you must exercise common sense and objectivity in forming a judgment.

Section III. PUBLIC SCHOOLS

4-13. HEALTH PROBLEMS IN PUBLIC SCHOOLS

Health problems in public schools resemble the problems in childcare centers due to the common nature of the two institutions. These problems focus on the prevention and control of childhood diseases and accident avoidance measures. As with child care centers, the preventive medicine specialist (91S) conducts the inspection to determine if hazardous conditions exist and to recommend improvements. Also, as with child care centers, the preventive medicine specialist frequently works with the community health nurse. The community health nurse focuses on childhood disease control and other health issues, such as vision and hearing tests.

4-14. GENERAL AREAS TO INSPECT

When inspecting public schools, pay attention to the following areas:

a. **Emergency Measures**. First, emergency evacuation plans should exist and second, drills conducted to ensure children are familiar with the plan. Third, the school should be capable of providing emergency medical care and have appropriate supplies and facilities for this purpose.

b. **Condition of the Building**. The building should be in good repair and clean without evidence of rodent or insect infestation. Paint should be nontoxic and lead free. Classrooms should have adequate illumination and floors should be easily cleanable and have non-slippery surfaces. Traffic in the area of the building and in neighboring streets should be controlled with low speed limits clearly marked.

c. **Washroom Facilities**. Bathrooms and toilet facilities are to be kept clean and in good repair with separate facilities for boys and girls. There should be enough toilets and washbasins to accommodate the child load. Exhaust should be provided

and the water temperature for washbasins should not exceed 110ºF. No common towels should be used.

d. **Storage Area**. There should be separate areas for storing cleaning equipment and supplies. Hazardous supplies, such as caustic and poisonous solvents, are to be stored in a place that is not accessible to children.

e. **Electrical Devices**. Electrical outlets should be covered or of the child-safe type; electrical appliances and devices should be designed to be non-hazardous for children. For example, children should not be able to insert their fingers into fans and contact the blades.

f. **Drinking Fountains**. The school drinking fountains should be child-sized when necessary and equipped with a mouth guard and angled jets. Drinking fountains should be kept clean and be made of nonabsorbent material.

g. **Heating and Ventilation**. Rooms occupied by children should have approved heating and ventilation systems and should maintain a comfortable temperature range. There should be three changes of outdoor air per hour. Adequate humidification in winter should also exist to prevent drying of mucous membranes and the resulting respiratory irritations.

h. **Outdoor Play Areas**. Playgrounds should be large enough to accommodate children without overcrowding and the risk of accidents. They should be located away from traffic and should be enclosed. Playground equipment should be as safe as possible, and designed to prevent accidents. Adult supervisors should be present when children are on the playground.

i. **Refuse Containers**. Refuse containers should be located so that children cannot reach them; they should be tightly covered and insect/rodent-proof.

j. **Water Supply**. The water supply should come from approved sources, ideally a community water source. The water supply should generally conform to Army regulations as stated in AR 40-5.

k. **Food Service**. Food services facilities should comply with the basic Army Regulations (TB MED 530) for food processing and handling.

l. **Reminde**r. Again, as with public use facilities and family housing, you should base your observations and recommendations on common sense and objectivity. Use the Army regulations for child-care centers as guidelines, and employ your general knowledge of and experience in sanitation. Be sure that your judgments concern health hazards to the children and do not merely reflect your opinion of what makes an attractive, modern school.

4-15. SUMMARY

a. As a preventive medicine specialist, you could be called upon to inspect a variety of facilities that have no written or formal standards. These facilities are usually public use facilities, family housing, or public schools.

b. Examining these facilities challenges your skill as an inspector. Because of the lack of formal standards or regulations, decisions depend on your own perceptions and judgments. You must balance Army standards for similar facilities with your experience and with your awareness of the principles of sanitation to reach a sound conclusion. Above all, you must use common sense in your evaluations.

c. The basic goal of inspecting these varied facilities is to determine whether they present a safety or health threat to the public. You must keep this goal in mind when evaluating a facility. Do not rate the facility based on your concepts of a good "standard of living" or attractiveness.

d. The term public use facilities refers to places such as theaters, bowling alleys, gymnasiums, and parks where people congregate, usually for recreation.

e. Public use facilities have both common problems and problems unique to each type of facility. You should inspect the following general areas common to most of these facilities:

(1) The water source and distribution system.

(2) Wastewater disposal.

(3) Restroom facilities.

(4) Hazardous chemicals, operations, or physical structures.

(5) Food service operations and vending units.

(6) Solid waste storage and disposal.

NOTE: In addition, you should be aware of sanitation needs and problems unique to a specific facility. Several examples are presented in the text.

f. A PVNTMED specialist (91S) becomes involved in family housing inspections when alone at a post. Otherwise, an officer usually handles these complaints.

g. When inspecting family housing, your goal is to evaluate conditions that may present a health threat to the public and not the standard of living. Be alert to situations that could cause disease transmission and safety hazards. Several examples were given in the text.

h. Sanitary inspections of public schools involve many of the same issues as childcare center inspections. The inspection focuses on measures to prevent and control childhood diseases and to avoid accidents.

i. When inspecting public schools, pay attention to the following areas:

(1) Emergency plans and drills and emergency medical care.

