



Health Aspects of Work in Extreme Climates within the E&P Industry

The Heat

Report No. 6.70/279
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The Oil Industry International Exploration and Production Forum

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- disseminating information on good practice through the development of industry guidelines, codes of practice, check lists, etc.

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HEALTH ASPECTS OF WORK IN EXTREME CLIMATES WITHIN THE E&P INDUSTRY: THE HEAT

CONTENTS

Introduction	2	Transient heat fatigue	12
Definition	2	Heat syncope	12
		Hyperthermia	12
The Basics of Body Temperature	3	<i>Heat cramp</i>	12
Regulation of body temperature	3	<i>Heat exhaustion</i>	13
Heat loss	4	<i>Heat hyperpyrexia or heat stroke</i>	13
		Dehydration	14
Prevention of Heat-Related Health Problems	6	Muscle-related problems	14
Medical screening to assess fitness to work	6	<i>Muscle fatigue</i>	14
<i>Medical examination</i>	6	<i>Muscular spasms</i>	14
<i>Contra-indications to work in extreme heat</i>	6	Skin-related problems	14
<i>Medications which may pose a problem in extreme heat</i>	6	<i>Fungus infections</i>	14
Acclimatisation	7	<i>Skin infections</i>	14
Water, food, and salt replacement	7	<i>Heat rash</i>	14
<i>Water</i>	7	<i>Sunburn</i>	15
<i>Food</i>	8	<i>Windburn</i>	15
<i>Salt</i>	8	The Medical Organisation in Extreme Heat	16
Employee awareness, education and training	8		
<i>First aid training</i>	8	Annexes	
Clothing	9	Annex 1: Heat stress indices	17
Living conditions at the base or camp	9	Annex 2: Contents of a health assessment	19
<i>Food and water hygiene</i>	9	Annex 3: Fitness guidelines	22
<i>Excrement and waste disposal</i>	9	Annex 4: Health risk management	28
<i>Psychological aspects</i>	10	Annex 5: Journey management planning	30
Conditions when leaving the base or camp	10	Annex 6: Medical and first aid equipment	31
<i>Information—journey management</i>	10		
<i>Transport</i>	10		
Working conditions	10		
Health Problems due to Extreme Heat and Humidity	12		
General recommendations in order to prevent heat-related problems	12		

INTRODUCTION

A set of guidelines on extreme climates has been prepared for member companies. This report covers the problems encountered in dry and moist heat.

Company and contractor have a joint commitment to health risk management stated in health policies and should develop a health management system. This needs to be based on a full and careful appraisal of the health hazards to which personnel will be exposed.

Work in dry or moist heat poses a number of hazards. As long as one is in a protected environment (base, housing, camp), the risk is minimal. However, as soon as one steps out into the extreme heat or humidity, there exist a number of potential hazards.

By providing practical information these guidelines, which target line management as well as the company health professionals, aim at preventing accidents, illness and loss of life.

It is important to remember that these guidelines are primarily aimed at the protection and maintenance of health and that, in certain situations, additional measures may be required to ensure effective and efficient performance.

Staying healthy in the heat (dry or moist) is possible, providing one is physically and mentally well prepared and has access to the correct equipment. However, one's condition is also dependent on the application of sensible precautions based on knowledge of the local conditions and of personal limitations.

Definition

Heat is a physical stress on the human body which can be fatal. For the purpose of this document the term 'extreme heat' is not defined by temperature alone. Health related problems due to the heat may appear at various temperatures due to variations in clothing, work conditions, work load, individual fitness and environmental factors. Therefore, although this document is intended primarily for desert and jungle regions, where dry heat or moist heat is encountered, it is not limited only to these conditions.

THE BASICS OF BODY TEMPERATURE

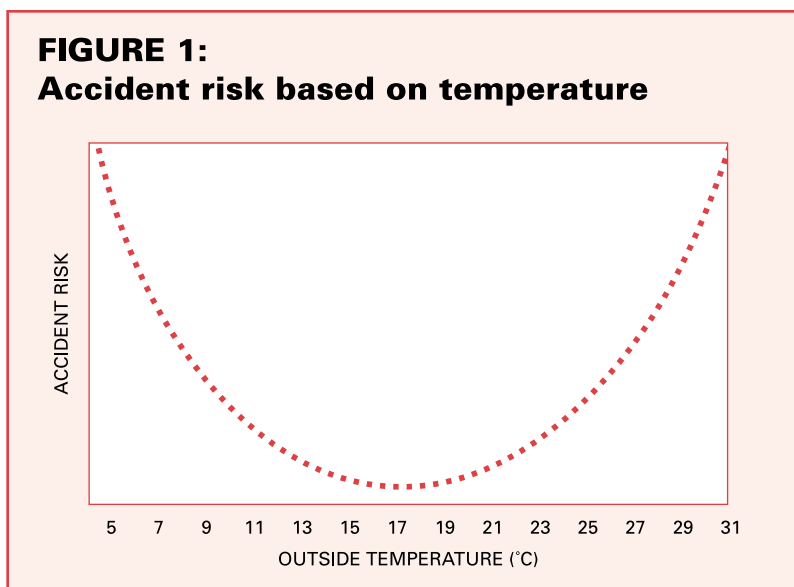
There are two major factors affecting the body's temperature when working in hot environments:

- Metabolic factors: The heat generated by the body functions increases with the work load. Excess body heat must be evacuated.
- Environmental factors: air temperature, radiant temperature (heat radiating from the sun), air speed and humidity (see Annex 1, Heat Stress Indices).

Normal body temperature is 37°C (98.6°F).

In extremely hot climates, ambient temperatures as high as 60°C (140°F) have been recorded.

Extremes in atmospheric temperature may have major consequences on the body's thermal reaction. The risk of accidents increases as temperatures approach +35°C (95°F) unless suitable precautions are taken (see Figure 1).



