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## **AUSTRALIAN ARMY**

### **LAND WARFARE PROCEDURES – GENERAL**

#### **LWP–G 1-2-2**

#### **Field Health and Hygiene Handbook**

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## LAND WARFARE PROCEDURES – GENERAL

### LWP–G 1-2-2

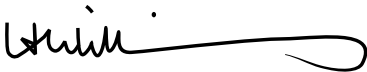
## Field Health and Hygiene Handbook

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Land Warfare  
Development Centre  
10 December 2001

Issued by command  
of the Chief of Army

A handwritten signature in black ink, appearing to read 'V.H. Williams', with a long, sweeping horizontal line extending to the right.

V.H. WILLIAMS  
Brigadier  
Commander  
Land Warfare  
Development Centre

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## PREFACE

### Aim

1. The aim of this publication is to provide direction, advice and background information on field health and hygiene in order to reduce significantly the number of disease and non-battle injuries and their impact on land-based operations.

### Level and Scope

2. The application of effective field health and hygiene measures requires a disciplined and informed approach. Only through effective leadership and continual vigilance will preventive health measures be truly effective. It is therefore essential that all non-commissioned officers and officers read and apply the preventive health measures detailed in this publication. This publication has been designed for use by all ranks within all corps.
3. This publication is designed to provide the basis for preventive health and hygiene measures in Australian field environments. Operational or regionally specific advice should be sought for areas outside the Australian Defence Forces' normal working environment. Nuclear, biological and chemical, tropical or cold environments can greatly enhance the impact of many diseases and need specific consideration during force preparation. Advice should be sought from organic health staff or J075 staff during the early phase of planning.
4. This publication has been compiled to provide a technical reference (in conjunction with associated publications) that should be used as the basis for all-corps field health and hygiene training.

## **Associated Publications**

5. This publication has been developed using:
- a. *Australian Defence Force Publication 717, Preventive Medicine Manual*, 1997;
  - b. *Australian Defence Force Publication 705, Pesticides Manual*, 2000;
  - c. *Australian Defence Force Health Surveillance System (EPITRACK) Instruction Manual*, 2001;
  - d. *Quadrupartite Standardisation Agreement 535, Edition 1, Medical Training in First Aid, Basic Hygiene and Emergency Care*, 1979;
  - e. *Australian Defence Force Publication 712, Envenomation and Poisoning by Animals and Plants in Australia*, 1996; and
  - f. *Quadrupartite Standardisation Agreement 245, Edition 2, Minimum Requirements for Water Potability*, 1985.

## **On-line Doctrine**

6. This and other doctrine publications are available via the Doctrine Central website located at:

**<http://lwdc.sor.defence.gov.au/doctrine>**

## **Gender**

7. Words importing gender refer to both male and female unless specifically stated otherwise.



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## ABBREVIATIONS

The following abbreviations are used in this publication.

### ADFP 103

ADF	Australian Defence Force
ADFP	Australian Defence Force Publication
AO	area of operations
MO	medical officer
NBC	nuclear, biological and chemical
NCO	non-commissioned officer
PW	prisoner-of-war
RAP	regimental aid post
WP	water point

### Common Military Usage

cm	centimetre
CSSB	Combat Service Support Battalion
DEET	diethyl toluamide
DB	dry bulb
DNBI	disease and non-battle injury
FFI	free from infection/infestation
GT	globe thermometer
HSB	Health Support Battalion
m	metre

mm	millimetre
PPE	personal protective equipment
SNCO	senior non-commissioned officer
SPF	sun protection factor
STL	shallow trench latrine
WB	wet bulb
WBGT	wet bulb globe temperature

## **CHAPTER 1**

### **Introduction**

#### **General**

- 1.1** The Australian Defence Force (ADF) is trained to conduct operations in diverse terrain and climates. This places significant physical and mental demands on deployed personnel. ADF personnel must achieve and maintain a high level of physical and mental fitness to enable them to carry out their duties in military operations with drive, determination and efficiency.

#### **Causes of Manpower Wastage**

- 1.2** The principal causes of personnel loss during military operations are:
- a. disease;
  - b. non-battle injury; and
  - c. wounds received in combat activities.
- 1.3** In the area of operations (AO), disease and non-battle injury (DNBI) is the main cause for the loss of personnel, even though, in individual operations, battle casualties may predominate. The problem is aggravated in the tropics by the increased prevalence of communicable diseases and heat casualties. Through realistic training and command-enforced health discipline, personnel loss caused by DNBI can be minimised.

## **Responsibilities for Preventive Medicine**

- 1.4 The Commander.** The principal causes of high DNBI rates are ignorance, carelessness, apathy, and lack of training. In addition to ensuring that their troops understand and comply with orders and instructions issued for the protection of health, commanders must also:
- a. monitor the health of their troops;
  - b. ensure that food, clothing and accommodation are of the highest possible standard;
  - c. ensure that footwear, clothing and equipment are inspected to see that they are well fitting, clean and in good repair;
  - d. remedy defects in hygiene and sanitation;
  - e. ensure that frequent foot and skin inspections are conducted; and
  - f. ensure that all subordinate commanders are aware of methods of minimising, recognising and treating DNBI.
- 1.5 The Service Member.** Implicit in the Defence Force Discipline Act is the intent that all officers, non-commissioned officers (NCO) and other ranks are responsible for the preservation of their own health and that of their subordinates.
- 1.6 The Health Services.** The Health Services are responsible for advising commanders on all matters affecting the health of the troops, and for the evacuation, care and treatment of the sick, injured and wounded.
- 1.7 Preventive Medicine Assets.** Preventive medicine assets are components of the Health Company of the Combat Service Support Battalion (CSSB) and within the Health Support

Battalion (HSB). They are mobile and designed to operate forward across boundaries to provide support to the area of highest health threat. Army Preventive Medicine assets may also operate with deployed Royal Australian Air Force and Royal Australian Navy environmental health assets to provide force-level preventive health support.

- 1.8 The role of preventive medicine assets is the conservation of manpower by promoting the prevention of DNBI through the study, evaluation and control of environmental factors affecting the health of the troops in an AO.
- 1.9 Preventive medicine assets focus on minimising the impact of environmental and occupational threats to which ADF personnel may be exposed during training and operations.
- 1.10 **Preventive Medicine Asset Capability.** Preventive medicine assets provide support capabilities in the following areas:
  - a. health intelligence, and health threat assessment;
  - b. field hygiene;
  - c. field sanitation, waste disposal, and environmental pollution;
  - d. field water quality;
  - e. food safety;
  - f. climatic stress control;
  - g. vector control;
  - h. disease outbreak investigation, and prevention and control;
  - i. epidemiology and health surveillance;
  - j. preventive medicine input to planning and operations;



- k. health education (threat and countermeasures briefings); and
- l. occupational health and industrial hygiene.

## **Section 1-1. Operational Planning and Health Monitoring**

- 1.11 Planning.** Planning and executing prevention measures ensures the incidence of preventable injury, illness and wounding of ADF personnel is minimised. Prevention of casualties in an operational environment requires a proactive, integrated approach with close cooperation between regimental staff and prevention assets.
- 1.12** At the higher levels, prevention must be factored into the Military Appreciation Process, and planned as part of any operation. Health intelligence estimates should be as complete and up-to-date as possible and included in the Intelligence Preparation of the Battlefield, in order to maximise the effect of health countermeasures.
- 1.13** Deployment of preventive medicine and environmental health personnel must occur as part of reconnaissance and at the earliest opportunity as part of the initial deployment of personnel. The rapid identification and minimisation of health threats are central to reducing casualties and maximising operational effectiveness.
- 1.14 Monitoring.** The ability to capture and readily evaluate health surveillance data is essential in allowing commanders to react quickly to health threats. The rapid identification and control of health threats may prove to be the difference between mission success or defeat.
- 1.15** The EPITRACK system detailed in the *Australian Defence Force Health Surveillance System (EPITRACK) Instruction Manual* is the cornerstone to ADF health surveillance.

Preventive medicine assets are the eyes and ears of the unit commander in interpreting EPITRACK data, identifying emerging health threats and evaluating the impact that those threats may have on the health of their soldiers. Preventive medicine assets also provide advice as to the most effective means to eliminate, control or limit the impact of health threats on the mission.



## CHAPTER 2

### Disease Prevention and Control

#### Section 2-1. Diseases with Significant Military Impact

- 2.1 Throughout the history of armed conflict, DNBI or non-battle casualties traditionally account for the highest proportion of casualties in military operations.
- 2.2 **East Timor, 1999.** Operation WARDEN, ADF support to International Force East Timor, resulted in a ratio of more than 250:1 non battle casualties to battle casualties.
- 2.3 Several diseases will have a significant impact on military operations because of their debilitating and long-lasting effects. These diseases are significant because:
  - a. they tend to occur in epidemics;
  - b. they can spread rapidly throughout a unit and have a massive effect on combat effectiveness;
  - c. if not treated, other serious complications may occur and some diseases may prove to be fatal;
  - d. infectious cases may spread the disease before they are diagnosed; and
  - e. the course of treatment can be prolonged, rendering Service members unfit for duty for some considerable time.
- 2.4 The following are examples of diseases with significant impact on military operations:
  - a. influenza,

- b. dysentery,
- c. cholera,
- d. malaria,
- e. typhoid, and
- f. hepatitis.

- 2.5** Although not all these diseases are prevalent in Australia, they are found in overseas countries in which ADF members may be called to serve. There is also the possibility of pathogens being used in biological warfare, even though international convention precludes such warfare.

## Section 2-2. Categories of Disease

- 2.6** There are two broad categories of disease: communicable and non-communicable. The types of diseases that fall within these categories are illustrated in Figure 2–1.

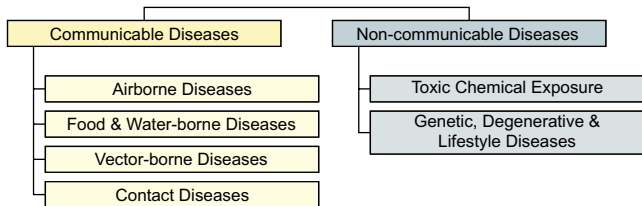


Figure 2–1: Categories of Disease

## **Communicable Disease**

- 2.7** Communicable disease is an illness that is due to an infectious agent that can be passed from an infected person, or animal (the source) to another person (a susceptible individual). This can occur directly or indirectly through contaminated food, water, insects or through the environment.

## **Non-communicable Disease**

- 2.8** A non-communicable disease is an illness that afflicts an individual, but which cannot be passed from one person to another. The area of greatest risk to Service personnel is due to exposure to toxic chemicals. Asbestosis, caused by individual exposure to asbestos dust, is one example. Genetic and degenerative diseases are beyond the scope of this publication and in all instances should be reported immediately to the Medical Officer (MO).

## **Causes of Communicable Diseases**

- 2.9** Communicable diseases are those spread from one person to another, by direct or indirect contact. In a concentrated community such as the ADF, where soldiers live, work and fight in close proximity, such diseases can spread rapidly. All communicable diseases have one common feature: they are caused by living organisms. These may be quite large, for example, some of the worms that live as parasites in the human bowel, or so small as to be invisible to the human eye even when aided by a microscope. (Examples include the micro-organisms that cause influenza and colds.)

- 2.10 Micro-organisms (Germs).** Micro-organisms are minute living organisms that cause disease by damaging internal organs or producing poisonous substances known as toxins, which damage or destroy the body cells by attacking and taking over these cells for nutrient and reproductive purposes. In favourable conditions they can spread rapidly and cause disease throughout a unit.

## **Spread of Communicable Diseases**

- 2.11** All communicable diseases have one important common factor: the transmission of each is through a chain consisting of three links ([Figure 2–2](#)):

- a. *The Source.* The source of disease can be any of the following:
  - (1) *Cases.* For the majority of diseases, the source is a human carrying the disease (germs). Usually the person is ill and has the clinical signs and symptoms of illness. This source is known as a 'clinical case' or 'case'.
  - (2) *Carriers.* Disease-causing organisms can be carried and spread by apparently healthy people. This happens in one of the following two ways:
    - (a) *During the Incubation Period.* After infection there is a period of days or weeks, called the incubation period, in which the disease organisms multiply. When there are enough to overcome the body's resistance, the infected person becomes ill. During the incubation period the person is capable of transmitting disease and is known as a 'carrier.'

- (b) *Immune Carriers.* After coming into contact with infectious organisms, the body builds up a resistance to these. With some diseases this is only partial, or temporary, with others, it is virtually complete and long-lasting. A person with this 'immunity' may harbour the organisms of disease while appearing symptomless, and can transmit them to others.
  - (3) *Animals.* Some types of animal disease such as rabies are transmissible to man and are called zoonoses.
  - (4) *Environment.* Some diseases exist normally in the environment and have an impact on man once an environment is disturbed. These diseases may be rare in the normal population but have severe effects once transmitted to man. One example of this is the Ebola virus.
- b. *The Route.* Diseases can be spread by the following four routes:
  - (1) *Airborne Infections.* Airborne infections are caused by organisms that travel from the mouth, nose, throat or lungs of the source and are breathed in by the target (a healthy soldier).
  - (2) *Ingestion (Food and Water) Infections.* Ingestion infections are caused by organisms that leave the bowel or kidneys of the source and are subsequently swallowed by the target through contaminated food, water or poor hygiene.
  - (3) *Vector-borne Infections.* Insects, rodents, monkeys and other animals can spread disease. Many such as dengue, malaria and scrub typhus are transmitted by blood-sucking insects which carry the disease from the blood of the source to the blood of the target.



- (4) **Contact Infections.** Contact infections are transmitted by bodily contact between source and target or the sharing of equipment such as clothing or towels.
- c. **The Target.** For each disease discussed in this publication the target is a human (a healthy soldier). Personal (target) protection can be achieved by good personal hygiene, vaccination, mosquito nets, and other measures.

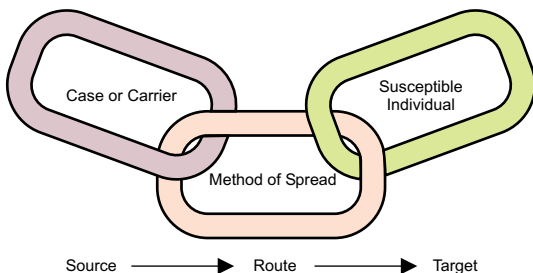


Figure 2–2: Spread of Communicable Diseases

## The Importance of Vaccination

- 2.12** The term 'vaccination' as used in this publication includes all procedures known as 'immunisation', 'inoculation' and 'vaccination'. Apart from the obvious tasks of treating illness and advising the officer commanding or commanding officer how best to deal with epidemics, the health services can help prevent certain diseases by vaccination. It is important that commanders at all levels ensure their subordinates have all

current vaccinations required for the region to which they are deploying. This must be done early in the planning process due to the time required for many of the vaccinations to become effective.