(2) Condition of the building and surroundings.

(3) Washroom facilities.

(4) Storage areas.

(5) Electrical devices.

(6) Drinking fountains.

(7) Heating and ventilation.

(8) Outdoor play areas.

(9) Water supply.

(10) Food service.

Continue with Exercises

EXERCISES, LESSON 4

INSTRUCTIONS: The following exercises are to be answered by marking the lettered response that BEST answers the question or BEST completes the incomplete statement or by writing the answer in the space provided.

After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers.

1. What is the main difference between inspecting the various miscellaneous facilities mentioned in this lesson and inspecting the facilities mentioned in previous lessons?

   _____
   _____
   _____
   _____
   _____

2. The three basic types of miscellaneous facilities are:

   a. _____

   b. _____

   c. _____

3. A preventive medicine specialist would most likely inspect which of the following public use facilities?

   a. Post office and bank.

   b. Theater and bowling alley.

   c. Department store and hardware store.

4. Although public use facilities provide different services, there are common areas that should be checked. These common areas are:

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

   f. _____

5. You are checking a gymnasium on an Army post. The gymnasium has typical workout facilities, a snack bar, restrooms, locker rooms, and a shoe rental service. You make the following observations. Indicate whether the observation is acceptable or not by recording "Satisfactory" or "Unsatisfactory" after the statement. If the rating is "Unsatisfactory," state why.

   a. The water supply is connected to a public source.

   _____
   _____
   _____
   _____

   b. The sewage system is also connected to a public system. There are no cross-connections or backflow connections.

   _____
   _____
   _____
   _____

c. Restrooms are clean and in good repair. There is no ventilation to the outside and no interior fan system.

_____
_____
_____
_____

d. Cleaning solutions, supplies and caustic chemicals are stored in a room set aside for that purpose.

_____
_____
_____
_____

e. The building appears to be well-maintained and in good repair. Doors and windows are screened. There are no accumulations of rubbish or rags inside the building.

_____
_____
_____
_____

f. Rental shoes are available. No foot powder is available.

_____
_____
_____
_____

g. Solid waste containers are located behind the building. The frequency of collection appears adequate. Container lids are half off and some of the waste has spilled out of the cans.

_____
_____
_____
_____

h. The snack bar appears to be clean with no food spillage or food accumulations. Refrigeration is present within required temperature ranges. Employees maintain personal sanitation by following hand washing and clothing regulations and by being free of infections.

_____
_____
_____
_____

6. A preventive medicine specialist normally conducts a family housing inspection when:

   a. Alone at a post.

   b. The reported problem does not appear serious.

   c. Requested to do so by the community health nurse.

7. The basic goal of a family housing inspection is to:

   a. Improve the general appearance of the house.

   b. Discover if the house is applying required energy-saving measures.

   c. Discover if the house presents public health or safety hazards.

8. Read the situation below.

   This house is located on a large lot with tall, uncut grass. No harmful weeds and no bushes are present. About seven large plastic sacks of garbage are placed behind the house. The sacks are tied. There are two adults, three children, four cats and one dog inhabiting the house. The inside of the house is messy: cat litter, but no fecal matter is on the floor; floors and walls are soiled. Unwashed dishes are stacked in the sink. The kitchen garbage container is full, but not overflowing. Children's clothes are thrown on the floor. Unwashed diapers, with urine and fecal stains are in the bathroom, washing facilities and the commode work are stained. Some roaches and ants can be seen in the kitchen near the garbage, but there is no evidence of massive infestation. Likewise, no evidence of rodent infestation can be found. Some of the lamps are without shades; the wiring appears intact.

How would you evaluate this house, as a problem of a standard of living or as a public health hazard? Briefly state the reason(s) for your evaluation.

_____
_____
_____
_____
_____
_____
_____

9. Read the situation below.

   This house is also located on a large lot. The grass is cut but the backyard contains an overgrowth of poison ivy and several bushes with berries that are poisonous if eaten. An empty refrigerator has been placed on the lot; the refrigerator door is self-locking. There are two adults, two children, and two dogs inhabiting the house. One of the dogs is a puppy, and his fecal matter is scattered on the bedroom and living room floor. One of the children is less than a year old and was observed crawling around near the fecal matter. Garbage on the outside of the house was recently collected. However, the plastic garbage container in the kitchen is over-flowing with rubbish as well as food items and half empty milk cartons. There are rodent tracks and droppings. Examination of lamp cords shows areas with bare wire exposed.

   How would you evaluate this house, as a problem of a standard of living or as a public health hazard? Briefly, state the reason(s) for your evaluation.