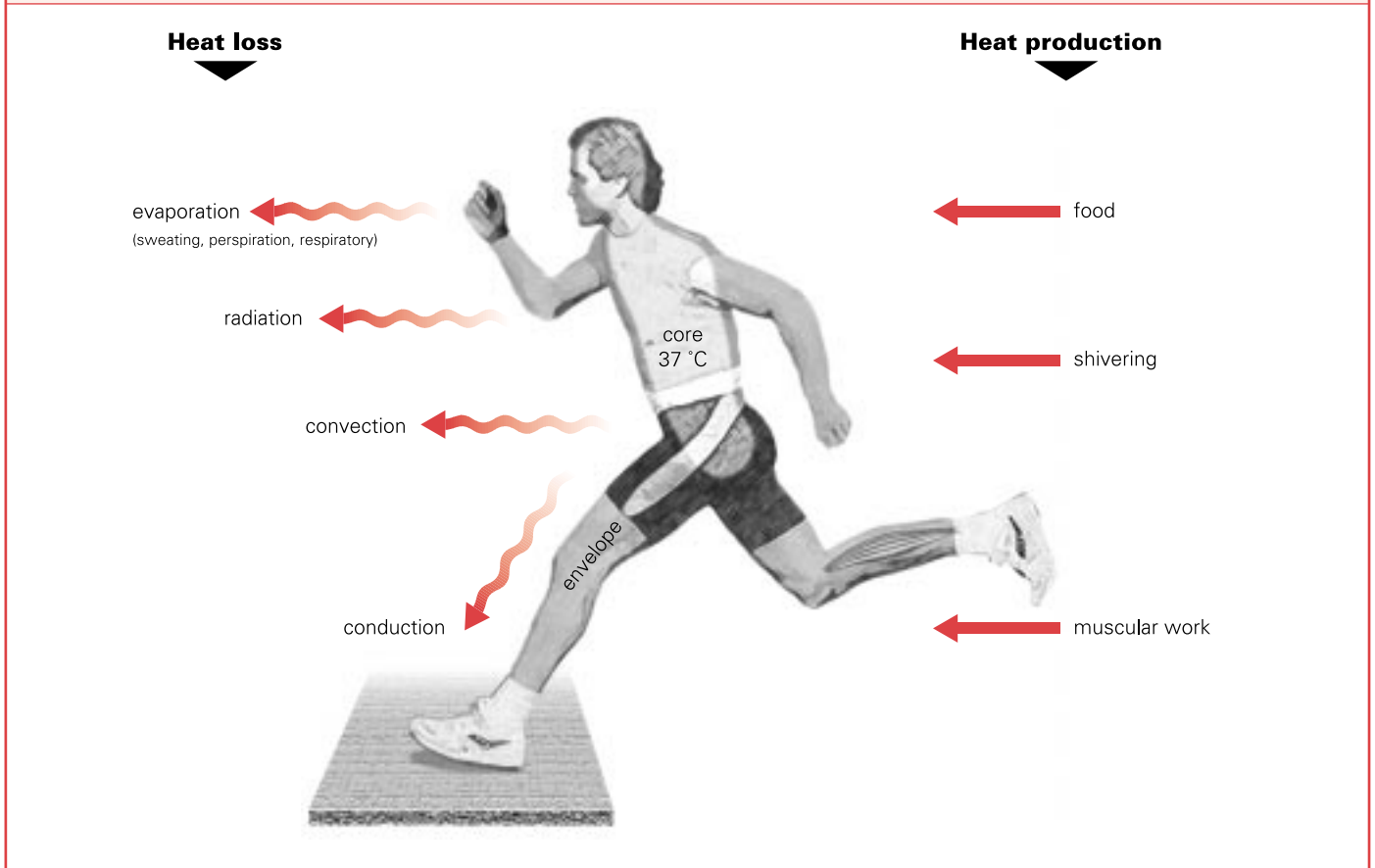
Adapted from: Ramsey J.D. *et al.*, 1983. *Journal of Safety Research* No. 14, pp. 105-114. Effect of the workplace thermal condition on safe work behaviour.

The body is made up of a central core containing the vital organs: heart, kidneys and brain, which must be protected and maintained at a constant temperature of 37°C (98.6°F), and a peripheral envelope, made up of skin, muscles, fat and bones whose temperature can vary greatly without ill effects (see Figure 2).

If the human body did not have methods of heat control the core temperature would rapidly attain that of the outside environment. Transfer of heat between the core and the peripheral envelope allows the body to regulate its core temperature.

Regulation of Body Temperature

FIGURE 2:
Heat loss and heat production: a diagrammatic representation
of man's thermal exchanges with his environment



The brain cannot survive when its temperature exceeds 44–45°C (113°F). When the blood's temperature rises above 37°C (98.6°F), special centres in the brain initiate the body's heat control mechanisms.

This results in an increased blood flow from the core to the envelope. The heart begins to pump more blood, the blood vessels expand, and bundles of tiny blood vessels called capillaries that thread through the outer layer of skin begin to fill up with blood. The heated blood circulates closer to the surface of the skin and excess heat is lost to the air through convection, radiation, evaporation and conduction depending upon ambient air temperature, humidity and air movement.

Heat Loss

The rate of body heat loss is a function of the difference in temperature and humidity between the body and the surrounding environment.

The body can lose or gain heat through four different physical methods:

- *Convection* is the transfer of heat by movement of the air next to the skin. There is a greater cooling effect with convection as the air movement around the body increases. The use of fans to move cool air next to the skin and move the air already warmed by the skin away is a common method of cooling the body. The higher the wind speed, the greater the amount of heat loss by convection. However, when

the air temperature is hotter than the body temperature loss of body heat is not possible by this mechanism.

- *Radiation* is the transfer of heat to cooler objects in the surrounding environment. The heat is transferred through space. The objects are not in direct contact with each other. If the surroundings are cooler than the body, the body's heat will transfer to these surroundings and if the surroundings are hotter than the body, the body will absorb heat.
- *Conduction* is the transfer of heat between objects that are in contact with each other in a stationary situation such as in the transfer of heat from the skin to the adjacent air. The air temperature must be cooler than skin temperature for this to occur. The lower the air temperature, the greater the amount of heat loss by conduction. The body loses heat 20 to 30 times faster in water than in air.
- *Evaporation* is the cooling of the body that takes place when sweat evaporates from the skin's surface. Millions of sweat glands are found over the body. Sweat evaporates from the skin and cools the skin surface.