## **Prevention of Communicable Diseases**

**2.13** Prevention is a process designed to break the chain at the source, route or target. The link that is most vulnerable to attack by preventive measures varies from disease to disease. Disease control aims at breaking any or all the links in the chain of infection through the following measures:

- a. Personal hygiene, isolation, quarantine, avoiding high risk areas if possible, treatment, and medical surveillance can control the source of disease.
- b. Transmission (the route) can be reduced or eliminated by good personal hygiene, avoiding overcrowding, good ventilation, dust suppression, water purification, effective food sanitation, proper preparation of food, sanitary disposal of waste and vector control.
- c. Control measures applicable to the target include personal hygiene, personal protective measures such as impregnated uniforms, mosquito nets and repellent, vaccination, and suppressive drugs.

**2.14** [Tables 2–1 to 2–4](#) provide a detailed breakdown of the four types of communicable diseases by source, route and target and the control measures used to break the infection chain at each link.

**Table 2–1: Airborne Diseases**

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
<i>Source</i>	Respiratory infections are diseases transmitted from person to person through the air by discharges from the respiratory tract of the infected person. They include diseases such as influenza, tuberculosis, and pneumonic plague. Some respiratory infections may result from inhalation of infectious material from other sources; for example, inhaling dust shaken from blankets.	<p>It is more difficult to control outbreaks of respiratory infections than many other types of communicable diseases. In general, control efforts are based on improving personal hygiene, avoiding contact with patients and carriers, controlling dust and aerial contamination, preventing overcrowding and fatigue, and immunising when applicable.</p> <p><b>Personal Hygiene.</b> Personal Hygiene is one of the most important respiratory disease control measures. Good personal hygiene is effective in controlling these diseases at all three links in the chain of infection. This approach involves the practise of simple health habits.</p> <p>Covering the nose and mouth when sneezing or coughing, and washing hands, should be routine practices.</p>

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
		<p><b>Avoidance of Contact.</b> Infected cases should avoid contact with healthy people. Personal articles such as towels, drinking glasses, and toothbrushes should not be shared.</p> <p>Soldiers should maintain a distance from others who show signs of illness, especially patients, prisoners-of-war (PW) and refugees. Patients, PWs or refugees with respiratory disease must be diagnosed early, isolated, and treated as soon as possible.</p> <p>Overcrowding in living quarters must be avoided. Close, continuous contact increases the spread of respiratory disease.</p> <p>Bed staggering and head-to-foot sleeping arrangements may also offer some protection.</p>

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
		<p>Overcrowding should also be avoided in classrooms and office areas. Alternating seating arrangements may accomplish this during respiratory infection epidemics.</p> <p>In addition, maximum use of outdoor training is encouraged when weather permits.</p>
<i>Route</i>	<p>The spread of respiratory infections from person to person occurs through:</p> <p><b>Droplet Transmission.</b> In the normal course of breathing or talking, a person exhales droplets of moisture, which can carry disease agents from the respiratory tract, if the person is infected.</p>	<p><b>Ventilation, Temperature, and Humidity.</b> The gentle circulation of fresh air at all times, and especially during periods of greatest personnel activity, aids in limiting dust and bacterial contamination of the air. Extremes of humidity and temperature are undesirable. Whenever possible, the barracks temperature should be near 20°C during daylight and slightly cooler at night.</p>

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
	<p><b>Droplet Nuclei.</b> Droplet nuclei are the residue of dried-out respiratory discharge droplets</p> <p><b>Fomites.</b> Fomites is a word used to refer to contaminated objects which can transmit disease.</p> <p><b>Direct Transmission.</b> Direct transmission of respiratory infections refers to person-to-person spread of the oral-pharyngeal (mouth and throat) route. This is the method of transmission of the viral infection glandular fever, which has accordingly been called the 'kissing disease' by some people.</p>	<p>Relative humidity of 45 to 60 per cent at the suggested temperature will provide a comfortable environment. Windows should be opened to provide ventilation.</p> <p><b>Dust Control.</b> Dry sweeping should be avoided. A wet mop should be used where possible. Large-scale measures, such as watering tracks, may be required in dusty environments.</p> <p><b>Catering Sanitation.</b> The early detection of coughs, colds, and sore throats among food handlers is the responsibility of the catering supervisor, who should refer cases to the appropriate medical personnel. All catering personnel must practise good personal hygiene, as the food-borne route can also transmit some respiratory diseases.</p>

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
<i>Target</i>	<p>The transmission of a respiratory infection to a new host, that is, a person lacking resistance to the particular agent, completes the chain of infection.</p> <p>This new person becomes a case or carrier of the infection. Several factors in particular encourage respiratory disease epidemics in military populations.</p> <p><b>Overcrowding.</b> As members of a military unit, people are housed, fed, drilled, and trained as a group. Various studies of barracks and wards have shown that the number of bacterial and viral agents in the air increases in proportion to the number of people in the area.</p>	<p><b>Dispersal of Personnel.</b> Personnel should be dispersed as widely as possible and ventilation maximised to prevent the transmission of infection.</p> <p>Those personnel already displaying signs of infection should be accommodated separately and in well-ventilated areas.</p> <p><b>Vaccination and Prophylaxis.</b> All commanders (with MO support) should ensure that personnel receive the full course of pre-deployment vaccinations and/or medication. However, the best prevention is the practise of good personal hygiene.</p>

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
	<p>Opportunities for transmission of agents causing respiratory infection are thus much greater. Recruits have a much higher prevalence of respiratory infections than do other military groups. The close quarters, fatigue, physical exhaustion and emotional stress found in recruits in the early training program are important factors tending to lower the recruit's resistance to respiratory infections.</p>	



**Table 2-2: Food and Water-borne Diseases**

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
<i>Source</i>	Communicable gastrointestinal diseases are infectious diseases passed from a person with the disease where either the causative agent enters the body through the gastrointestinal tract, or by some other route, in which case the major disease process still takes place in the gastrointestinal tract. Chemical food poisoning, caused by the ingestion of numerous chemical substances, is not a communicable disease, but may cause symptoms difficult to distinguish from the communicable infectious diseases mentioned. Some bacteria, which may be transmitted to food, can produce certain chemicals (toxins). These toxins, if ingested, can cause severe diseases such as staphylococcal food poisoning and botulism.	<p>Intestinal infection control rests on interruption of the 'faecal-oral cycle'. Individuals who are ill with gastrointestinal disease should be removed from any food handling and seen and treated by an MO.</p> <p>It is the responsibility of the supervisor to inspect all kitchen personnel for signs of any illness and for general cleanliness before starting work each day. The supervisor must make on-the-spot corrections and immediately refer anyone who is obviously ill. It is also the supervisor's responsibility to enforce rules of personal hygiene among the food handlers and diners. Facilities for utensil sanitising with hot water and hand washing with soap and warm water must be readily available within the dining hall and each individual must wash his hands after using the latrine, and before handling utensils or food.</p>

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
		This is one of the most effective general measures for preventing intestinal infections.
<i>Route</i>	The spread of gastrointestinal infections from person to person occurs by several methods. The primary mode of transmission is by the 'faecal-oral cycle', via ingestion of food or water contaminated directly by a person with the disease or indirectly by flies, cockroaches or rodents. In some cases they may be spread directly from one person to another due to poor personal hygiene.	<p><b>Faeces.</b> Human faeces should be disposed of in a sanitary manner as described in <a href="#">chapter 3</a>. This is one of the best long-term control measures, since it prevents contamination of the soil and water sources. Local food sources should be avoided as human faeces are often used as fertiliser for growing fruits and vegetables, which may later be eaten raw or only partially cooked.</p> <p><b>Fluids.</b> Water is one of the main vehicles for spreading gastrointestinal infections. As such, all water must be treated as described in <a href="#">chapter 4</a>. Ice must also be considered a potentially dangerous vehicle of many gastrointestinal diseases, especially in foreign countries with poor sanitation.</p>

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
		<p>All milk must be kept at a temperature of 4°C or below, but not frozen. Pasteurised milk, if so kept, will keep fresh for several days. Milk that is served to diners or exposed to the air cannot be reused, but will be discarded.</p> <p><b>Food.</b> Gastrointestinal diseases are also transmitted through food. Every effort must be made to keep food from becoming contaminated while being stored or handled. Most foods contain the essential nutritional elements for bacteria to multiply rapidly within them. Bacterial growth in foods can be markedly inhibited by refrigerating them below 4°C. Emphasis should be placed on the maximum time that food may remain out of the refrigerator. Bacterial growth can also be minimised by preparing all foods as close to the serving time as possible.</p>

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
		<p>One of the best preventive measures for intestinal infections is the thorough cooking of all food. This will destroy organisms which have the capacity to produce this type of disease in humans. Care must be taken not to recontaminate food after it has been cooked. It should not be returned to its original container and should be kept away from contaminated working areas, such as cutting boards. If food is to be kept warm while being served, it must be kept above 60°C to prevent bacterial growth.</p> <p><b>Flies, Fomites and Fingers.</b> Patients who are ill with intestinal infections and those caring for them must pay close attention to personal hygiene. Latrines and clothing soiled by cases and carriers must be thoroughly disinfected.</p>

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
		<p>Proper screening of latrines is also important. This prevents insects carrying organisms from the latrine to areas where food is being prepared and eaten. Flies and cockroaches carry faecal material on their bodies.</p> <p>To minimise the transmission of these diseases, all eating utensils should be thoroughly washed after use and sanitised by dipping in hot water immediately before use.</p> <p>Since insects and rodents can spread gastrointestinal infections, food service facilities should be screened and a high level of sanitation maintained. Insecticides and rodenticides may be used, but they are no substitute for sanitation. Garbage cans should be kept covered and cleaned thoroughly after emptying.</p>

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
		All personnel must wash their hands immediately after using the latrine. Supervisors must ensure that hand washing facilities are readily available.
<i>Target</i>	All soldiers are susceptible to intestinal infections. Every new soldier infected becomes a case or carrier of the infection and can pass on the disease.	Immunisations exist only for typhoid fever and cholera. Since the immunity offered by these immunisations can be easily overcome when one ingests a large number of organisms, immunisations should be considered as supplements to, and not substitutes for, good personal hygiene and a high level of sanitation. Particularly important measures applicable to the susceptible person are hand washing, drinking potable water only, thoroughly cooking all food, avoiding local sources of disease, and promptly reporting disease symptoms.

**Table 2–3: Vector-borne Diseases**

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
<i>Source</i>	<p>Vector-borne diseases are infectious diseases passed from person to person via a vector such as mosquitoes, flies, ticks, fleas or some other animal. Rodents (rats and mice) are also important vectors in their own right, but also assist insects like fleas to spread diseases such as plague. Monkeys carry many human diseases including Ebola and yellow fever. Humans are the only source for diseases such as malaria and epidemic typhus.</p>	<p>Vector-borne disease control rests with personal protection, the interruption of the vector's breeding cycle, killing vectors and isolating them from the source.</p> <p>Individuals who are ill with vector-borne diseases should be removed from exposure to the vectors and seen and treated by an MO.</p> <p>It is the responsibility of the medical staff to enforce strict personal protective measures in order to stop patients further spreading the disease.</p> <p>Local populations and animals which are potential sources of disease should be avoided and must be discouraged from entering the unit area.</p>

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
<i>Route</i>	<p>The spread of vector-borne diseases from person to person occurs in several ways. Their primary mode of transmission is by the bite of blood-sucking insects with major diseases such as malaria and dengue fever being spread by mosquito bites. Other diseases may be spread by the bite or in the urine or faeces of the vector.</p>	<p>In a combat zone the unit responsibility for control includes the immediate vicinity out to 100 metres (m) from the area occupied by the unit. The order of precedence for controlling disease vectors and rodent reservoirs is:</p> <ol style="list-style-type: none"> <li>physical methods including breeding site destruction, screening buildings, good sanitation and drainage; and</li> <li>chemical methods such as rat baits and insecticides.</li> </ol> <p>Area protective measures to control disease harbours and reservoirs over large areas are performed by preventive medicine or environmental health personnel.</p>



	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
		Area protective measures such as drainage of swamps or lagoons acting as vector breeding sites, may require significant engineering assistance.
<i>Target</i>	An individual's resistance to vector-borne diseases is in some cases related to immunity or previous exposure to the disease. This new person becomes a case or carrier of the infection and can pass on the disease.	Correct wearing of the uniform will reduce contact with biting vectors. Long-sleeved shirts should be worn with sleeves rolled down. Trousers should be bloused or tucked into boot tops. Headgear should be worn whenever Service members are outside. Troops are vulnerable when sleeping and should use mosquito nets correctly. All these measures limit exposed skin, which attracts biting insects.

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
		<p>The ADF Permethrin/diethyl toluamide (DEET) repellent system detailed in <a href="#">chapter 5</a> provides additional protection and is required in many field training areas as well as overseas.</p> <p>The most significant vector-borne disease for ADF troops on operations has proven to be malaria. It is imperative that troops in malarious areas take malaria suppressive drugs as prescribed by health services advice. Commanders should order regular anti-malarial medication parades to ensure compliance with such medication. Note that these drugs are not effective, and do not provide protection from many of the other diseases such as dengue fever. <b>Strict enforcement of personal protective measures is also required.</b></p>

**Table 2-4: Contact Diseases**

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
<i>Source</i>	Contact diseases are transmitted by direct contact between source and target, or indirect contact through the sharing of personal items such as clothing, razors or towels.	<p>The most important control measures for contact diseases rest with eliminating contact with the source.</p> <p>Individuals who are ill with contact diseases should be removed from contact with other soldiers and be seen and treated by medical staff or MO.</p> <p>It is the responsibility of the medical staff to enforce strict personal hygiene and isolation measures in order to prevent patients further spreading the disease.</p>
<i>Route</i>	The spread of contact diseases occurs from person to person. Transmission may be as a result of casual contact as in the case of lice, scabies or tinea, contact with body fluids such as saliva	<b>Avoidance of Contact.</b> Soldiers should maintain a distance from others who show signs of illness, especially patients, PWs and refugees. Suspect cases should be isolated and treated as soon as possible.

	<i>Causes/Description of Transmission</i>	<i>Control Measures</i>
	for glandular fever or blood as with hepatitis B and AIDS or from sexual contact as with all the sexually transmitted diseases.	Physical methods include the use of disposable gloves and correct wearing of the uniform.  Chemical methods include the use of disinfectants to thoroughly clean surfaces and equipment contaminated by contact.
<i>Target</i>	Susceptibility to contact diseases normally depends on the disease. In some cases, immunity may be gained from previous exposure to the disease. However, some of these diseases do not give immunity and may be fatal, such as AIDS. This new person becomes a case or carrier of the infection and can pass on the disease.	Good personal hygiene plays an important role in minimising the spread of these diseases and includes the prompt treatment and covering of cuts and abrasions, as well as early reporting of signs of disease by individual soldiers.  Vaccinations are available for some contact diseases such as hepatitis B and must be taken as prescribed.