   _____
   _____
   _____
   _____
   _____
   _____
   _____

10. Inspecting public schools is similar to inspecting _____; the major health problems are _____ and _____.

11. When determining if a public school has adequate emergency measures, what are some items to check?

    a. _____

    b. _____

    c. _____

12. The following are characteristics of the school building you are inspecting. Which item would you consider to be unsatisfactory? Why do you consider it to be unsatisfactory?

    Item a. The paint used on walls and building surfaces is nontoxic and lead free.

    Item b. The floors are generally clean and non-slippery

    Item c. The building is close to a main street with a speed limit of 45 mph. Traffic monitors are not present.

    Item d. There is no evidence of widespread insect or rodent infestation.

    _____
    _____
    _____
    _____

13. Playground equipment should be designed to _____ and _____ should be present when children are on the playground.

14. You are inspecting a public school and make the following observations:

    Observation 1. Drinking fountains are child-sized with mouth guards and angled jets.

    Observation 2. The water supply is from a public source.

    Observation 3. Rooms are maintained at a warm but comfortable temperature with three changes of outdoor air per hour; humidification equipment is present.

    Observation 4. The bathrooms are clean with a sufficient amount of toilets and hand washing basins for the student load. The water temperature does not exceed 110ºF. Exhaust is provided.

    Observation 5. There is a special closet for cleaning equipment and supplies.

    Which of the above observations would be considered unsatisfactory?

    a. Observations 1, 2 and 4.

    b. Observations 2, 3 and 5.

    c. Observations 3, 4 and 5.

    d. Observations 1, 2 and 5.

    e. All of the observations.

    f. None of the observations.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 4

1. The facilities mentioned in this lesson do not have formal or written standards, such as those found in AR 40-5 or other Army regulations. You must base your judgments on your own knowledge and experience, and above all, on common sense. (para 4-1a; 4-15b)

2. Public use facilities.
   Public housing.
   Public schools. para 4-1b)

3. b (para 4-2)

4. Water source and distribution system.
   Wastewater disposal.
   Restroom facilities.
   Hazardous chemicals, operations, or physical structure.
   Storage and disposal of solid waste.
   Food service operations and vending units. (para 4-3a-f)

5. a. Satisfactory. (para 4-4a)
   b. Satisfactory. (para 4-5a, b)
   c. Unsatisfactory. Restrooms should be ventilated, to prevent moisture accumulation. (para 4-6)
   d. Satisfactory. (para 4-7a)
   e. Satisfactory. (para 4-7c)
   f. Unsatisfactory. As rental shoes are used by many people, they could be a source of contamination, particularly of fungal diseases, such as athlete's foot. As a preventive measure, these shoes should be kept dry and foot powder should be used. This inhibits the growth of fungus. (para 4-10a)
   g. Unsatisfactory. Solid waste containers should have tight-fitting lids to prevent spillage. (para 4-8b)
   h. Satisfactory. (para 4-9)

6. a (para 4-11b)

7. c (para 4-12a)

8. As a standard of living problem. The house appears unattractive with minimal up-keep. This is shown by the uncut grass, spilled cat litter, unwashed diaper/dishes, lamps without shades and the presence of some insects. However, there is nothing to cause a health or safety threat to others or even to the occupants of the house. (para 4-12a, b, c)

9. As a public health hazard. There are several items that could cause disease or harm to others and to the occupants of the house, specifically: the presence of poison ivy and bushes with toxic berries; the empty, self-locking refrigerator that could trap children; the animal fecal matter collected on the floor; overflowing garbage; evidence of a rodent infestation; and exposed electrical wires. (para 4-12a, b, c)

10. Childcare centers; prevention and control of childhood diseases, accident avoidance measures. (para 4-13)

11. Existence of emergency evacuation plans.
Drills conducted to familiarize children with the plans.
Facilities and supplies for providing emergency medical care. (para 4-14a)

12. Item c. The building is located near a main street with high-speed traffic. There has been no attempt to control traffic or reduce the speed limit. (para 4-14b)

13. Prevent accidents, adult supervisors. (para 4-14h)

14. f (para 4-14f, j, g, c, d)

END OF LESSON 4

COMMENT SHEET

SUBCOURSE MD0166, Environmental Health Inspections and Surveys II EDITION 100

Your comments about this subcourse are valuable and aid the writers in refining the subcourse and making it more usable. Please enter your comments in the space provided. ENCLOSE THIS FORM (OR A COPY) WITH YOUR ANSWER SHEET **ONLY** IF YOU HAVE COMMENTS ABOUT THIS SUBCOURSE..

FOR A WRITTEN REPLY, WRITE A SEPARATE LETTER AND INCLUDE SOCIAL SECURITY NUMBER, RETURN ADDRESS (and e-mail address, if possible), SUBCOURSE NUMBER AND EDITION, AND PARAGRAPH/EXERCISE/EXAMINATION ITEM NUMBER.

PLEASE COMPLETE THE FOLLOWING ITEMS:

(Use the reverse side of this sheet, if necessary.)

1. List any terms that were not defined properly.

2. List any errors.

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