When air temperatures are as warm as or warmer than the skin, blood brought to the body's surface cannot shed its heat by convection or conduction. Under these conditions evaporation of sweat becomes the only effective way to cool the body.

Sweat consists mainly of water. One quarter of all sweat is produced by sweat glands on the head. The legs and arms each produce another quarter and the rest of the body produces the remaining quarter. The more one sweats the more one must drink.

Air movement increases evaporation. Sweating does not cool the body unless the sweat can evaporate from the skin. The drier a climate the more sweat will be evaporated by the body. When the humidity is low, a large amount of evaporation takes place and increased cooling results. In a very humid climate evaporation of body sweat is difficult since the surrounding air is already highly saturated with water. This explains why **hot, humid days produce more heat problems than hot, dry days**. Strength declines and tasks which require co-ordination, accuracy and comprehension become more and more difficult.

Other factors can influence sweating:

- Drinking hot liquids increases sweating.
- Psychological factors such as stress can also provoke sweating of the hands, feet, armpits and forehead. This is cold sweat which is not accompanied by skin vasodilatation and does not reduce body temperature.
- Alcohol reduces a person's resistance to heat by interfering with hormones which control body fluids.

In extremely hot climates radiation, convection and conduction are of little value since the air temperature is hotter than the body temperature. Under certain temperature and humidity conditions, cooling by evaporation will also stop and heat will begin to accumulate in the body. When these situations occur, the exposed person is in danger of experiencing heat related health problems.

PREVENTION OF HEAT-RELATED HEALTH PROBLEMS

The prevention of heat-related health problems requires a multi-faceted approach that takes into account both the individual and the environment.

Preparation must cover:

- medical screening to assess fitness to work;
- acclimatisation;
- food, water and salt replacement;
- employee awareness, education and training;
- clothing;
- living conditions at the base or camp;
- conditions when leaving the base or camp; and
- working conditions.

Medical Screening to Assess Fitness to Work

It is easier to survive in extreme heat when medically fit and in good health. Medical advice should be based on a proper medical examination.

Medical Examination

Prior to work in the heat it is recommended that a Level 2 health assessment as defined in the E&P Forum Report No. 6.46/228, *Health Assessment of Fitness to Work in the E&P Industry* (See Annex 2) be performed by a doctor with knowledge of the extreme conditions to be encountered and of the requirements of the job.

The same standards as those applied to work on offshore rigs or remote geophysical operations should be applied in order to determine an employee's fitness to work in the heat. (See Annex 3; from E&P Forum Report No. 6.30/190, *Health Management Guidelines for Remote Land-Based Geophysical Operations*).

Appropriate Level 3 tests should be performed with emphasis placed on psychological aspects.

Contra-indications to Work in Extreme Heat

Only a medical assessment will be able to determine whether certain medical problems may be acceptable for work in the heat (e.g. recurrent kidney stones, respiratory or cardiovascular problems).

Certain conditions such as severe obesity i.e. Body Mass Index (BMI) ≥ 35 are relative contra-indications as they impede the acclimatisation process. For further guidance refer to Annex 3. (Source: E&P Forum report No. 6.30/190, *Health Management Guidelines for Remote Land-Based Geophysical Operations*).

(BMI = weight in kg divided by height in m²)

Medications Which May Pose a Problem in Extreme Heat

All medications should be scrutinised by the examining physician as to their effects or physiological impact when working in extreme heat. The problems of photosensitisation or phototoxicity due to certain medication (e.g. doxycycline) must also be considered when exposed to sun light.

The following medication can have side effects relevant to heat:

- Amphetamines increase the metabolic needs;
- Anticholinergic medication, atropine and antihistamines inhibit perspiration;
- Beta-blocking agents may inhibit the maximum heart rate.
- Diuretics inhibit necessary expansion of body fluid volume;
- Muscle relaxants may cause postural hypotension;
- Tranquillisers, sedatives and central nervous system inhibitors (phenothiazines, tricyclic antidepressants, monoamine oxidase inhibitors and glutethamide) are all implicated in lower heat tolerance;
- Vasodilators cause a relaxing action on smooth muscles and decrease peripheral resistance as well as provoking a reflex increase in the heart rate;
- Anti-inflammatory analgesics which may have antipyretic properties, such as aspirin and non-steroid anti-inflammatory medication, may interfere with temperature regulation.

Acclimatisation of an individual is a major factor in preventing heat-related problems. Any person when exposed for the first time to heat will develop signs of strain, such as elevated body temperature, high pulse rate and sweating. But the body will, over a series of days spent working in the heat, make a series of adjustments. These adjustments, which include a decrease of body temperature and pulse rate, will occur after the person has worked in the heat for at least a week and for at least 2 hours per day. The amount of sweating may increase but the salt content of sweat is reduced.

After acclimatisation has taken place work in the heat can be performed without a major strain on the body. This allows a person to work more effectively under conditions that might have been intolerable before acclimatisation.

Useful acclimatisation can usually be achieved in 7 to 10 days.

Acclimatisation is gradually lost if the work in heat stops or is interrupted for long periods of time.

Good physical fitness improves one's ability to acclimatise. People in poor health usually have trouble acclimatising to the heat. This is a major reason for having a medical examination of all people who will be working in hot environments.

Extreme heat requires certain modifications to water and food intake.

Water

Lack of water replacement, or dehydration, is the major factor in most heat disorders. In normal conditions the body loses two and a half litres of body fluids a day. While performing strenuous work in the heat, the body can lose up to 1–1.5 litres of sweat per hour! This means that a great deal of body weight in the form of sweat can be lost within one day when doing strenuous work in the heat.

Any significant weight loss is a signal that the individual is not drinking enough fluids and is at risk of developing heat-related problems. Scheduled breaks, during which the person should drink water, are essential.

Acclimatisation

Water, Food and Salt Replacement

A 1–2 per cent loss of body weight is usually acceptable without any problems. Loss of 2–3 per cent of body weight reduces the volume of circulating blood, and may result in heat strain symptoms such as elevated body temperature and heart rate, thirst and severe heat discomfort. The loss of 3–6 per cent of body weight (1.5–4 kgs. in the average 70 kg. person) results in impaired work performance and further work under these conditions may lead to heat related health problems. Losses in body weight due to fluid loss of greater than 6 per cent may have serious medical consequences.