## Section 2-3. Toxic Chemicals

### General

- 2.15** Toxic chemicals are found in many ADF materials. In general, the ADF uses defined guidelines to store and handle these hazardous substances to control the risk of exposure for soldiers.
- 2.16** Operations in industrialised areas increasingly expose soldiers to toxic chemicals, especially in third world countries and where conflict has led to the breakdown of infrastructure and control systems. They may also appear as by-products, impurities or wastes related to the production of otherwise safe substances.
- 2.17** Many plants and animals naturally produce toxic chemicals with the range of different types dependent on the region. *Australian Defence Force Publication (ADFP) 712 Envenomation and Poisoning by Animals and Plants in Australia* is the authoritative reference for operations in Australia.
- 2.18 The Source.** As opposed to the communicable diseases mentioned previously in this chapter, the source of toxic chemicals is usually the environment. Many toxic chemicals are used in the manufacture of everyday items. They are also used extensively in agriculture and are the product of petro-chemical industries. In areas of conflict, many of these industries may be left abandoned and the ADF may be required to operate in and around these areas.
- 2.19 Routes of Entry of Toxic Chemicals.** Toxic chemicals can enter the body by various routes. The body's response to any toxic chemical may vary markedly depending on the specific route of entry and physical form of the chemical, including:

- a. *Inhalation.* Inhalation is the most significant route of entry. Some toxic chemicals may produce acute effects that are quickly recognised by the person being exposed. Other chemicals may cause chronic effects that take many years to develop, such as asbestosis from asbestos exposure.
- b. *Absorption.* The most common occupational disease is dermatitis. Contact dermatitis can be caused by a chemical irritating or causing an allergic sensitisation in contact with the skin. Systemic poisoning can also result from skin absorption.
- c. *Ingestion.* Ingestion often occurs as a result of eating or smoking with contaminated hands, utensils, or in contaminated areas. Ingestion of inhaled materials also occurs as a result of the natural cleansing action of the lungs.
- d. *Injection.* Accidental injection may occur from contamination of a penetrating wound or the use of high pressure air or liquid and from high pressure lines rupturing.

**2.20 The Target.** Susceptibility to chemical poisoning is general and depends on the type of chemical and its action on the body. It is also dependent on the amount of exposure, including the amount of chemical and the length of time exposed, as well as the route of entry influenced by the physical state of the chemical.

**2.21 Classification of Toxic Chemicals.** Toxic chemicals are classified according to their physical state or chemical characteristics. Classification is important in determining the route of exposure. Classifications include:

- a. *Gas.* Gas is a state of matter in which material has a very low density and viscosity; can expand and contract greatly

in response to changes in temperature and pressure; is easily diffused into other gases; and is readily and uniformly distributed throughout any container. A gas can be changed to a liquid or solid state only by the combined effect of increased pressure and decreased temperature.

- b. *Liquid.* Liquid is a state of matter in which the substance is a free-flowing formless fluid. A liquid takes many forms depending on the environmental conditions including:
  - (1) *Vapour.* Vapour is the gaseous form of substances normally in a solid or liquid state at normal room temperature and pressure.
  - (2) *Mist.* Mist is the term used for suspended liquid droplets generated by condensation from the gaseous to the liquid state or by a liquid breaking up into a dispersed state by splashing, foaming, or atomising.
- c. *Solids.* Solids include:
  - (1) *Fume.* Fume is defined as airborne dispersion consisting of minute solid particles arising from heating a solid such as lead. This physical change is often accompanied by a chemical reaction, such as oxidation. Fumes flocculate and sometimes coalesce.
  - (2) *Dust.* Dust comprises solid particles generated by handling, crushing, grinding, impacting, detonating, and decrepitating materials. Dust does not tend to flocculate, except under electrostatic forces. Dusts do not tend to diffuse in the air, but settle under the influence of gravity.

**2.22 Control Measures.** The most important control measures for chemical poisoning rest with eliminating contact with the source:

- a. *Measures Applicable to the Source.* Measures applicable to the source include:
  - (1) early identification and marking of suspect chemical sources in the unit AO while some locations may need to be designated 'No Go Areas'; and
  - (2) adherence to the procedures and policy for storage, handling and contamination control of ADF hazardous materials.
- b. *Measures Applicable to the Route.* Measures applicable to the route comprise:
  - (1) avoidance of contact:
    - (a) soldiers should maintain a distance from any suspect sites of chemical contamination;
    - (b) physical methods include the use of respirators, impervious gloves and over-suits for soldiers required to work in contaminated areas. Once these areas are identified they should be taped off and signposted to restrict entry; and
    - (c) chemical methods such as the use of detergents should be used to thoroughly clean surfaces and equipment contaminated by contact.
- c. *Measures Applicable to the Target.* Measures applicable to the target include:
  - (1) individuals who show signs of intoxication should be immediately removed from contact with the contaminated environment and seen and treated by an MO. Other soldiers must be warned of the hazard and entry to the area restricted to members with appropriate Personal Protective Equipment (PPE); and



- (2) good personal hygiene plays an important role in minimising cross contamination.

### **Section 2-4. Summary**

- 2.23** The control of disease in deployed forces is critical to the maintenance of combat power. Disease is indiscriminate in the way it affects a unit's manpower. It will strike down soldiers at all ranks and positions, and will rapidly spread if effective control measures are not implemented and maintained.
- 2.24** Training and enforcement of preventive measures should be part of the unit's normal way of doing business. Preventive measures should be built into standing operating procedures, training exercises and work in barracks.

## CHAPTER 3

### Field Hygiene

#### Section 3-1. Introduction

- 3.1 Failure to follow correct sanitary requirements in the field has often been responsible for the high incidence of preventable disease.
- 3.2 **Responsibilities.** The commander is responsible for the health of personnel down through the unit chain of command. The commander is advised by the unit MO on all health matters and uses the technical advice from the MO or health personnel to effectively maintain hygiene practices conducive to the health of his personnel. Although technical advice originates with the medical services it is erroneous to think that the provision or maintenance of hygiene appliances or facilities is the responsibility of medical personnel. The responsibility and allocation of duties for management of field hygiene, including all types of waste handling, must be clearly defined **by the commander**. All officers and NCOs, and indeed every individual, plays an active role in disease prevention. Communal facilities must be rigidly supervised and be of the highest possible hygiene standards.
- 3.3 **General Principles.** The length of time a campsite is to be occupied and the labour available are the prime factors in the selection of sanitation methods and appliances. Permanent construction should be used where possible. A more permanent construction will require less maintenance.

- 3.4** The maintenance of ADF health in the field is a skill, which, as with all military skills, requires training. There is always a real enemy present: DISEASE.
- 3.5** **Classification of Wastes.** Wastes are classified into three categories:
- a. human wastes (faeces, urine);
  - b. sullage water (greasy and soapy water from kitchens and ablutions); and
  - c. rubbish (wet refuse, dry or combustible refuse and hazardous waste).
- 3.6** If these wastes are not disposed of correctly, the incidence of disease will increase, thereby decreasing unit efficiency.
- 3.7** **Types of Deployments.** Deployments can be classified as follows:
- a. short halts (on the march);
  - b. temporary deployment (12 hours to three days); and
  - c. deployments of over three days (semi-permanent camps).
- 3.8** **General Considerations.** The level of consideration for the selection of campsites are as follows:
- a. *Temporary Deployments (12 hours to three days).* Tactical consideration, including camouflage, are frequently overriding factors. The occupation of buildings, damaged or otherwise, may permit use to be made of existing sanitary facilities.
  - b. *Semi-permanent Camps (more than three days).* Semi-permanent camps are used for concentrations of troops in base or communications zones, or for training. In order to maintain the health of the camp, due regard must be paid to site selection, camp layout and maintenance.

**3.9 Site Selection.** When tactical considerations permit, platoon harbours and static locations should avoid potential sources of disease. A simple checklist of considerations is included at [Annex A](#) to this Chapter. The following principles should be applied:

- a. *Location.* Close proximity to towns and villages in underdeveloped countries is undesirable. Such locations are often infected.
- b. *Terrain.* Broken ground encourages bad sanitation, and harbours insects and vermin. Swampy areas should be avoided. These terrain types, together with banks of lakes and rivers, often increase the incidence of mosquitoes and biting insects. It is best to select fairly high ground, well grassed, which possesses good natural drainage. Steep slopes and valley floors should be avoided.
- c. *Access.* Formed roads are desirable, but access should be off main traffic routes.

### **Section 3-2. Camp Layout**

**3.10 General Guidelines.** As a general guide to camp layout, the following points should be considered:

- a. the front of semi-permanent camps should face prevailing winds;
- b. sleeping accommodation should be situated to the front;
- c. technical areas should be concentrated away from the domestic area;
- d. sanitary facilities should be downwind, but reasonably accessible to accommodation. When latrines are of the excavated type, care must be taken to prevent pollution of underground water supplies. Latrines must be at least 50 m from kitchens and water resources; and

- e. ablution areas and water points (WP) should be located to one side, with drainage to avoid waterlogging. The camp should, if possible, have surface drainage.

- 3.11 Striking Camp.** The site should be left clean. Refuse should be removed to the nearest refuse tip, taken back to base or burned and buried, with no dump being left uncovered. All latrines and other pits must be filled with soil and marked with a 'FOUL GROUND' sign (these signs should be dated, and within Australia also include the unit name).

### **Section 3-3. Disposal of Waste**

- 3.12** All categories of waste matter should be disposed of in a manner which will avoid pollution of water supplies, prevent breeding of flies and rodents, and keep odours to an absolute minimum.
- 3.13 Other Considerations.** Kitchen washing-up facilities, ablutions, showers, facilities to dry clothing and aids to kitchen hygiene (including improvised food safes) are additional considerations, especially for use in semi-permanent camps.

### **Field Sanitation**

- 3.14** On arrival at a campsite, facilities must be provided for the correct disposal of all wastes. If sanitation is not accorded due consideration, later problems may be difficult to correct.
- 3.15** It is essential that all units train their personnel in methods of constructing field appliances. Improvisation is time-consuming and thus, many of the appliances required for field use described in this chapter should be prefabricated. When practicable they should be portable, and easily transported in landrovers or trailers.

## Latrines

- 3.16** Even in camps of short duration it is necessary to ensure that there are correctly sited, constructed, and maintained latrines of sufficient scale to meet unit requirements.
- 3.17 Short Halts (Cat Sanitation) (up to a few hours).** For short halts of up to a few hours, a sanitary area should be designated (separate areas for each sex). Members proceed to these areas and using entrenching tools, dig a personal latrine, defecate, and then replace the earth removed. This is the minimum sanitary requirement and should be strictly enforced. At the first possible opportunity members should then wash their hands with soap.

## Temporary Deployments (12 hours to three days)

- 3.18 Shallow Trench Latrines.** Shallow trench latrines (STL) are adequate for up to three days.
- 3.19 Construction.** The STL is the most basic of all field latrines. It is a shallow pit, with maximum use made of natural cover (screens are rarely available). Two STLs are required for the first platoon of 30 men, five STLs are required for 100 men and three for every additional 100. Latrines should be approximately 900 millimetres (mm) long, 300 mm wide and 600 mm deep (minimum) and at least 600 mm apart. The trench is marked out and the turf cut and rolled back. The turf and excavated earth are placed at the rear of the pit. A scoop, which can be manufactured from a ration tin, is placed in the pile of earth. Members use the latrine by squatting over it. Each deposit of faeces must be covered with soil. Toilet paper should be stored in a ration tin to keep it dry. Hessian screens may be provided for privacy. After 24 hours, or when the trench is filled to within 300 mm of ground level, the

latrine should be filled in, using earth to which, if possible, waste oil has been added. The earth should be rammed hard and the turf replaced. A new STL should be dug before the old latrine is sealed (Figure 3–1). The fouled area should be marked with a 'FOUL GROUND' sign (Figure 3–2).

- 3.20 Supervision.** Close supervision of this form of sanitation is necessary. Male soldiers should not urinate in STLs (as this reduces both the serviceable life and efficiency of a STL); urinals should be provided in close proximity to latrines. Fouling of the surrounds of the latrines should be avoided.

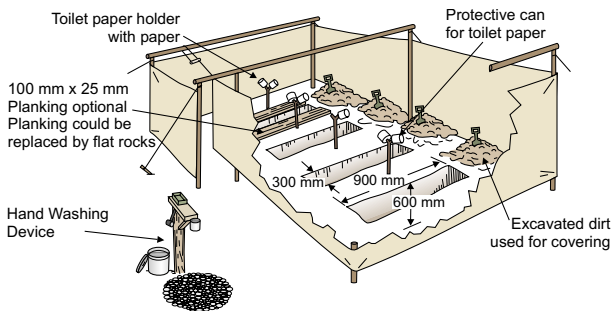


Figure 3–1: Shallow Trench Latrine

**Note:**

1. Alternative material such as ration tins may be used if suitable construction material is not available.
- 3.21 Other Latrines.** Many of the latrines recommended for use in semi-permanent camps will also be found practicable for temporary deployments.

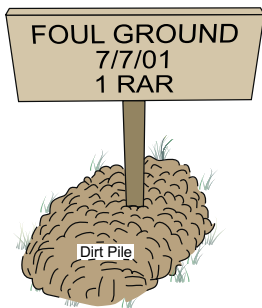


Figure 3–2: Foul Ground Sign

### **Semi-permanent Camps**

**3.22** Various latrines are suitable for use in semi-permanent camps. Selection depends on:

- a. the duration of the camp;
- b. the number to be accommodated;
- c. the nature of the sub-soil (whether or not it can be excavated); and
- d. the labour and materials available.

**3.23 Types of Latrines.** The two main types of latrines for semi-permanent camps are:

- a. the excavated types, which are deep trenches, shallow bores or deep bores; and
- b. the receptacle types, which are pan latrines or chemical closets.



- 3.24 Excavated Types.** Excavated latrines are preferable, but they require careful siting to avoid pollution of underground water supplies. In no circumstances should deep bore latrines be constructed without the concurrence of the medical and engineer services. Fly breeding and odours can be prevented by sound construction techniques and good maintenance.
- 3.25 Receptacle Type.** Receptacle latrines are not usually as satisfactory as those that are excavated. The contents require eventual disposal, usually necessitating carriage and the digging of pits, or stirring and burning, duplicating effort. This may be required in some situations when the site has a high water table or is on bedrock. The decision to implement receptacle type latrines should be supported by Preventive Medicine advice.
- 3.26 Deep Trench Latrine.** This type of latrine is to be used where occupancy is likely to be prolonged (more than three days). The deep trench latrine consists of a pit approximately 1.8 m in depth, 600 mm wide and approximately 2.4 m in length. It is surmounted by an enclosed, light timber or heavy plywood seat, which should not exceed 400 mm in height, the base of which is banked with packed earth. This type of latrine will seat four or five persons ([Figure 3–3](#)).