Production of small quantities of dark coloured urine is an early sign of a low water intake and dehydration. Dehydration will ultimately have the same effects on the body whether it occurs over one or several days.

The solution is simple. Drink at least enough water to replace the water that is lost through sweating and other losses (e.g. respiration, urine production, faeces). Ideally, fluids should be taken every twenty minutes throughout the day. Cool water is the ideal replacement fluid. People who sweat profusely must be encouraged to drink large amounts of water whether they are thirsty or not. Thirst is a poor indicator in preventing dehydration because by the time thirst is felt the problem already exists. *Drink regularly even if not thirsty.*

Food

Eat well-balanced meals at regular intervals.

Digestion of food requires water. Do not eat if you do not have water to drink. One can live without eating for many weeks, but one cannot live more than a few days without water.

Salt

The body requires a certain amount of salt to function correctly but *the routine use of salt tablets is not recommended*. Salt tablets cause stomach irritation, which may provoke nausea and vomiting. The habit of adding salt in water is not necessary.

It is important that employees who work in a high heat environment be encouraged to eat a normal diet from which they will find all of the necessary salt.

Employee Awareness, Education and Training

Employee awareness can be improved by education and training.

First Aid Training

First aid training should be given based on Annex 4, Modules 0 to 3 (source: E&P Forum report No. 6.30/190, *Health Management Guidelines for Remote Land-Based Geophysical Operations*).

In addition to routine first aid training, some training should be given on prevention and treatment of heat exposure, dehydration and ultraviolet radiation injury.

Employee education should also cover recognition of the effects of alcohol and substance abuse.

Acclimatisation to the heat can be facilitated by wearing the correct type of clothing.

Clothing

Clothing should be loose fitting, with a layer of air between skin and clothing to aid evaporation of perspiration. Clothes should be light in weight. It is also important for clothes to be light in colour as this reflects heat, while dark clothes absorb the heat.

Clothes made of thin cotton fabrics are ideal as they help evaporate the sweat by picking it up and bringing it to the surface. Most synthetic fibres increase sweating, interfere with evaporation and increase the risk of fungus infections.

Long trousers and a long sleeved shirt are recommended.

It is important that clothing is washed regularly to remove sweat and salt which can irritate the skin.

Head protection and protection of the ears, nose and back of the neck is necessary (e.g. wide brimmed hat).

Good quality sunglasses protect the eyes from ultra-violet radiation.

Comfortable shoes, which keep the sand out, should be worn. Avoid walking barefoot in the desert. Skin can easily be damaged or burned and there is an increased risk of snake and insect bites as well as fungus infection.

In some industrial settings it may be necessary for the worker to wear special protective equipment such as impermeable clothing. Impermeable clothing (e.g. acid suits, chemical suits or fire protection clothing) prohibits or diminishes heat loss via evaporation. The use of impermeable clothing, while intended to reduce the risk of injury, may in some cases increase personal risk for heat related health problems by impeding the body's ability to dissipate heat through the evaporation of sweat. Special working practices must apply to these employees.

Cooling devices may be recommended for certain types of work. Jackets or vests with refreezable gel-type packets only provide cooling for a short period of time. Cooling tubes using air or liquid cooling medium have the disadvantage of requiring tethering, although cooling is provided for extended periods of time. Liquids have a much greater heat capacity than air and therefore offer greater heat transfer efficiency.

Cooling devices represent a potential safety hazard and a proper assessment of their need and appropriateness should be carried out prior to the task to be performed.

Food and Water Hygiene

Normal hygiene and storage are required. Extra vigilance is necessary because as ambient temperatures or humidity increase, the risk of food and water deterioration increases. The quality of raw food must be guaranteed (cold chain) from its source, through transport and at its final destination.

Living Conditions at the Base or Camp

Excrement and Waste Disposal

The disposal of sewage and rubbish must be designed to protect the health of humans as well as the environment. A high ambient temperature

or humidity increases the risk of contamination from flies and other potential infectious agents.

Psychological Aspects

The following aspects may be exacerbated by the heat and may contribute to a lack of motivation and performance:

- substance abuse;
- boredom and problems due to isolation;
- living together in a group;
- inappropriate work/leave cycles;
- lack of recreational facilities; and
- lack of air-conditioned accommodation.

Conditions When Leaving the Base or Camp

This is the period of greatest risk. Weather conditions may change rapidly (e.g. sand storm, flash flooding). Be prepared for the worst.

Information—journey Management

Information is an integral part of health management. A correct journey management system should be in place. (See Annex 5; from E&P Forum Report No. 6.50/238 *Land Transport Safety Guidelines on Journey Management Planning*):

- Take along plenty of water.
- Never travel long distances alone or work alone.
- Stay in pairs. Each person looking after the well being of the other.
- A personnel accounting system must be organised with notification of departure and arrivals between locations.
- Travel with two vehicles is recommended.
- Know the terrain.
- Get the weather forecast.
- Have an emergency or evacuation plan.
- Have a remote communication system.

Transport

The transport should be equipped with a radio, extra food and water, clothing and a survival and first aid kit.

When travelling in the desert by car, carry an extra 10 litres of drinking water per person per day of planned travel. Bring food and warm clothing since ambient temperatures can drop abruptly at night.

A Module 1 First Aid kit should be carried in all transports. The contents of a Basic First Aid Kit can be found in Annex 6 (source: E&P Forum Report No.6.30/190, *Health Management Guidelines for Remote Land-based Geophysical Operations*).

Air conditioning in the transport should be available if appropriate.

Working Conditions

The following are general recommendations for managing and reducing heat exposure on the work site:

- Allow time for adequate heat acclimatisation. Acclimatisation may be lost if work in heat or humidity is stopped or interrupted for long periods of time.
- Enforce a schedule of frequent rest breaks and provision of abundant, cool drinking water or other non-alcoholic drinks. Avoid salt tablets.
- Use power tools where applicable and safe (hoists, cranes, lifting aids, etc.) to reduce the individual's physical workload.