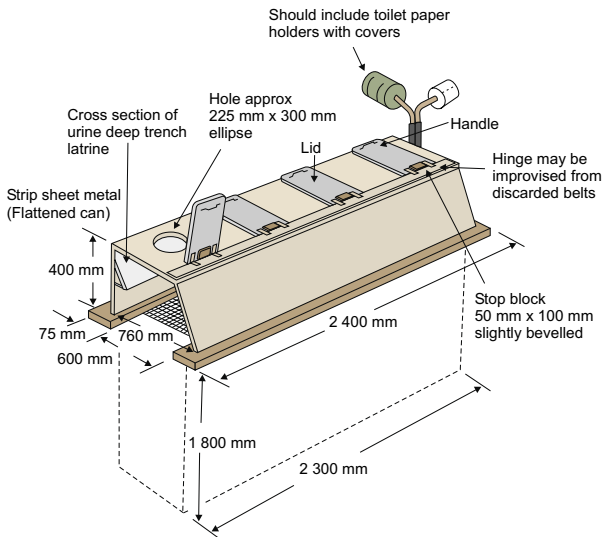


Figure 3–3: Deep Trench Latrine (Cross Section)

- 3.27** Under the front of each seat opening a metal shield is placed to deflect urine to the centre of the pit bottom. The seat openings must be provided with hinged self-closing lids, so that the entire seat structure is fly-proof. The latrine should be surrounded by a screen or provided with a weatherproof superstructure, preferably the latter. Floors should be kept dry by the provision of duckboards and by a shallow perimeter trench to divert surface water. Toilet paper, and containers to hold it, are essential. If the latrine does not have a roof, the toilet paper holder must be waterproof. A vent stack must be installed in the

more permanent latrines to release moisture-laden gases of decomposition. This will prevent condensation from forming on the inside of the self-closing lids. The stack should extend from the upper part of the pit to approximately 2 m above ground level. The outside opening of the vent stack must be screened. Hand washing facilities must be located near all latrines, especially those latrines used by food handlers or cooks. Deep trench latrines are preferable to shallow ones, as they are much more capable of being rendered fly-proof. They also take up less ground and can be sited closer to the living quarters. The dimensions vary according to considerations. A convenient size is indicated in [Figure 3–3](#).

- a. *Fly Control.* Despite all precautions, fly maggots may hatch out in a trench and the larvae will seek the surface through the soil. Approved residual pesticides should be applied after a survey of the latrine pit has identified fly breeding. Latrine pits should not be sprayed daily since flies can develop resistance to pesticides used routinely.
- b. *Maintenance.* Maintenance considerations should include:
  - (1) Disinfectants must not be used in a deep trench latrine. Such chemicals interfere with the natural process of digestion and liquefaction of the contents. Latrine seats require regular scrubbing with soap and water; however, disinfectants should be applied to the seats only as medically directed. Where deep trench latrines have to be used during the winter months, they should be windproof.
  - (2) Heated latrines have been used, but with varying degrees of satisfaction, since any form of heating requires careful installation and involves additional labour and technical guidance. Exposed skin will quickly adhere to very cold surfaces and cold injuries can also be sustained; thus this aspect must be taken

into consideration. In areas where there is snow, such as the Australian Alps, tightly packed snow around the outside of the latrine is a good insulator.

- (3) In extremely hot climates, and particularly in summer or in the dry season, some form of shading of the seats may be advisable to prevent sunburn to personnel on seats heated by the sun. Alternatively, provision of some form of disposable paper towelling for seat covers could be used.
- (4) A light cover of earth should be applied to deep trench latrine contents daily in warmer weather. If a small amount of water has seeped into the trench the adding of earth will not be necessary, as the water aids digestion and helps control odours.
- (5) In winter the faecal mass in a deep trench latrine may freeze if the weather becomes cold enough, and the trench fills more rapidly than in summer. For this reason, reserve pits should be available so that the superstructure can be moved if necessary.
- (6) During any season, when the latrine contents reach to within 600 mm of the trench top, the trench should be filled in. Then the earth cover is tightly packed to the top of the trench and the site is clearly marked with a foul ground sign.

## Urinals

**3.28 Short Halts.** A shallow trench urinal is suitable for short halts, but it may be found possible to employ the types of urinals recommended for use in semi-permanent camps.

- 3.29 Shallow Trench Urinal.** A pit, 2 m x 0.7 m x 0.25 m deep, is sufficient for about 100 men per day. The soil at the bottom of the pit is loosened to assist disposal of urine. Earth is banked on three sides of the pit and is eventually used to refill the pit. Care should be exercised to avoid fouling surrounding areas (Figure 3–4).

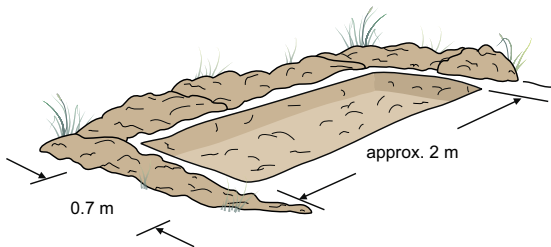


Figure 3–4: Shallow Trench Urinal

- 3.30 Semi-permanent Camps.** In semi-permanent camps, there is a requirement to provide a system whereby urine is collected in a suitable receptacle and is then passed into the ground with the minimum fly attraction or odour. The following are useful, well-tried, methods of urine disposal:
- trough urinal, and
  - funnel urinal.
- 3.31 The Trough Urinal.** The trough urinal (Figure 3–5) is the best type of field urinal for daily use. This urinal is made from a sheet of corrugated iron, or plain galvanised sheeting, in the form of a trough with a high back, raised to a height of

about 750 mm on supports and sloping to a drainpipe which leads into a soakage pit sized 1.2 m x 1.2 m x 1.2 m. The ends of the trough are closed, and a wire screen is placed over the outlet. One 2.4 m long urinal will be required for every 100 personnel.

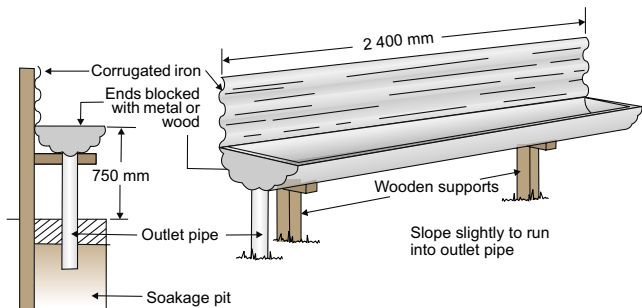


Figure 3–5: Trough Urinal

- 3.32 The Funnel Urinal.** The funnel urinal (Figure 3–6) is built by first preparing the 1.2 m x 1.2 m x 1.2 m soakage pit as illustrated in the diagram. Four to six conical metal funnels are built into the pit and provided with strainers. The mouths of the funnels should be at an average height of 750 mm from the ground. Once sited it is unnecessary to move the funnels to different parts of the soakage pit. One funnel urinal will be required for every 25 personnel.

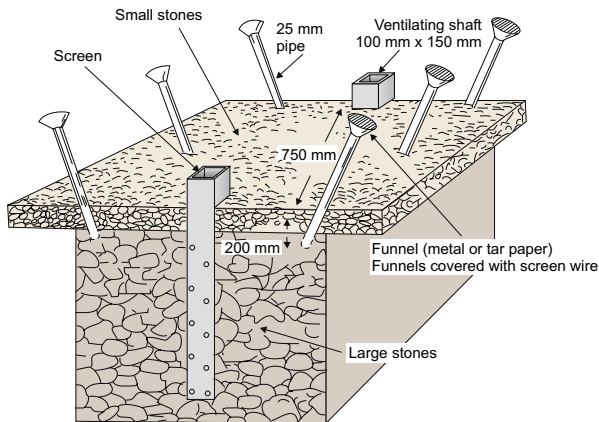


Figure 3–6: Funnel Urinal

- 3.33 Maintenance.** Trough and funnel urinals should be mopped down daily with a medically approved disinfectant.
- 3.34 General Rules for Latrines and Urinals.** There are a few essential rules to be observed in the provision of latrines and urinals. These include:
- All excavated latrines and urinals must be located so that they do not pollute a source or potential source of water supply. As a general rule, the bottom of any latrine, trench or soakage pit should be at least 900 mm to 1 200 mm above the ground water table, and 30 to 45 m downhill from any well, spring or other surface water source. Under no circumstances should any sanitary appliance be drained into a dry well.

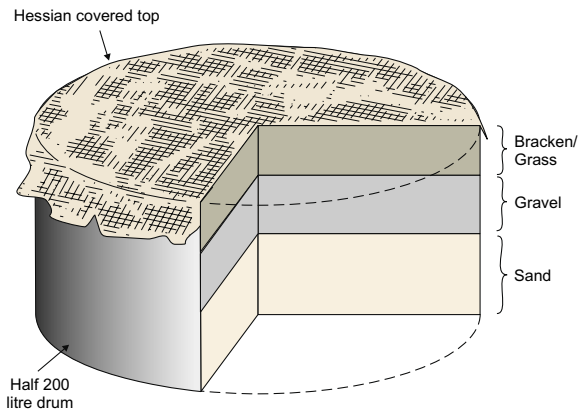
- b. Particular care must be exercised to exclude and control flies.
- c. Toilet paper, in a waterproofed container, must be provided.
- d. Hand washing facilities should be located between, or adjacent to, all latrines, especially those used by cooks and other food service personnel.
- e. In standing camps, latrines must be clearly marked as such, direction signs provided if necessary, as well as lighting at night.
- f. Floors of latrine structures must be kept dry. The usual method is to provide duckboards and perimeter drainage.
- g. If latrines are roofed, the roof must slope and extend sufficiently clear of the earth banking to prevent washouts in wet weather, with consequent loss of fly-proofing.
- h. Closed urinals should be marked with a foul ground sign. No disinfectant must be added to latrines of any type.
- i. Smell can be neutralised by adding a bucket of water to each seat hole each day.
- j. Latrines should be screened using natural concealment if available.

### **Section 3-4. Disposal of Sullage**

- 3.35 General.** Sullage is wastewater from cookhouses and ablution blocks, which contains a considerable amount of grease and soap. If this is not removed before the liquid enters the soakage pit, the walls and base of the pit will soon become clogged with grease and the sullage waste will 'pond'. Satisfactory sullage disposal, therefore, necessitates the removal of grease before the liquid is discharged into a soakage pit.



- 3.36 Short Halts.** When field kitchens are established during halts, attempts should be made to use the methods advocated for temporary camps.
- 3.37 Temporary Deployments of Up to Three Days.** There can be few refinements in temporary deployments of up to three days. An improvised grease trap (Figure 3-7) can be constructed, but an issue trap, fitted with a strainer (Figure 3-8), is available through the normal supply system. The trap is placed over a soakage pit (Figure 3-9) and all sullage poured into it. The grass or bracken from an improvised trap should be changed at least once daily and the foul grass burnt or buried.
- 3.38 Improvised Grease Trap.** The improvised grease trap (Figure 3-7) may be constructed from any waterproof material, for example from a standard packing case which has been lined with sheet metal. A soap trap of similar design should be used to trap shower and laundry wastes. The improvised grease strainer extracts grease by filtration and the contents of the drum should be removed when chokage occurs.



Note: Completed trap is placed over standard soakage pit

Figure 3–7: Improved Grease Trap

- 3.39 Semi-permanent Camps.** The facilities utilised in semi-permanent camps should be of a more solid construction, although the same general principles apply. Grease and soap should be removed before disposal into soakage pits.

- 3.40 Issued Grease Trap.** An issue grease trap ([Figure 3–8](#)) is available (**NSN 4510-66-021-5646**). The issue grease trap allows the wastewater to enter the cold water once it has passed through the strainer. The solidified grease is trapped between the baffles and should be skimmed off daily. The trap should be emptied once a fortnight, all sludge removed from the bottom and the inside scraped. It is essential that the grease trap be fitted with a fly-proof lid.
- 3.41 Use of Grease Traps.** Grease traps must be watertight boxes and are let into the ground to within 75 mm of their top edge. They are filled with cold water. The incoming warm, grease-laden water passes through the primary strainer, which retains solids. The warm water passes under the baffle, and in the cold water the grease solidifies and rises, forming a scum between the baffles. The cleansed effluent passes under the second baffle and thence to a soakage pit.

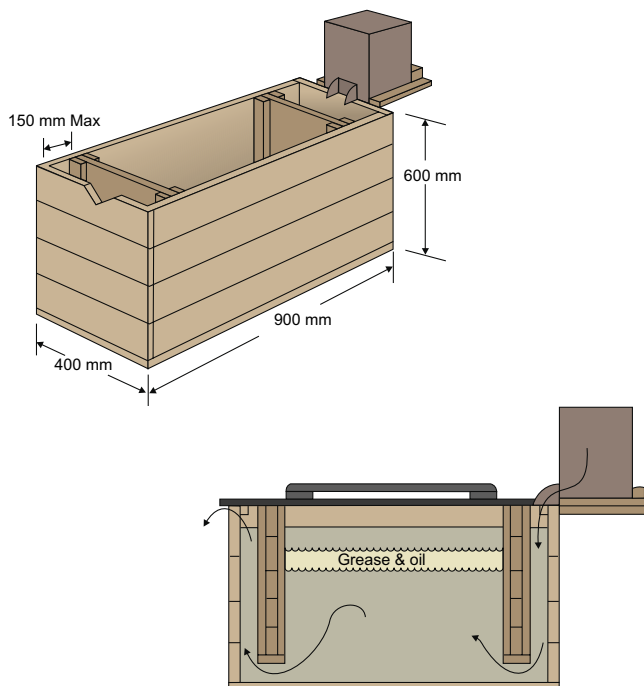


Figure 3–8: Issued Grease Trap

**3.42 Soakage Pits.** Soakage pits (Figure 3–9) should only be put into soil that can absorb water. They should be approximately 1.2 m x 1.2 m x 1.2 m in size. If more soakage area is required, further pits of the same size may be dug. Each soakage pit will handle the ablution wastewater from approximately 250 personnel, depending upon the soil porosity. In practice, the load on an overworked soakage pit can be relieved by laying a long length of sub-soil agricultural drain pipe about 300 mm below the surface of the ground. The pits should be filled to within 150 mm of the surface of the ground with stones or rubble and the contents graded so that the largest pieces are at the bottom and the smallest pieces at the top. The top of the pit is filled with earth, straw, grass or sacking. The pipe or gully conveying the effluent from the grease trap should discharge over the centre of the pit. Principle of use that apply to a soakage pit include:

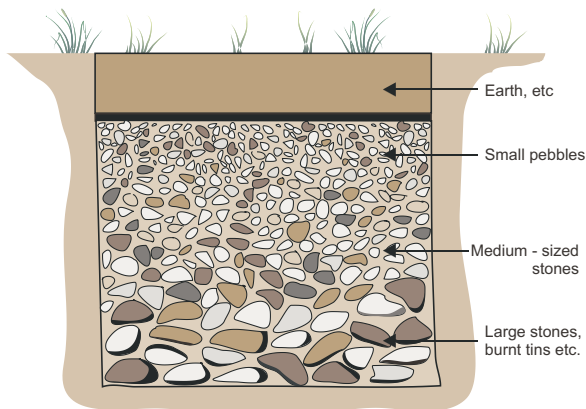


Figure 3–9: Soakage Pit

- a. The top layer of the soakage pit can be replaced daily and burned/buried. This procedure eliminates the need for a grease trap. However, where prolonged use is necessary, a grease trap is recommended.
  - b. The soakage pit can be provided with a removable cover.
- 3.43** If the ground is waterlogged, or if the water table is high, soakage pits will not function. In hot, dry climates, effluent disposal can be efficiently carried out by the construction of either evaporating pans (Figure 3–10) and/or Herringbone Drains (Figure 3–11).
- 3.44 Evaporating Pans.** The construction of evaporating pans commences when a series of earth pans (approximately 10 x 10 m to a depth of 300 mm) are dug. They are linked by a main channel. Sufficient pans must be dug so that when one is filled it need not be used again for seven days. Evaporation is usually complete in about five days; deposits are then raked out. This system requires careful control.