- Use general ventilation, spot cooling or air conditioning to reduce temperature at the workplace and in the rest areas.
- Isolate, relocate, redesign or substitute equipment and/or processes in order to reduce thermal exposure at the work site. Use caution when handling objects left in the sun. Cover metal tools with thermal insulating materials.
- Where possible, move work indoors or to cooler areas. Shield work area from the dust and sun.
- Assign extra workers to very demanding and strenuous tasks.
- Design work-rest schedules in order to reduce heat exposure.
- Schedule the most physically demanding work for the coolest parts of the day.

HEALTH PROBLEMS DUE TO EXTREME HEAT AND HUMIDITY

General Recommendations in order to Prevent Heat-Related Health Problems

Prevention of all heat-related problems is based on:

- Medical screening of workers. Persons who are physically fit, with no pre-existing illness, acclimatise more quickly and become more heat tolerant.
- Progressive acclimatisation to the heat and humidity. This requires 7 to 10 days.
- Drinking plenty of fluids even when not thirsty.
- Eating well balanced meals at regular intervals.
- Sleeping or resting in a cool place

Transient Heat Fatigue

Transient heat fatigue is a heat-related effect that is more a behavioural than a physiological response to working in heat. The work performance of the employee declines especially where the task requires co-ordination, alertness, or vigilance. Generally these employees are unacclimatised. This results in an increased risk of accidents.

Heat Syncope

A heat related condition, where blood which would normally be circulated to the heart and brain tends to pool in the leg veins, thereby causing fainting. The veins lack tone when initially exposed to hot climates. Heat syncope is transient and will cease to occur within two weeks even without any effort to acclimatise.

Prevention: In addition to the general recommendations on preventing heat-related health problems it is recommended to walk about. The muscle pump effect on the leg veins discourages pooling.

Hyperthermia

Hyperthermia covers a spectrum which can go from heat cramps to heat exhaustion and finally to heat stroke. It is possible to differentiate the extremes of hyperthermia but there is no value in attempting to differentiate between exhaustion and stroke. The priority is rapid cooling and this will be beneficial regardless of where the casualty is on the spectrum.

The dangers of overemphasising the differentiation are that too much effort is put into replacing fluids or electrolytes and the casualty continues to heat up. As a consequence of the rise in body temperature the heat regulatory mechanisms may be damaged and the individual is put at increased risk of serious consequences including death. *Keep the patient cool.*

Heat Cramp

Heat cramp occurs after prolonged vigorous exercise especially in hot climates. There is a sudden onset of pain and cramps in the extremities. There may be nausea and hypotension and in some cases hyperventilation.

Treatment: Remove the casualty to a cool environment and give copious fluids with added glucose (sugar) if nausea is not present. If nausea or hypotension (dropping of blood pressure) is present it may be necessary to establish an intravenous infusion.

Heat Exhaustion

Heat exhaustion is a progression from heat cramp and it is a more severe condition. It is more likely in the dehydrated, the unfit, the elderly and those who have high blood pressure. It is caused by both salt and water loss.

Symptoms and signs: These include headache, fatigue, dizziness confusion, nausea and abdominal cramps. There may be syncope and collapse. Profuse sweating and a pale and clammy skin are often observed along with a weak and rapid pulse, hypotension and rapid breathing. The body temperature may be normal or elevated up to 39°C.

Treatment: Move the patient to a cool environment, commence rapid cooling by fanning, tepid sponging and possible immersion in lukewarm water. Administer copious fluids unless nausea is present in which case an intravenous infusion will need to be established.

Heat Hyperpyrexia or Heat Stroke

Heat hyperpyrexia or heat stroke is caused by exactly the same conditions as heat exhaustion. It begins as heat exhaustion, but when the body's system for losing heat is overwhelmed the core temperature rises rapidly and tissue damage occurs. This affects mainly the brain, kidneys and liver. The circulation collapses.

Symptoms and signs: These include headache, dizziness along with a dry mouth. The skin may be hot and flushed and may feel dry, although this is not a universal sign and should not be relied on. The body temperature may be very high, greater than 40°C. This should be taken with a rectal thermometer, preferably electronic. The pulse is strong and bounding initially but may then collapse. If the condition is not correctly managed convulsions, coma and death may result.

At this extreme of hyperthermia the condition of hyperpyrexia may occur. This is a medical emergency and exceedingly difficult to manage effectively in the field. This extreme heat condition has a mortality rate of 20 to 50 per cent depending upon the pre-existing health status of the victim.

Treatment: It is vital that rapid cooling be initiated as soon as possible. The preferred method is to moisten the skin and fan it. This is best achieved by lying the patient on their side or supported in the hands and knees position while the skin is sprayed with atomised water at a temperature of approximately 15°C. The patient should also be fanned with warm air. This method of cooling avoids the problem of peripheral vasoconstriction which can occur when ice or cooling baths are used. Oral fluids should be given if the patient is conscious but in most cases intravenous infusion will be required. Cardiac monitoring and additional biochemical monitoring are required and any convulsions (epileptic seizures) will require appropriate treatment.

Dehydration

Heat associated dehydration is caused by the loss of body fluids mainly through excessive sweating. Progressively, the body loses weight. The heart beat increases, there is reduced urine output along with dry mucous membranes (mouth) and increased thirst. Dehydration can provoke cramps in the legs and abdomen. When fluid loss surpasses 10 per cent of the body weight, problems in vision and hearing occur along with difficulty speaking. Eventually delirium, convulsions and coma may ensue. These are all symptoms and signs of the heat condition described above. Thirst is a poor indicator of the state of dehydration as dehydration has already occurred by the time the person becomes thirsty.

Muscle-Related Problems

Muscle Fatigue

As a consequence of vasodilatation a great deal of blood goes to the external skin surface and less blood is supplied to the active muscles. Strength declines and the onset of fatigue comes sooner than it would otherwise. Mental problems may appear such as reduced accuracy, comprehension and retention. Reduced physical performance and mental alertness may increase accident rates. These may also be compounded by other associated factors such as slippery palms, dizziness, the fogging of safety glasses and the possibility of burns from accidental contact with hot surfaces.

Muscular Spasms

A heat related illness characterised by painful muscular spasms of the voluntary muscles (mainly arms, hands, legs and feet) usually found in people who drink extremely large quantities of water but have some salt depletion. This condition is described as 'Stokers Cramps' or 'Foundry Workers Cramps' in some medical textbooks.

Treatment: Ample water along with increased salt intake which can be provided by food or non-alcoholic drink.

Skin-Related Problems

Skin problems are often due to excess sweating and salt excretion as well as irritation and rubbing of clothing which can produce minor cuts and abrasions.

Fungus Infections

Fungus infections, particularly under the arms and around the groin, are very common. They are due to increased sweating and ambient humidity as well as the sweat's acidic pH level (4–6.8).

Treatment: Antifungal powder and antifungal creams.

Prevention: Keep the skin clean and dry. Wash regularly and dry completely (particularly feet). Wash clothes regularly in order to remove sweat and salt.

Skin Infections

Skin infections develop rapidly on minor cuts and wounds.

Treatment: Disinfect all wounds and cuts.

Prevention: Keep skin and clothing clean. Wash clothing regularly.

Heat Rash

Heat rash, also known as prickly heat, is likely to occur in hot, humid environments where sweat is not easily evaporated from the skin. Sweat

ducts become plugged, the sweat glands inflamed and a rash appears. This rash is made up of profuse, tiny, raised red vesicles (blisters) on affected areas. This is accompanied by a prickling sensation during heat exposure.

Treatment: Mild drying lotions and skin cleanliness. 'Prickly heat soap'.

Prevention: Cool rest areas and sleeping quarters should be provided in order to allow the skin to dry between heat exposures. A shower should be taken regularly after each work shift. Avoid tightly fitting clothes.

Sunburn

Overexposure to the sun's ultraviolet radiation (UVB) will provoke skin damage ranging from redness (erythema) and tenderness to oedema and blistering along with systemic problems (e.g. fever).

Treatment: Cool shower, calamine lotion, non-sensitising after sun-cream, hydrocortisone cream. Avoid soap which can be painful and irritating.

Prevention: Sun-block, shirt, hat. The sun's radiation can penetrate through thin clothes, clouds and even shade by reflecting on a bright surface.

Windburn

Windburn provokes dry skin.

Treatment: First aid treatment requires the use of moisturisers on affected parts and pain relief with simple analgesics (pain killers) if necessary. Avoid soap which can be painful and irritating.

Prevention: Cover up exposed parts of the body (face) in windy conditions.

THE MEDICAL ORGANISATION IN EXTREME HEAT

A Module 3 or 4 medical kit (see Annex 6) should be provided for the base camp when a competent medical specialist is available.

The provision of adequate medical services relies on having:

- company approved medical professionals at each strategic location;
- effective communications with outside physicians (corporate, company approved specialists, telemedicine, etc.) to advise on difficult medical cases, treatment and actions to be taken;
- effective transport systems and management for evacuation of casualties and
- effective communications with relevant authorities/managers to expedite the latter.

In environments where extreme heat can be encountered, normal emergency care procedures are usually applicable. Careful consideration should be given to the problems of pressurised gases exposed to heat, sand infiltration of medical facilities or equipment and refrigeration and conservation of medication.

Further guidelines can be obtained through the E&P Forum report No. 6.30/190, *Health Management Guidelines for Remote Land-Based Geophysical Operations*.

ANNEX 1: HEAT STRESS INDICES

The most frequently used and most widely accepted index is the Wet Bulb Globe Temperature (WBGT). The value is in units degrees centigrade (°C) derived from the formula:

$$\text{WBGT} = 0.7 \text{ WB} + 0.3 \text{ GT (indoors) or}$$

$$\text{WBGT} = 0.7 \text{ WB} + 0.2 \text{ GT} + 0.1 \text{ DB (outdoors)}$$

Where:

WB is the wet bulb temperature (natural);

GT is the globe temperature (150 mm diameter); and

DB is the dry bulb.

The WBGT takes in to account radiant and air temperatures, humidity and low air velocities (below 1 metre per second). The original index was developed to reduce heat casualties in the USA during military training. It is now used as a basis for many standards including Threshold Limit Value (ACGIH) and ISO 7243. Although WBGT can be measured using separate modified thermometers it is more commonly obtained from an integrating meter, which conveniently combines the readings and displays the result of the calculation.

The WBGT is used to determine the exposure limits that will be safe for most people. These are generally conservative. It may be combined with other indices but is classically used by determining the WBGT and then comparing the reading with a reference table. This will then give a work-rest routine appropriate to the task. Below is an example for acclimatised workers.

WBGT and recommended work-rest regimes.

Workload			Work-rest routine (each hour)
Light	Medium	Heavy	
30.0	26.7	25.0	Continuous work
30.6	28.0	25.9	45 min. work/15 min. rest
31.4	29.4	27.9	30 min. work/30 min. rest
32.2	31.1	30.0	15 min. work/45 min. rest

It is necessary to adjust for clothing and other factors. Details of the WBGT and other Heat Stress Indices, their measurement and application, can be found in the references.

Example: If the WBGT = 28, a person performing a medium workload should rest for 15 minutes and work for 45 minutes.

Examples of Industry Activities

Light workload: sitting or standing; inspecting or monitoring hot processes; walking in easily accessible areas; very light assembly operation; light control operations (e.g. buttons, hand wheels).

Medium workload: carrying or stacking light items; operating heavy controls (e.g. opening valves); cleaning or clearing light debris, spillages etc.; walking in congested areas (e.g. limited head room); heavy welding.

Heavy workload: intense arm and trunk work; pushing or pulling heavily loaded cages or pallet trucks; heavy manual handling; clearing heavy debris.

Very heavy workload: very intense activities at fast to maximum pace (e.g. intense shovelling); heavy assembly or building work; climbing stairs or ladders rapidly.

N.B. Work in this category can rarely be sustained for long periods without a break.

References

American Conference of Governmental Industrial Hygienists (1994). *Threshold Limit Values for 1994–95*. ACGIH, Cincinnati.

British Occupational Hygiene Society (1990). *The Thermal Environment*. BOHS Technical Guide No. 8. Science Reviews, Leeds. ISBN 0-905927-38-9

International Organisation for Standardisation (1982) (revised 1989). *Hot Environments—Estimation of the Heat Stress on a Working Man, Based on the WBGT-Index*. International Standard ISO 7243.