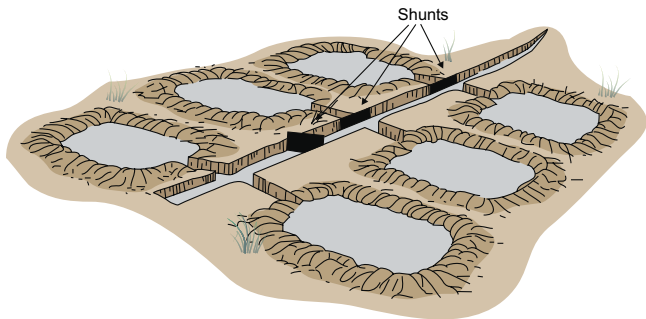


Figure 3–10: Evaporating Pans

- 3.45 Herringbone Drains.** This method may be used when soakage pits cannot be employed either because of a high sub-soil water level or because the soil is not absorbent. A heavy soil (with a high clay and rock content) or hilly terrain necessitates the modification of the herringbone system of drainage. The modified system, as described below, is very efficient and requires a minimum number of personnel for construction and maintenance.

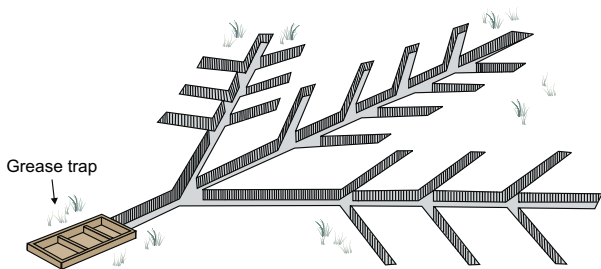


Figure 3–11: Herringbone Drains

- a. *Construction.* As shown in Figure 3–11, the system is constructed of two types of trenches:
  - (1) *Main Trench.* The purpose of the main trench is merely to convey the effluent from the cold water grease trap to the absorption trenches. Its dimensions therefore are minimal: width – no wider than the shovel or spade, depth – no deeper than 15 centimetres (cm). The main trench should run with the fall of the land.

- (2) *Absorption Trench.* It is in the absorption trench that the effluent is absorbed into the sub-soil. The principles of construction of this trench are:
- (a) length – 10 m to 15 m if possible;
  - (b) the bottom of the trench is to be as close as possible to dead level; therefore the trench should be dug along a contour. It follows that, if the ground has a reasonably even fall, the absorption trenches will be at right angles to the main trench;
  - (c) width – not less than 40 cm but can be up to 70 cm;
  - (d) depth – not more than 8 cm deeper than the main trench, ie. approximately 23 cm deep;
  - (e) soil from trenches should be mounded on the high side to prevent flooding. A path of about 45 cm wide should be left between the trench and soil to permit maintenance; and
  - (f) the number of trenches is dependent on the amount of water to be disposed. A minimum system (about 30 m by 30 m of absorption trench) can be constructed at first and extended later as required.
- (3) *Principles of Operation.* The effluent must not be permitted to flow naturally into the system but should be directed by various 'controlling gates' into each trench in turn. Each trench should hold a maximum of 75 mm of water; when this depth is reached, the trench is closed off by a controlling gate and the next trench used. A trench should not be used again until it has dried out so that if all trenches contain water, the system must be gradually extended until the top



trenches are ready for reuse. The controlling gates can be improvised from old packing case material, corrugated iron, or any other suitable material.

- (4) It is most important that a responsible person working in the kitchen area be delegated to keep a regular check on the following points:
  - (a) ensuring that no grease leaves the grease trap and enters the drainage system as this will result in fouling of the ground, offensive odour, possible fly breeding, and clogging of the soil preventing further absorption of effluent. If grease does enter the drainage system, action should be taken to clean the grease trap and, if possible, remove the fouled ground.
  - (b) ensuring that the trenches do not overflow. When a trench receives 75 mm of water, the controlling gates should be adjusted to close off that trench and direct the effluent into another trench.

### **Section 3-5. Disposal of Rubbish**

**3.46 General.** Rubbish should be separated into the following three classes:

- a. wet waste (kitchen scraps, grease from grease traps etc.);
- b. dry waste (cardboard, paper, tins, packaging material etc.); and
- c. hazardous waste (batteries, gas cylinders, petrol, oils and lubricants, explosive ordnance, medical waste etc.).

- 3.47** The general policy is that all rubbish should be collocated in one area, away from kitchens and accommodation, for ease of management. All rubbish should be backloaded to a point where it can be effectively managed by dedicated resources, although this may not be possible for short halts and temporary deployments.
- 3.48 Wet Waste.** Wet waste is mostly created from field kitchens and needs to be double bagged in order to stop leakage. The use of bins with tight fitting lids will reduce problems with flies and vermin. These bins need to be cleaned regularly. Wet wastes may be incinerated in correctly designed and constructed field appliances to reduce volume and attractiveness to flies and vermin. Any decision to implement incineration practices should be supported by Preventive Medicine staff.
- 3.49 Dry Waste.** Dry waste will be created from all areas and may need to be disposed of at a local level. Substantial reductions in the volume of dry waste can be achieved by incineration. This also makes the waste less attractive to flies and vermin. The old adage of 'burn, bash and bury' still applies as an effective method of removing the health threat. An inclined plane incinerator may be easily constructed to burn waste. The residue should then be crushed and buried in a deep hole. These methods of disposal are described as follows:
- Inclined Plane Incinerator.* **Figure 3–12** depicts the construction of an inclined plane incinerator formed by three pieces of corrugated iron banded together with wire. The triangular notches form air inlets and prevent the refuse from slipping downwards. The plane can be inclined to any required angle for efficient air flow, and can also be turned tail-on to the wind. The appliance can be folded flat so that it is readily transportable.

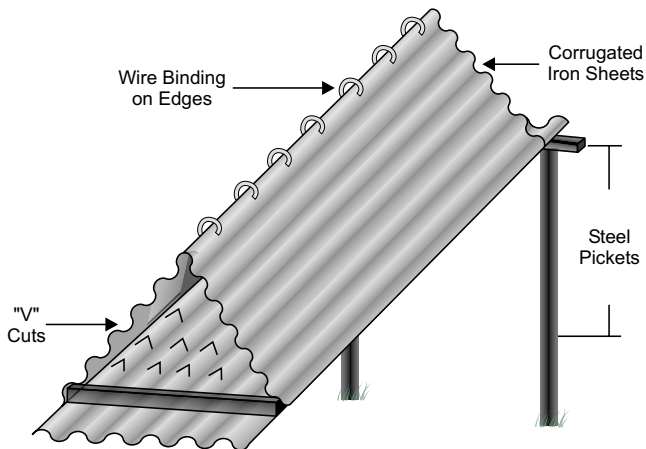


Figure 3–12: Inclined Plane Incinerator

- b. *Deep Hole Method.* Simply dig a pit with an area of 1.2 m square and 1.2 m deep. This will be suitable for one day for a unit of 100 personnel. The rubbish should be placed in as small an area as possible, then immediately covered with earth. Care should be taken to reduce volume by flattening cans and boxes. The pit should be filled to 0.3 m from ground level, with 0.9 m of earth cover added.

### **WARNING**

Hazardous wastes such as batteries, explosive ordnance, aerosol cans, gas or fuel containers must not be burnt as they may explode.

Personnel should be positioned so that they are not exposed to smoke, as this smoke may be toxic. Ideally they should be positioned downwind and well away from the source of the smoke.

A minimum safety distance should be observed in the advent of hazardous waste being accidentally incinerated.

- 3.50 Hazardous Waste.** Hazardous waste needs to be managed carefully and in accordance with specific equipment instructions. Hazardous waste must have a separate collection and disposal system supervised by the sub-unit that creates the waste (with the exception of batteries, as these are primarily Royal Australian Electrical and Mechanical Engineers and Royal Australian Army Medical Corps activities).

### **Section 3-6. Personal Hygiene in the Field**

- 3.51 General.** Personal hygiene contributes to the effectiveness of the unit in several ways:
- It protects the individual from disease organisms in the environment.
  - It protects the unit by reducing the spread of disease.
  - Personal hygiene promotes the health of the unit's members, improves their morale and most importantly maintains the combat effectiveness of the unit.

- 3.52 Personal Cleanliness.** Regular use of soap and water prevents skin disease such as impetigo, boils, eczema and heat rash. It blocks the faecal-oral spread of hepatitis, salmonellosis and other gastrointestinal diseases. Daily washing of the body reduces the risk of louse, tick and flea infestation, effectively controlling related diseases such as typhus, relapsing fever and plague. Proper daily dental care prevents gum infections and dental cavities. When a Service member is living in the field, particularly for long periods, it is essential for the unit to establish a simple and efficient laundry. A copy of a Free From Infection/Infestation (FFI) inspection form is at [Annex B](#) to Chapter 3.
- 3.53 Clothing.** If properly worn, the uniform can be an effective means of protection. The uniform should fit well, be properly maintained and be suitable for all locally hazardous conditions such as extremes of climate, toxic chemicals, insect-borne diseases, etc. For example, where there is a risk of being bitten by insects, long trousers should be worn and sleeves should be kept rolled down. Properly fitted shoes and clean, regularly changed socks are essential to prevent serious problems with feet.
- 3.54 Personal Protection.** Where necessary, personal protective devices should be provided to Service members to assist them in prevention of disease. Instruction in proper use is required as necessary. Items include such things as:
- ADF-approved insect repellents (diethyl toluamide, commonly known as DEET);
  - bed netting and uniforms impregnated with permethrin;
  - anti-malarials; and
  - condoms.

**3.55 Avoidance.** A final general health principle for individuals involves avoidance. A general awareness of the potential disease hazards from local food, drink, animals and inhabitants in many foreign countries can decrease the incidence of preventable disease.

**3.56 Improvised Personal Hygiene Devices.** Soldiers in the field may have to improvise the devices necessary for maintaining personal hygiene. Some of the devices which have been tried and used successfully in the field are described below:

- a. *Hand-washing Devices.* Potable water should be used for washing hands. Hand-washing devices which are easy to operate must be provided at appropriate places such as outside the latrine enclosures, near the mess area and at other locations as needed. A soakage pit must be provided under each device to prevent water from collecting. The water containers for these devices must be checked periodically to ensure that they are kept filled. Hand-washing devices can be successfully improvised as follows:

- (1) *Improvised Hand-washing Device – Example 1.* A cleaned food can in which four small holes have been punched is attached to an improvised stand as illustrated in [Figure 3–13](#). A 20 litre can of water, a dipper made from a small can and a bar of soap are provided. A small can or a split can with the edges turned down may be used as a soap dish. The water is dipped from the large can and poured into the food can. The streams of water make it possible for a person to wash both hands at the same time. Minimal amounts of water are required for this washing device. When this device is not in use, the can of water should be covered to prevent mosquito breeding.

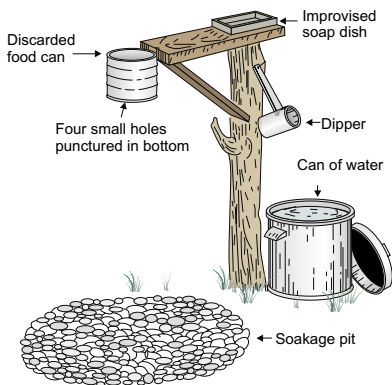


Figure 3–13: Hand-washing Device – Example 1

- (2) *Improvised Hand-washing Device – Example 2.* Two salvaged water cans, one filled with soapy water and one filled with clear water, are suspended from an improvised frame as illustrated in [Figure 3–14](#). A hole is punched in the cap of each can to allow the water to run out when the cans are tipped.

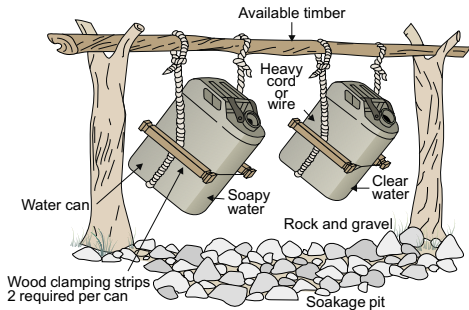


Figure 3–14: Hand-washing Device – Example 2

### Section 3-7. Daily Guide to Personal Hygiene

**3.57** A guide to provide Service members with proper daily hygiene routines is outlined below. This routine should be followed, as conditions allow, in order to establish the habit of personal cleanliness and preventive care in the field:

- a. Soldiers should sleep approximately seven to eight hours in a warm, dry and well-ventilated area if possible. Although this cannot be done in many field situations, adequate rest is essential to long-term fitness.
- b. A daily bath or shower is best, but at the minimum the armpits, waist, feet, face, hair, teeth and crotch area must be cleaned. These areas are particularly liable to infections.