ANNEX 2: CONTENTS OF A HEALTH ASSESSMENT

Taken from E&P Forum Report No. 6.46/228, *Health Assessment of Fitness to Work in the E&P Industry*.

A three-level modular system is recommended:

Level 1: A nurse based health assessment

Level 2: A physician based health assessment

Level 3: Additional investigations

For All Occupations

A health questionnaire should be completed by each individual and a basic clinical examination performed. This can be undertaken by a designated nurse working under the physician's supervision.

Level 1 Module:
Nurse-based Health Assessment

The Health Questionnaire

The health questionnaire should include:

- *Administrative information*
 - last name, first name, address, date of birth, sex; and
 - proposed occupation.
- *Medical information*
 - past medical and dental history;
 - occupational history;
 - family medical history;
 - current medical complaints;
 - known allergies;
 - current medication taken;
 - immunisations received (type, date of last booster); and
 - lifestyle (smoking, alcohol intake, exercise).

The Basic Clinical Examination

After review of the completed questionnaire the following should be noted:

- height;
- weight;
- blood pressure;
- pulse;
- visual acuity (eye chart); and
- urine analysis (dip stick urine test).

If any significant abnormalities are detected during the Level 1 module, the person should be referred to a Level 2 physician based health assessment. If any major lifestyle risks are identified appropriate advice could be given.

A Level 2 module should include a review of the Level 1 nurse-based health assessment, an interview and a physical examination as appropriate.

Level 2 Module:
Physician-based Health Assessment

Level 3 Module: Additional Investigations

A Level 2 module health assessment may be required:

- as a result of Level 1 findings;
- by the occupation involved;
- by the living and working environment;
- by legislation; and
- to meet industry standards.

Results of the physical examination and its consequences should be discussed with the individual. Significant abnormalities detected during the Level 2 physician's assessment may require Level 3 additional investigations.

A Level 3 health assessment may be required:

- as a result of Level 2 findings;
- by the occupation involved;
- by the living and working environment;
- by legislation; and
- to meet industry standards.

The above criteria will determine which of the following additional tests may be performed. This list is non-exhaustive.

Eye Testing

- colour vision;
- testing of visual fields, peripheral vision and visual depth;
- peripheral vision; and
- night vision (where applicable).

Hearing

- Audiometry

Laboratory Tests

- *Blood tests*
Type of blood tests to be performed depend on the above criteria. Testing for blood borne diseases should not be performed as part of a routine health assessment for fitness.
- *Urine analysis*
Further tests may be required if the initial dip-stick test results were abnormal.
- *Stool Analysis*
Analysis for blood, parasites, ova, cysts and pathogenic organisms in stools.

Radiological Investigations

- *Chest X-ray may be required if:*
 - Level 2 assessment is abnormal;
 - required by law;
 - required by industry standards;
 - required by exposure.

No other X-ray investigations should be considered as mandatory for basic health assessments unless required by law or industry standards.

Pulmonary-function Spirometry and/or Peak Flow may be required if:

- Level 2 assessment is abnormal;
- required by law;
- required by industry standards;
- required by exposure.

Electrocardiogram (ECG)

An ECG should not be mandatory for a basic health assessment. A resting ECG is not a predictive test but can be considered useful by the examining physician if clinically indicated. In case of cardiological problems, a specialist's advice is recommended.

Drug Testing

With reference to the E&P Forum document *Substance Abuse and Management Strategies* (Report No. 6.23/173, July 1991), drug testing should respect a chain of custody and include all or some of the following:

- amphetamines;
- barbiturates;
- benzodiazepines;
- cannabinoids;
- cocaine;
- methadone;
- methaqualone;
- opiates;
- phencyclidine;
- propoxyphene.

Alcohol Testing

Testing for chronic or acute alcohol intake can be performed through a breathalyser (breath alcohol concentration) or a blood test (blood alcohol concentration). Further guidance is available in the E&P Forum report *Substance Abuse and Management Strategies* (Report no. 6.23/173, July 1991).

Psychological Assessment

The examining physician may recommend, if indicated, a referral for psychological assessment.

Testing of Physical Fitness

The examining physician may recommend that an appropriate test of physical fitness be carried out.

The examining physician will determine if other tests are necessary.

ANNEX 3: FITNESS GUIDELINES

Taken from E&P Forum Report No. 6.30/190, *Health Management Guidelines for Remote Land-based Geophysical Operations*.

These guidelines should be considered as advisory only and should be applied by a physician knowledgeable of the local area.

Infectious Diseases

Active infectious disease must be treated before assignment. Catering staff require special examination to identify acute or chronic disease involving gastrointestinal tract, chest, ear, nose, throat and skin.

Malignant Neoplasms

Each case should be considered individually and the natural history and prognosis of the neoplasm taken into account. The progress and likelihood of complications of the disease and the availability of treatment on site must be carefully evaluated.

Diseases of the Digestive System

- Dental caries, abscess or severe gum disease should be treated before assignment. Dentures or other orthodontic appliances should be well fitting and functional.
- History of digestive disorders causing severe or recurrent symptoms requiring special diet or medication, e.g. oesophagitis, gastritis, cholelithiasis, inflammatory or parasitic bowel disease, is unacceptable¹ until satisfactorily treated and reassessed.
- Acute gastric erosion may be considered following healing, demonstrated by endoscopy, with absence of symptoms.
- Proven active peptic ulceration is unacceptable.¹ Where there is a part history of peptic ulceration a person may be acceptable provided that the examining physician is satisfied that the risk of complications is reduced to an absolute minimum by successful surgery or the use of appropriate medication. Healing is normally assessed by endoscopy.
- Diaphragmatic hernia is only unacceptable.¹ if disabling symptoms are present.
- Hernia is unacceptable.¹ until satisfactorily surgically repaired.
- Haemorrhoids, fistulae and fissures causing intractable pain, or frequent recurrent bleeding, are unacceptable¹, unless treated. Abscesses and fistulae are unacceptable.¹
- A person with a stoma is unacceptable.¹

Diseases of Liver and Pancreas

- Chronic or recurring pancreatitis is unacceptable.¹
- Diseases of the liver are unacceptable¹ where the condition is serious or progressive and/or where complications such as oesophageal varices, or ascites, are present. This includes chronic active Hepatitis B. Asymptomatic Hepatitis B carriers may be acceptable.