- c. When dressing:
  - (1) Socks should be clean, dry, proper size and in good repair; woollen (standard issue) socks are recommended.
  - (2) Boots should fit correctly, be pliable and in good repair.
  - (3) Underwear should be clean, dry and in good repair; it should be changed daily and laundered regularly.
  - (4) Outer clothing should be reasonably clean, dry and afford protection against sun exposure. For this reason a wide-brimmed hat is essential in the field.
- d. Regular bowel movements are important to long-term health. Any shyness regarding defecation in field sanitary appliances must be overcome.
- e. Soldiers should try to eat regularly using a wide variety of foods. When using hard rations, all portions, or at least some of each portion, of the ration should be consumed to ensure a balanced diet.
- f. When the situation permits soldiers should try to balance sleep, work and recreational activities.
- g. Instructions regarding personal protection against insect-borne and communicable diseases must be followed.

**3.58 Additional Factors.** An adequate supply of personal hygiene products is essential to allow soldiers to maintain an acceptable personal hygiene routine. Personal protection against disease is as much a part of personal hygiene as the measures described above. Preventive measures include:

- a. mosquito nets for sleeping;

- b. suitable permethrin impregnated clothing and mosquito nets;
- c. personal insect repellents;
- d. vaccination/chemoprophylaxis; and
- e. insecticide spraying.

### **Section 3-8. Care of the Feet**

- 3.59 Introduction.** The health of the feet in a unit is a good index of the physical preparedness of that unit for operations.
- 3.60** Care of the feet concerns all Service members. All personnel must be prepared at any time to move without their vehicles and to penetrate to places inaccessible to vehicle transport. Combat soldiers are of little value if, because of the condition of their feet, they are unable to move freely and maintain the same pace as their unit.
- 3.61** The responsibility lies with the commander to ensure that personnel have correctly fitting boots, that their feet are accustomed to marching with field equipment, that they know how to look after their feet and that any foot ailments are promptly reported to the medical staff or MO.
- 3.62 The Foot.** It is important to realise that the foot is not a rigid structure. When it bears weight, both its length and breadth increase. Hence the added importance of correctly fitting boots.
- 3.63** During the march the foot swells with blood. The swelling is due to the increased flow of blood to the foot, caused by the repeated striking of the foot against the ground. Tight boots cause interference with return of the blood to the upper body. One remedy is to ensure Service members raise their feet

above the level of the rest of their body during extended halts so that the blood drains out of the feet.

- 3.64 Combat Boots.** All Service personnel deployed on operations should wear the Service-provided combat boot (Terra Combat Boot), with the exception of those personnel involved in water operations.
- 3.65 Fitting Combat Boots.** If boots are too small, the feet become compressed on weight bearing. Severe discomfort and pain can result and skin over prominent joints such as the big toe will readily become chafed; in the course of time corns will develop at pressure points. On the other hand, if the boots are too large they will fail to support the feet and protect them from overstrain, and because of excessive rubbing, blisters will develop rapidly.
- 3.66** The combat boot is available in 43 sizes, which can be varied to make up to 215 different fit variations. Before any Service member is issued with combat boots, a trained person at a designated fitting facility must physically fit them. Boots will then be issued in accordance with the Terra Fit Size Chart. No Service member should accept a set of combat boots unless they have been correctly measured and tuned to ensure the correct size is selected for issue. Tuning is achieved by the insertion of an innersole called a footbed. Two thicknesses of footbed are available (2 mm and 4 mm) which may be selected according to the degree of stretching which the boot experiences after several weeks of wear. Instances of facilities failing to correctly measure or select boots for issue should be reported through the chain of command. All Service members should record their individual fit size for future issues, in particular when submitting demands for replacement boots when on operations.

- 3.67** A replacement footbed should be carried and this should be rotated at least weekly and replaced when worn or hardened. The use of tuning inserts is optional, but recommended for maintaining a snug fit as the boot leather will stretch.
- 3.68 Breaking In the Combat Boot.** The combat boot does not generally require breaking in. The leather used in the combat boot is known as Nubuck, which is soft and will breathe and stretch. The only breaking in of the boots will be around the heel cup, which, once heated with a hair drier, becomes pliable, enabling the correct contour to be achieved.
- 3.69 When to Replace the Combat Boot.** It is imperative that only serviceable combat boots are worn. The combat boot should be replaced when it no longer provides adequate support to the ankle and forefoot, or where the sole is damaged or worn to a point where it fails to provide a firm grip. It is an individual's responsibility to regularly check the serviceability of his boots. Commanders at all levels should ensure that this occurs.
- 3.70 Repair of Boots.** The combat boot should not be repaired by Service members. Boots with possible manufacturing faults must be returned to the unit Q store. When required, these boots will be repaired under warranty by the contracted supplier.
- 3.71 Cleaning the Combat Boot.** Combat boots can be cleaned with a stiff bristled brush to remove any external material. If the boots have been saturated in salty water then they should be quickly rinsed inside and outside using fresh water. The boots should be air-dried (using a well ventilated area), avoiding direct sunlight where possible. They should not be dried using drying rooms or external heat sources. Aftermarket waxes or oils should not be used as these may affect the boot's ability to breathe and its waterproofing.

- 3.72 The Socks.** Combat boots should always be worn with thick woollen, heavyweight sock (standard issue woollen khaki sock). These socks are designed to make a cushion between the foot and the boot, absorb perspiration and provide sufficient air circulation for a high degree of insulation and evaporation.
- 3.73** The correct fit is again of utmost importance. If the socks are too large, they will wrinkle and crease in the boot; if too small, they will compress the foot and wear out very quickly.
- 3.74** Socks should be washed daily. Dirty socks become hard and non-absorbent and chafe, leading to infections, abrasions and rashes. Socks should be washed thoroughly in lukewarm water, using only a moderate amount of soap. Once damaged or worn, the socks should be replaced.
- 3.75 Foot Inspections.** Foot inspections should be held regularly by representatives of unit commanders. At least once a week in camp and on the second day of a bivouac, a complete inspection should be carried out to include the following:
- a. serviceability of boots;
  - b. serviceability and cleanliness of socks;
  - c. hygiene of the feet;
  - d. detailed inspection for:
    - (1) tinea between the toes,
    - (2) rashes,
    - (3) corns,
    - (4) ingrowing toenails, and
    - (5) blisters and abrasions.
- 3.76** Unit commanders should seek guidance from the MO or preventive health staff concerning the recognition of various

foot disorders. Service members with foot disorders must be referred to the medical staff or MO.

- 3.77 Cleanliness.** The feet must be washed with soap and water every day and dried thoroughly, especially between the toes. Toenails should be regularly cut square across the top to avoid ingrown toenails.
- 3.78 Preparation of Feet Prior to Activities.** When possible, feet can be prepared by physical training sessions (under combat fitness leader/physical training instructor direction) and the wearing of boots. These activities should be part of pre-deployment training and gradually increase in intensity and duration.
- 3.79 Care of the Feet During a March.** At halts, if Service members complain about soreness of their feet, their boots should be removed and treatment administered on the spot. Service members must be convinced of the need to search for and eradicate the cause of discomfort in the feet as soon as it starts, rather than carry on until a serious disability develops.
- 3.80** On long marches, drying the feet and changing into clean, dry socks during short halts can prolong the fitness of feet. When tactically possible, Service members should elevate their feet and allow them to air in the sun at every opportunity during rest breaks.
- 3.81 Care of the Feet after Extended Field Activity or March.** After extended field activity or a long march, the following routine should be adhered to as far as possible:
- boots should be removed and cleaned, dried and checked for serviceability;
  - feet should be washed in cold water, dried thoroughly, elevated and allowed to air in the sun; the medic should treat blisters, abrasions etc, and dust with foot powder;

- c. clean socks should be worn;
- d. socks should be washed and dried and their serviceability checked; and
- e. if the feet are swollen or painful, or chafed, a hot footbath of Condy's crystals should be used, after washing the feet in cold water. This is of value both as an antiseptic and a tanning agent. The heat helps to relieve the pain.

**3.82 Tinea.** Tinea is a fungal infection of the skin that is difficult to eradicate completely once it has started although not so difficult to keep under control. It is very prevalent in hot and humid climates. Tinea can affect different areas of the body including the scalp, beard, nails, body, groin ('Jockstrap itch'), hands and feet ('athlete's foot'). It should be searched for at foot inspections and all personnel must make frequent inspections of their own feet, reporting cracks, rashes and any area of dead white skin between and under their toes to health staff or the MO. Preventive measures are the most important and can include:

- a. cleanliness of the ablution areas; floors and duckboards must be washed down daily with antiseptics and, when possible, exposed to the sunlight;
- b. daily washing of feet, which should then be dried thoroughly, especially between the toes and dusted with foot powder. Feet that sweat profusely should receive special care;
- c. changing of socks on a daily basis. Personnel should change to dry socks as often as necessary during the day;
- d. drying of towels after use; if possible, they should be dried in the sunlight;

- e. reporting of all skin complaints. It must be remembered that there are other common causes of skin disease of the feet apart from tinea, and the diagnosis is the responsibility of the health staff or MO. Any condition not responding to care must be reported; and
- f. using foot powders or other applications prescribed by the health staff or MO for treatment of tinea as directed, on a regular basis.

**Annexes:**

- A. [Field Health and Hygiene Checklist for Site Selection](#)
- B. [Free From Infection/Infestation Inspections](#)





## Field Health and Hygiene Checklist for Site Selection

1. When deciding on the location of a site, the following considerations should be assessed against the health threat and the tactical situation. Where possible, the following should be avoided:
  - a. *Local Towns and Villages.* Sites should not be located close to local towns and villages, particularly:
    - (1) water points such as wells, dams, drains and creeks;
    - (2) rubbish points;
    - (3) ablution areas;
    - (4) sewer systems and disposal areas;
    - (5) population concentrations and refugees; and
    - (6) collection points for domestic animals such as dogs, pigs, etc.
  - b. *Industry and Agriculture.* Industrial and agricultural centres should be avoided, including:
    - (1) factory and manufacturing sites;
    - (2) drainage areas from industrial sites;
    - (3) waste disposal areas;
    - (4) disused mining areas;
    - (5) domestic animal feeding and watering areas; and
    - (6) rice paddies.

- c. *Terrain*. Types of terrain to be avoided include:
- (1) thick undergrowth;
  - (2) steep slopes and valley floors;
  - (3) broken ground;
  - (4) swampy areas; and
  - (5) banks of lakes and rivers.
2. Ideal sites include high ground, well grassed, on a gentle slope which possesses good natural drainage. Harbours should be sited upstream from local villages and infrastructure.

ANNEX B TO  
CHAPTER 3

## Free From Infection/Infestation Inspections

### How to Perform an Inspection

1. Troops should undress to underwear for a general overall inspection as will expose more general complaints, for example:
  - a. sunburn;
  - b. insect bites;
  - c. swelling in elbows, knees, ankles; and
  - d. rashes and abrasions which may need minor treatment.
2. At this stage, the soldier should be asked whether he has any specific complaints. If so, he should be examined and sent to the regimental aid post (RAP) if required.
3. Before soldiers are sent to the RAP, a full FFI must be performed.
4. Personnel in charge of troops should conduct physical inspections in the following circumstances:
  - a. before and after involvement in an arduous military activity;
  - b. when troops have been exposed to environmental hazards, eg. tick-infested areas, or rough terrain; and
  - c. when infection, infestation or other disability is noted within a member of the group.

5. During a full FFI inspection the following areas should be checked:
- a. hair – lice and ticks;
  - b. eyes – eye infections;
  - c. ears – outer ear infections, behind ears for insect bites and dirt rash;
  - d. lips – lip chafe;
  - e. neck –
  - f. shoulders –
  - g. collar –
- } insect bites, sunburn;  
} abrasions;  
} webbing rash;
- h. armpits – heat rash, chafing;
  - i. arms – sunburn, bites;
  - j. middle – heat rash, chaffing, ticks;
  - k. crutch – tinea, thrush, heat rash;
  - l. legs – insect bites, leeches;
  - m. feet – swollen feet, blisters; and
  - n. toes – ingrown toenails, broken toenails, corns and tinea.
6. Troops should be warned and instructed prior to each activity about:
- a. personal hygiene before, during and following an assignment;
  - b. treatment of minor ailments before commencing a task;
  - c. their responsibility, to themselves and others, to report any infection or infestation which may spread to others; and

- d. personal and communal protection where possible, and the correct methods for protection against disease-carrying insects.



## CHAPTER 4

### Water Supply

#### Section 4-1. Introduction

- 4.1** Health personnel are concerned with water supply because water is critical to survival, yet is also a vehicle for transmission of many diseases, such as cholera, typhoid fever, amoebiasis, dysentery and infectious hepatitis.
- 4.2** Health personnel survey water supplies from source to consumer and recommend changes necessary for the protection of Service members' health. Those responsible for field water supply include the MO and health personnel whose duties include:
- a. ensuring that water sources have been surveyed;
  - b. approving water for distribution;
  - c. establishing disinfection chemical residual levels;
  - d. establishing a recommended frequency for WP survey by health personnel;
  - e. recommending procedures for the maintenance of water potability;
  - f. ensuring water distribution equipment is regularly surveyed by health personnel; and
  - g. approving the use of alternative water distribution equipment during extreme emergencies.



## **Section 4-2. Drinking Water Quality Standards and Analysis**

### **General**

- 4.3** Drinking water is water that is intended to be used for maintaining adequate levels of hydration and for nutritional purposes.
- 4.4** To be satisfactory for human consumption, water must be free of all pathogens or substances in concentrations that can cause harmful effects. Water meeting these requirements is said to be potable. Drinking water should also be palatable: that is, clear, cool and relatively free from unpleasant taste and odour.
- 4.5** For logistic purposes, the daily drinking water requirement under temperate climatic conditions is considered to be approximately five litres per person. Under extremely hot and humid conditions, such as are present in northern Australia, water consumption may substantially exceed five litres per day, depending on the level of activity.
- 4.6** ADF field drinking water standards are contained in *Quadripartite Standardisation Agreement 245, Edition 2, Minimum Requirements for Water Potability*. These standards are calculated on the basis of an intake of drinking water of five litres per day per soldier and are categorised as short-term or long-term standards. Short-term field water consumption is calculated on a period of one to seven days; long-term field water consumption is usually for a period in excess of seven days.
- 4.7 Long-term Deployments and Ships.** The quality of water supply aboard ships and field water supply used by a deployed force for one month or longer, should comply with the National Health and Medical Research Council

Australian Drinking Water Guidelines, promulgated in 1996. Most of these guideline values may be achieved by clarification and reverse osmosis treatment.

- 4.8** At the individual level, the bacteriological standard and the short-term physical standard are applied. At small unit level, only short-term standards can be applied. At major unit level and in static areas, the short-term standards apply for the first seven days, following which, the long-term standards apply.

### **Section 4-3. Individual Emergency Water Treatment**

- 4.9** In emergency situations when it is logistically not possible to provide enough water, water may need to be individually won from non-approved sources. This situation will expose soldiers to a much greater risk of disease but must be assessed against the risk of heat illness and dehydration. The individual emergency water treatment process must be closely monitored, as a lapse or failure to follow the process will result in casualties, often requiring large amounts of clean water to maintain hydration. Individual emergency water treatment is a three-step process involving the following:

- a. site selection (where to draw water from);
- b. individual clarification (filtering water); and
- c. disinfection (purification/treatment).

- 4.10 Site Selection.** The site chosen to draw water should not be exposed to possible sources of contamination. The most likely sources of water are:

- a. creeks and rivers;
- b. lakes and dams;

- c. wells, bores, and springs;
- d. snow; and
- e. existing piped supplies.

**4.11** A reconnaissance is required to determine the suitability of a water source and as a minimum should include consideration of all possible sources of pollution. Where possible, water should be taken upstream from:

- a. known enemy activity,
- b. local villages, and
- c. any industrial or agricultural areas.

**4.12** The following sources of water should be avoided (unless approved by medical staff):

- a. wells in local villages,
- b. stagnant ponds, and
- c. animal watering holes.

**4.13** An ideal water source is fast flowing, or has a very large volume and has no human activity upstream or nearby.

## **Section 4-4. Water Treatment**

### **Individual Clarification**

**4.14** The individual equipment used to filter water is the Millbank Individual Filter. It is a green, chain-weave bag of stout cotton, treated to render it rot and mould proof. It measures 140 x 140 x 20 mm, weighs 20 grams, and can be carried in a soldier's basic webbing. The weave of the bag filters out suspended matter while allowing the water to pass through

and discharge into a water bottle from one of the bottom corners of the bag which runs to a point. The procedure is as follows:

- a. As the material is nearly waterproof it is necessary for it to be thoroughly wet before use. This is done by turning the bag inside out and soaking the lower part, up to the black line, in water.
- b. The bag is turned back to its correct side.
- c. The bag is filled to the top with the cup canteen or some other suitable container to avoid dirtying the outside of the bag.
- d. The filter is attached to a stake or tree branch, using the eyelets in the top of the bag.
- e. The first half litre is allowed to run to waste to clean the external surface of the bag.
- f. When the water level reaches the black line a water bottle is placed below the lowest point. The filtered water will run down the outside of the bag to the pointed end and drip into the bottle. Providing the bag is thoroughly wet, a bottle will fill within five to eight minutes.

**WARNING**

The bag is not to be squeezed or the hole size enlarged at the pointed end of the bag.

- g. After filtering, the water must still be disinfected.

## **Individual Disinfection**

- 4.15** In the Army, the term 'disinfection of water' refers to the process whereby microorganisms, which have not been

removed during clarification, are killed. In the field this is usually done by adding water purification tablets to the water, or if only very small quantities are involved, by boiling. After the addition of two water purification tablets a period of 30 minutes is allowed for the iodine to kill the water-borne organisms. In normal climatic conditions, 15 minutes is adequate; however, when schistosomes are present or the water is very cold (below 20°C), a 30-minute period is required. During this time, the iodine kills water-borne organisms and remains present in the water for killing any bacteria which may enter the water later.

- 4.16** The Army provides a compact, easy to use, rapid acting tablet known as the water purification tablet, iodine for Treating Water in Canteens (**NSN 6850-66-135-2321**), which helps prevent gastro-intestinal disorders such as diarrhoea caused by water-borne infection.
- 4.17** Water purification tablets, used in the recommended dosage will destroy:
- a. amoebae, which cause dysentery;
  - b. bacteria, including those which cause diarrhoea, enteric fever, typhoid, para-typhoid, cholera, poliomyelitis, and various food poisoning organisms;
  - c. schistosomes which cause schistosomiasis;
  - d. microorganisms that cause minor stomach and intestinal disorders common in tropical and sub-tropical areas; and
  - e. fungi.

## **Dosage and Use**

- 4.18** Two water purification tablets, in one litre of water is sufficient for sterilisation to occur. These tablets are NOT FOR ORAL

ADMINISTRATION OTHER THAN IN WATER. The recommended method is as follows:

- a. add two tablets to a canteen (one litre) of clear water;
- b. replace canteen cap loosely. Wait five minutes and shake well allowing leakage, then tighten cap; and
- c. wait an additional 30 minutes before using for any purpose. Do not add anything to the water during this period.

- 4.19** If no water purification tablets are available, the source is suspected to be polluted, or the water is still cloudy after clarification, then it must be boiled to achieve disinfection. Bringing the water to boiling and keeping it boiling for at least one minute will do this. Boiling and allowing to cool before the disinfection step will provide the safest water for drinking.



## CHAPTER 5

### Permethrin/DEET Insect Repellent System

#### Section 5-1. Introduction

##### What is the Permethrin/DEET Repellent System?

- 5.1** The permethrin/DEET repellent system is the cornerstone of the system for personal protection of ADF personnel against arthropod-borne disease. It is the method by which one chemical repellent is applied to the skin, and another to the clothing, to prevent insects such as mosquitoes from biting exposed skin or biting through clothing.

##### What is the Health Threat which makes the System Necessary?

- 5.2** There is a serious threat of diseases transmitted by arthropods (eg. mosquitoes, mites, ticks, etc) in many parts of Australia and other areas of operational interest to the ADF. These diseases include those listed in Table 5–1. See Chapter 8 of *ADFP 717, Preventive Medicine Manual* for further details.

**Table 5–1: Some Diseases Transmitted by Arthropods**

<i>Diseases transmitted by mosquitoes</i>	<i>Diseases transmitted by mites</i>
Australian Encephalitis	Scrub Typhus
Barmah Forest Fever	



<i>Diseases transmitted by mosquitoes</i>	<i>Diseases transmitted by mites</i>
Dengue	
Epidemic Polyarthritis (Ross River Virus)	
Japanese Encephalitis	
Malaria	
Murray Valley Encephalitis	

### **How can the Transmission of Arthropod-borne Diseases be Prevented?**

- 5.3** Transmission of arthropod-borne disease can be controlled by breaking any link in the chain of infection. One of these methods is to protect the human host from infection. This can be done by proper wearing of the uniform to protect the skin surface (for example, by rolling down the sleeves at night), by use of mosquito nets, and by the use of the permethrin/DEET repellent system.

### **How does the Permethrin/DEET Repellent System work?**

- 5.4** The permethrin/DEET repellent system combines treatment of field uniforms, mosquito nets and tentage with an insecticide (permethrin), in combination with the application of an insect repellent (DEET) to exposed areas of the skin. With most mosquito species, permethrin works by killing mosquitoes on contact with the treated fabric, although it has

some repellent effect on mosquito types such as Culex. It is therefore necessary to apply a repellent to exposed areas of skin.

- 5.5** The United States National Academy of Science has conducted a review into this system and has concluded that it is safe and effective. A review by the Australian Defence Health Service Branch of the toxicity of the chemicals used in the permethrin/DEET repellent system, together with extensive work conducted by the Army Malaria Institute, has also shown that the system is very safe and effective.

### **What Chemicals are used in Permethrin Treatment of Field Uniforms?**

- 5.6** The chemical used is permethrin, a synthetic pyrethroid insecticide. It is very toxic to insects such as mosquitoes, which are killed by coming into contact with uniforms and mosquito nets treated with it, however, it is of very low toxicity to humans. The solution used to treat field uniforms, mosquito nets and tentage is made by dissolving the concentrated formula (the only product currently approved for this purpose is an emulsifiable concentrate which has the trade name Perigen 500, and contains 50 per cent permethrin, as well as a solvent and some emulsifiers).

### **How much Permethrin Remains in the Uniforms?**

- 5.7** The target dose rate recommended for field uniforms is 0.12 milligrams of permethrin per square cm of fabric after the uniform has been treated, drained and dried.

## **Can Permethrin cause Reactions in People wearing Treated Uniforms?**

- 5.8** If the correct procedures as described in this chapter are followed carefully, there is very little likelihood of reaction. Skin rashes might occur if the product is not used exactly in accordance with the instructions. If the treatment is carried out properly, the solvents and emulsifiers are drained away, and the solvent evaporates. If the uniform is not drained or dried properly, small traces of the emulsifiers might remain in the fabric.
- 5.9** The concentrated product, Perigen 500, could cause irritation if it came into contact with the eyes or skin before it was diluted with water. The diluted dip, prepared from Perigen 500 mixed with water, is much less likely to cause skin or eye irritation, but caution should still be exercised.
- 5.10** It is important that the correct procedures be followed when making up the permethrin rinse and treating uniforms with permethrin.

## **What Chemicals are used for Skin Application in this System?**

- 5.11** DEET is used for skin application in the DEET/Permethrin insect repellent system. There is only one approved formulation of DEET for use by ADF personnel, and its ADF supply details are as follows:
- Insect Repellent Personal 75 ml, Insect Arthropod Repellent Lotion (**NSN 6840-66-106-Q2471**). This is a 75 ml flexible plastic screw top tube containing 35 per cent DEET.

### **How is DEET used in this System?**

- 5.12** DEET is applied to exposed skin surfaces when there is a risk of insect bites. DEET is not applied to skin already covered by permethrin-treated field uniform clothing.

### **Can DEET cause Reactions in People Applying it to their Skin?**

- 5.13** Provided that the correct procedures, described in *ADFP 705, Pesticides Manual*, are followed carefully, there is very little likelihood of reaction.

### **Who may carry out Permethrin Treatment of Uniforms, Nets and Tentage?**

- 5.14** The treatment of field uniforms, mosquito nets and tentage with permethrin may be carried out by all personnel, provided that they work under direct supervision. Treatment is to be carried out under the direction of one of the following personnel:
- a. suitably qualified health trades, eg. preventive medicine or environmental health;
  - b. a unit member, for example a senior non-commissioned officer (SNCO), who has been trained for this task by qualified personnel; or
  - c. other qualified health or medical personnel.
- 5.15 Safety Aspects.** See Chapter 2, Insect Repellent System – Guide for Medical Officers, in *ADFP 705* for further information on safety aspects.

### **What Items should NOT be Treated with Permethrin?**

- 5.16** Bush hats or underwear should NOT be treated with permethrin.

### **How often does Treatment/Re-treatment need to be Carried Out?**

- 5.17** As the permethrin will be leached slowly from the fabric by washing, abrasion and rinsing by rain, etc, uniforms and nets will need to be re-treated at regular intervals to maintain the effectiveness of the permethrin treatment. In highly malarious areas it is recommended that field uniforms be re-treated with Perigen 500 after three to four cold water washes or rinses.
- 5.18** Mosquito nets are unlikely to be washed, but permethrin will be lost by handling and use. It is recommended that nets be re-treated every three months.
- 5.19** The recommended re-treatment schedule is shown in [Table 5–2](#).

**Table 5–2: Re-treatment Schedule**

<i>Item</i>	<i>Cold wash</i>	<i>Hot wash</i>	<i>Comment</i>
Field uniform	Re-treatment needed after 3-4 COLD water washes or rinses.	Re-treatment needed after one to two 30 minute HOT (50°C) water washes (eg. at commercial laundry).	Field uniforms ideally should be washed in COLD water to minimise the need for re-treatment after washing.
Mosquito Nets	-	-	Bed-nets are not likely to be washed, but permethrin is lost due to abrasion by handling. Re-treat every three months.
Tentage	-	-	Re-treat every three months.

## **What Personal Protective Equipment and Hygiene Procedures are Needed for the Treatment Procedure?**

- 5.20 Handling the Concentrated Product.** PPE must be worn when handling the concentrated product. Care should be taken not to splash the concentrated Perigen 500 into eyes, on skin, or onto clothing. Personnel who accidentally splash themselves with the concentrate should remove the contaminated clothing and wash contaminated areas of skin with soap and water. Splashes in the eye should be washed out immediately with plenty of water. All treatment, including drying, should be conducted in a well-ventilated area.
- 5.21** When the concentrated product is being handled, eye baths and washing facilities should be available on-site.
- 5.22 Handling the Diluted Solution.** The diluted solution should be washed off the skin with water, or washed out with water if it enters the eye.
- 5.23 Drying.** Field uniforms and mosquito nets must NOT be removed from the site until dry, and must NOT be worn or used until completely dry.

### **Section 5-2. Overseas Deployment**

- 5.24** Personal equipment (field uniforms and mosquito nets) of ADF personnel on overseas deployment to areas where there is risk of arthropod vector-borne disease is to receive permethrin treatment before departure from Australia. Re-treatment is to continue at the recommended intervals for the duration of deployment. SNCO members of the deployment force down to company or equivalent level are to be trained as qualified supervisors of permethrin treatment,

or receive refresher training. This training should occur in conjunction with pre-deployment health threat briefings provided by Preventive Medicine/Environmental health personnel. Only the correct, approved insect repellent (see [sub-paragraph 5.11a](#)) is to be obtained and used for overseas deployments. Units are not to purchase or use stocks of non-approved repellents.



## CHAPTER 6

### Prevention of Environmental Injury and Illness

#### Section 6-1. Heat

- 6.1** Within the military environment, heat casualties, including deaths, occur in units operating in hot climatic conditions. The adverse affects caused by extreme heat conditions on the human body are collectively known as heat stress. The level of heat stress which causes actual injury (known as heat injury) is affected by air temperature, humidity, air movement, **water consumption, physical activity and acclimatisation.**
- 6.2** The progression of physical signs of incipient heat injury, which can occur singularly or in combination are:
- a. headaches, dizziness, nausea;
  - b. fatigue, or muscle cramps;
  - c. confusion, lack of coordination;
  - d. pale clammy skin, tingling in extremities;
  - e. weak pulse;
  - f. seizures; and
  - g. unconsciousness.
- 6.3** Very little can be done about the climatic conditions of an operational environment, therefore prevention of heat injury is centred around the three control measures of **water consumption, physical activity and acclimatisation.**

- 6.4** As commanders at all levels are responsible for the health and continued effectiveness of their subordinates, it is essential that they understand the significance of these three factors if they are to adopt effective preventive measures. The effective application of preventive measures has the potential to provide ADF with a significant tactical advantage over adversaries who are not adequately prepared for operating in such environments.
- 6.5** The three most effective preventive measures available to commanders are to:
- ensure that all individuals increase their water intake as heat stress increases,
  - limit physical activity as the tactical situation permits, and
  - educate Service members in the recognition of heat stress and the prevention of heat injury.

### **Tactical Situation**

- 6.6** In an actual conflict, the commander's ability to reduce physical activity levels is significantly reduced. Guidelines provided by medical services for operating in hot environments may have to be breached to achieve operational outcomes.
- 6.7** Commanders at all levels must plan for the heat injury and concurrent loss of effectiveness that will occur when they decide the tactical situation warrants strenuous and sustained physical activity in a hot climate. The loss of effectiveness can be reduced by emphasis on the other two key preventive measures of **water intake** and **acclimatisation**. The proliferation of night fighting and night observation devices provides all commanders with options for reducing physical activity during peak temperature periods.

- 6.8** Training exercises during peacetime are not essential tactical situations. Exceeding the medical services guidelines for a training situation will risk the lives of Service members. Heat effects must always be included in risk assessments for training activities.

### **Heat Stress Index – Measured by Medical Services**

- 6.9** Medical services (RAP, CSSB, HSB), are responsible for advising commanders on physical activity levels in hot environments. The current method used by medical services for providing this advice is the Wet Bulb Globe Temperature (WBGT) heat stress index reading. These readings provide an immediate measure of the heat stress at the point the reading was taken. Recommendations are made to commanders to prevent heat injury based on the measured heat stress index.
- 6.10** The WBGT is the preferred heat stress measurement because it can be used in the full range of heat stress environments. A WBGT measures three parameters: the Wet Bulb (WB) thermometer reads the temperature as reduced by natural evaporation of moisture; the Black Globe thermometer (GT) indicates radiant heat load; and the shaded Dry Bulb (DB) thermometer reads the actual air temperature. The readings are combined in the ratio .7 WB, .2 GT and .1 DB ( $WBGT = 0.7 WB + 0.2 GT + 0.1 DB$ ). The resulting temperature index indicates the amount of heat stress. In addition to glass thermometer kits there are a number of portable electronic WBGT devices available which are both easy to use and sufficiently accurate for safe implementation of these guidelines.
- 6.11** WBGT instruments may not be readily available in all field situations. If instruments are not locally available, the index reading may have been taken some distance from the unit. Commanders may have to estimate heat stress levels or

modify reported readings to reflect local conditions. To prevent heat casualties, all decisions at the unit level should err towards giving too much water and towards further reducing work levels. Commanders must ensure that guidance from medical advisers is not exceeded unless essential tactical circumstances dictate. For non-combat related activities a **thorough risk assessment** must be conducted and the ultimate responsibility for non-compliance with medical advice rests with the commander. The most significant benefit that the WBGT heat index provides to commanders is as a quantitative measurement tool which can be incorporated into risk assessments and risk mitigation strategies. If the guidelines must be exceeded for operational requirements, commanders can expect heat casualties in direct proportion to increases in the heat stress index and physical activity. The general guidance is based on the assumptions that:

- a. service members are drinking at least the minimum recommended quantities of water;
- b. service members are fully acclimatised;
- c. service members are not wearing special clothing or are not in enclosed vehicles, aircraft or buildings, for example, nuclear, biological and chemical (NBC) protective dress, individual protective equipment, ballistic vests, or closed armoured vehicles; and
- d. the heat stress index used was taken in the same location as the Service members.

- 6.12** The operation of a WBGT is not complex but should only be effected by trained personnel. Where units (sub-units) are operating in remote hot environments without medical services support, commanders at all levels should consider obtaining their own instruments and having personnel trained to operate

before deployment. Commanders should always contact supporting preventive health staff for advice and direction before taking this action.

- 6.13** Because of insulating qualities and restriction of evaporation, special clothing such as NBC, individual protective equipment, or ballistic vests causes increased heat stress and heat casualties at much lower heat stress index levels.
- 6.14** Service members must be monitored closely by commanders whenever special clothing is worn, regardless of the heat stress index.
- 6.15** Commanders at all levels must be aware of the heating effects of sunlight on the working conditions inside vehicles, aircraft, tents and other enclosed spaces. The radiant heat load and absence of ventilation-aided evaporation causes increased heat stress. Service members in these environments must also be monitored closely regardless of the outdoor heat stress index.

### **Implementing Preventive Measures**

- 6.16** Successful prevention of heat injury depends on educating command and supervisory personnel in recognition and prevention of heat injury. Prevention involves:
  - a. developing procedures to alert individuals to the existence of dangerous heat stress,
  - b. measures to reduce the severity of exposure, and
  - c. use of methods to increase the resistance of Service members to heat stress.
- 6.17** The three main methods used to maintain the individual's contribution to combat power in hot environments are:
  - a. *Water Intake.* Vital considerations on water intake include:

- (1) Service members subjected to high heat stress may lose body water in excess of one litre per hour through sweating. If these losses are not replaced, body temperature increases, work ability decreases and heat casualties occur. Water loss must be replaced, preferably by periodic intake of water to meet the intake requirements of [Table 6-1](#) (page 6-7).
  - (2) Thirst is not an adequate indicator of body water requirements. Commanders must require water intake at the recommended rates for the heat stress level of their particular location.
  - (3) Water economy can only be achieved by reducing activity or limiting activity to the cool hours of the day to reduce sweating. Restricting water intake will reduce work capacity and increase heat casualties.
  - (4) Clear urine is an indicator that water intake is probably adequate. If urine becomes concentrated and turns yellow, water intake should be increased.
  - (5) The term 'water discipline' involves the measures taken to ensure the efficient, controlled, and hygienic use of water. It does not imply a reduction in the drinking of water.
- b. *Work and Rest Cycles.* Physical activity must be tailored to the climate, physical condition of personnel, and the operational situation. Commanders, supervisory personnel and medical personnel must closely monitor those factors to achieve maximum work output with minimum risk of heat injury. General principles which must be considered are:
- (1) body heat increases directly with increasing activity. Moderating activity to the work rest cycles of [Table 6-1](#) will help control heat stress;

- (2) when water is in short supply, working in the cooler hours of the night (using night vision capability) or morning allows more work per given expenditure of water because excess sweating is reduced;
- (3) heavy work should be scheduled for the cooler hours of the day and all work in direct sunlight avoided;
- (4) the hourly work rest cycles recommended in Table 6–1 allow for periodic recovery before heat injury occurs;
- (5) the rest period should be in a relatively cool, shaded, airy location to allow for better recovery from heat stress; and
- (6) water intake and work rest cycles can be approximated for situations where special protective clothing is worn by adding 5.6°C to the measured WBGT heat stress index and then referring to Table 6–1.

**Table 6–1: Preventive Measures Based on Wet Bulb Globe Temperature Heat Stress Index**

<i>LEVEL</i>	<i>HEAT WBGT INDEX<sup>1</sup> (°C)</i>	<i>WATER INTAKE (L/HR)</i>	<i>WORK/REST CYCLE<sup>2</sup> (W/R)</i>
1	26 – 27.5	0.5	50/10
2	27.5 – 29	0.5 – 1	50/10
3	29 – 31	1 – 1.5	45/15
4	31 – 32	1.5 – 2	20/10

**Notes:**

1. Personnel wearing special clothing or in enclosed spaces must be closely monitored for heat stress regardless of the heat stress index. Their level of water intake and work/rest can be approximated by adding 5.6°C to the measured heat stress index.
2. Depending on the condition of personnel.
  - c. *Acclimatisation.* Acclimatisation is achieved in the following way:
    - (1) A period of two weeks with progressively increasing exposure to heat and physical activity is required for substantial acclimatisation. Service members who are required to do heavy work before being acclimatised have a high potential for heat injury, have retarded development of full work capacity in heat, and perform the work poorly.
    - (2) Acclimatisation to heat begins with initial exposure and is usually 50 per cent developed by the end of the first week. Some individuals who are especially susceptible to heat injury will require longer acclimatisation times. Full acclimatisation is attained most quickly by progressively increasing work in the heat. Full acclimatisation can be obtained by as little as two 50-minute periods of work in the heat each day. The work should require cardiovascular endurance work (aerobic) such as running in place, instead of muscle work (anaerobic) such as push-ups. Resting for three or four days in the heat, with activity limited to that required for existence, results in only partial acclimatisation. Physical work in the heat must be accomplished to result in full acclimatisation.
    - (3) If it is necessary that Service members work during acclimatisation, the cooler hours of the day should be used.



- (4) The key factors in the acclimatisation process are the larger volumes of sweat and earlier onset of sweating together with a significant reduction in the salt content of the sweat produced (from half normal saline equivalent to one fifth normal saline). Therefore, fully acclimatised personnel do not usually need additional salt. However, the water intake requirements detailed in [Table 6–1](#) must be followed to keep acclimatised personnel fit.
- (5) Once acclimatised, personnel will retain most of their adaptation for about one week after leaving the hot environment. If they are not exposed to work at high temperatures, the acclimatisation will decrease at a variable rate, with a major portion usually being lost within a month.

**6.18** Other factors contributing to the maintenance of combat effectiveness are:

- a. *Salt.* Service members should have adequate salt intake from consuming three meals per day. If rations are restricted, drinking water may be salted **only under medical supervision**. The excessive consumption of salt in the name of preventing heat injury should be avoided since this has led to many cases of dehydration as the body will 'waste' water in an attempt to 'wash out' excessive salt loads. This is also the case for sugars and applies equally to soft drinks and coffee.
- b. *Host Factors.* Susceptibility to heat injury is increased by illness, fatigue, use of alcohol or drugs, poor physical fitness, a previous heat injury, recent immunisations, heat loss factors, humidity, occlusive clothing and age.

## **Preventive Measures**

**6.19** Water, work rest cycles and acclimatisation can be used as a combat multiplier. A unit's ability to project its fighting strength can be protected by adopting the following measures:

- a. drink at least the recommended amount of water while avoiding alcoholic, high sugar and caffeinated drinks, and load up on water by drinking a litre in the morning, at each meal and before and during any hard work;
- b. do not use thirst to determine water intake;
- c. keep the skin covered and clean, rolling down the shirt sleeves, wearing full-length trousers and wide brim hat;
- d. use sunblock [at least a sun protection factor (SPF) of 15] and lip balm, applying to all exposed skin (face, neck, ears, and under the chin);
- e. replace salt loss by eating three meals each day (the entire ration);
- f. increase rest periods and lower work rates and loads by following the correct work and rest cycle as the heat index increases;
- g. schedule work for the cooler times of day, avoiding 1000 hours to 1400 hours;
- h. use pre-deployment time to increase acclimatisation as much as possible; and
- i. use the buddy system and seek medical assistance if experiencing symptoms of heat injury.

- 6.20** All personnel should be trained in 'Buddy Aid' treatment of heat injury in the field by:
- a. stopping all activity;
  - b. disrobing to underpants or shorts if shade is available;
  - c. placing casualties in the shade or on a cool surface if possible;
  - d. encouraging the casualty, if conscious, to drink water;
  - e. sprinkling water on the casualty's skin;
  - f. fanning the body with a shirt or similar item;
  - g. evacuating the casualty to a medical facility; and
  - h. continuing the cooling process during the transfer.

### **Section 6-2. Cold**

- 6.21** Commanders at all levels can minimise the threat of cold injury by ensuring personnel use preventive measures, such as dressing in layers, keeping dry and changing socks on a regular basis. Soldiers performing at low levels of activity should be reminded to increase exercise or movement (even moving toes and fingers results in increased blood circulation to the extremities). As in hot weather, soldiers must drink adequate amounts of water and consume all meals. Commanders and leaders should provide warm, well-ventilated areas for personnel to get out of the cold, mission permitting. To avoid carbon monoxide poisoning, they must ensure that personnel do not sleep in unventilated areas or in vehicles with the windows closed and the engines running.

## **Preventive Measures**

**6.22** Maintaining the correct personal protective measures can be used as a combat multiplier. A unit's ability to project its fighting strength can be protected by adopting the following measures:

- a. wearing clothing in layers (creating air spaces) to hold maximum body heat, and by ensuring clothing is fitted properly;
- b. reducing the layers of clothing when exercising or working to prevent sweating (sweating reduces the protective effects of layered clothing);
- c. keeping dry and changing socks several times a day to keep the feet dry;
- d. frequently exercising the entire body, when the tactical situation permits (at a minimum, exercise the feet, hands, and face to increase circulation);
- e. drinking sufficient water to prevent dehydration;
- f. increasing the required calories during cold weather operations and eating all meals to ensure adequate body heat can be generated;
- g. using sunblock (at least an SPF of 15) and lip balm, applying the sunblock on all exposed skin (face, neck, ears, and under the chin); and
- h. wearing ultraviolet eye protection to prevent snow blindness.

### **Section 6-3. High Altitude Considerations**

- 6.23** Mountain and high altitude illness and injuries add a new dimension in military operations. Commanders at all levels must be aware of the effect this environment will have on their personnel. Personnel must not be allowed to ascend to high altitudes at a rapid pace. To do so can cause acute mountain sickness and/or other more serious illnesses and injuries that will prevent the accomplishment of their mission. Acclimatisation to high altitudes is based on altering the ascent rate to allow soldiers to partially acclimatise. Graded ascents limit the daily altitude gain to allow partial acclimatisation. The altitude at which soldiers sleep is critical. A recommended practice is to have soldiers spend two nights at 2 750 m (9 000 feet) and limit sleeping altitude to no more than 300 m (1 000 feet) above the previous night's sleeping altitude. When personnel begin to show the effects of high elevation, they may have to be evacuated to below 2 450 m (8 000 feet) to recover. At very high elevations [above 4 270 m (14 000 feet)] personnel may be able to work for only a few minutes at a time. Rest periods may have to be extended until the personnel can acclimatise to the environment.
- 6.24** Commanders should be aware that altitude above 2 450 m (8 000 feet) affect mental abilities. The higher the altitude, the lower the oxygen content in the air, thus causing mental confusion in personnel due to the lack of adequate oxygen. Initial symptoms of altitude sickness may include euphoria so that the individual is unaware of any impaired ability. Close observation of subordinates is required to detect early signs of altitude sickness.

- 6.25** Specific advice should be sought from medical services for areas outside the unit's normal working environment. Tropical and cold climates can greatly enhance the chance of many diseases affecting a unit's performance.

## **CONTRIBUTE TO IMPROVED TRAINING PUBLICATIONS**

**BY FORWARDING SUGGESTIONS FOR AMENDMENTS, USERS CAN HELP THE ARMY TO IMPROVE ITS TRAINING PUBLICATIONS.**

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Fill in one of the tear-off cards attached to the next page, stating any ideas or recommendations for improving this or any other training publication. Be sure to fill in all spaces provided on the card. Hand the card in to the unit orderly room for forwarding, through normal command channels, to Doctrine Wing, TDG, LWDC, which will acknowledge comments as soon as they have been received. All adopted proposals will be incorporated into the next amendment to the publication. Lengthy comments should be attached to the card and slipped into an envelope before forwarding. Additional copies of the Amendment Proposal Card may be obtained from Doctrine Wing, TDG, LWDC.

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Proposals for changes to doctrine

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Errors, omissions or suggested improvements in:

- Safety procedures

- Security procedures

- Technical procedures

- Doctrine

- Layout

- Illustrations

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If the submission affects **SAFETY** or **SECURITY**, the card should be passed to an appropriate training supervisor for special handling.



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