¹ When used in this Annex the term *unacceptable* means the presence of the condition under circumstances whereby the condition would cause the person to be a safety or health hazard to him or herself or to others, where the conditions cannot be controlled by the measures as described in this document.

Cardiovascular System

The cardiovascular system should be free from acute or chronic disease.

- *Congenital heart disease*
If this is unassociated with symptoms or haemodynamically significant change it is acceptable.
- *Valvular heart disease*
 - If there is significant haemodynamic change it is unacceptable.¹
 - An individual who has undergone successful cardiac surgery for valvular or congenital heart disease may be fit for assignment in remote areas if free of all symptoms and off all therapy. If otherwise, then cardiac review is needed. Individuals in this group may require more frequent assessment.
- *Ischaemic heart disease*
Myocardial insufficiency (e.g. uncontrolled angina), is unacceptable.¹
- *Myocardial infarction*
Normally a past history of myocardial infarction is unacceptable.¹ After an infarct, it is likely that medical assessment for work in remote areas will be inappropriate for a least one year. Specialised cardiac opinion should be obtained in all cases.
- *Coronary bypass surgery (CABS) and angioplasty*
Individuals who have undergone these procedures must have their cardiac fitness proven before return to work. A cardiological opinion is essential, and will be appropriate not earlier than six months after the event. This assessment must include submaximal exercise testing. Individuals with cardiac transplants are not acceptable.
- *Cardiac arrhythmias*
If these produce symptoms, or are associated with haemodynamic abnormality, then expert cardiac opinion is recommended.
- *Cardiomyopathy*
These individuals are unacceptable.¹
- *Cardiac enlargement*
Fitness will depend on the underlying cause.
- *Pacemakers*
The subject of pacemakers is highly specialised and acceptability to work in remote areas must include assessment of:
 - the underlying condition and indication for insertion;
 - the type of pacemaker;
 - the effect of the seismic environment on the unit (i.e. radioactivity, explosives, cold, heat, etc.); and
 - the risk of physical damage to the unit.

¹ When used in this Annex the term *unacceptable* means the presence of the condition under circumstances whereby the condition would cause the person to be a safety or health hazard to him or herself or to others, where the conditions cannot be controlled by the measures as described in this document.

Hypertension

As a general rule, hypertension is acceptable provided it is uncomplicated and well controlled by treatment.

Peripheral Circulation

The following conditions are unacceptable¹:

- current or recent history of thrombophlebitis or phlebothrombosis with or without embolisation;
- varicose veins associated with varicose eczema, ulcers or other complications; and
- arteriosclerotic or other vascular disease with evidence of circulatory embarrassment, e.g. intermittent claudication, or aneurysm.

Pulmonary Circulation

- A history of more than one pulmonary embolism is unacceptable.¹ A single episode requires careful assessment.

Cerebro-vascular Disorders

- Any cerebro-vascular accident including history of transient ischaemic attack or evidence of general cerebral arteriosclerosis, including dementia, is unacceptable.¹

Diseases of the Blood or Blood Forming Organs

There should not be any significant disease of the haemopoietic system and the following are unacceptable¹ for working in remote areas:

- anaemias until investigated and successfully resolved;
- leukaemia, polycythemia and disorders of the reticulo endothelial system unless in long term remission;
- haemorrhagic disorders;
- any other disease of blood forming organs which may adversely affect performance or safety;
- individuals with immuno suppression are unacceptable¹; and
- splenectomy (generally unacceptable).¹

Mental Disorders

Care is necessary when assessing an individual during remission from one or more episodes of mental illness. An established medical history or clinical indication of any of the following is unacceptable¹ for working in remote areas:

- personality disorders characterised by anti-social behaviour;
- psychoses;
- phobias;
- chronic anxiety states and recurrent depression;
- alcohol abuse; and
- drug abuse.

Diseases of The Nervous System and Sense Organs

- Organic nervous disease causing, or likely to cause, any significant defect of intellect, muscular power, balance, mobility, vision, sensation or coordination is unacceptable.¹

¹ When used in this Annex the term *unacceptable* means the presence of the condition under circumstances whereby the condition would cause the person to be a safety or health hazard to him or herself or to others, where the conditions cannot be controlled by the measures as described in this document.

- Established medical history with current diagnosis of epilepsy of any type, or disturbance of consciousness is unacceptable.¹ Any other convulsive disorder, disturbance of consciousness or neurological condition likely to render the individual unable to perform duties safely is also unacceptable.¹ This category includes epileptiform seizure following episodic drinking or tranquilliser withdrawal, or those which are stroboscopically induced (e.g. by the flicker of helicopter blades).
- Established history of migraine which does not interfere with the individual's ability to work efficiently and safely is acceptable.

Musculo-skeletal System

- There must be no deformity, or amputation of body or limb, which significantly reduces mobility, interferes with performance of duties, or prevents compliance with all evacuation procedures. An upper limb prosthesis may be acceptable providing the above criteria can be met.
- Acute chronic or recurrent disease of peripheral nerves, muscles, bones or joints significantly affecting mobility, balance, coordination or ability to perform normal duties, or installation evacuation procedures, or survival training is unacceptable.¹

Skin

The skin should be healthy, without evidence of clinical disease.

- Any skin condition likely to be aggravated or triggered by items in the environment is unacceptable.¹

Endocrine and Metabolic Disorders

- Adequately controlled thyroid disease may be acceptable but, in all cases, thyroid disorders require careful assessment.
- Uncomplicated stable diabetes mellitus treated by diet alone (or diet and an oral hypoglycaemic agent), and satisfactorily controlled, may be acceptable but will require more frequent assessment. Insulin dependence is unacceptable.¹
- Individuals suffering from other endocrine disorders such as Addison's disease, Cushing's syndrome, acromegaly, diabetes insipidus and hypoglycaemia, either functional or due to pancreatic or adrenal pathology, are unlikely to be acceptable for remote areas but should be individually considered and carefully assessed.
- All cases of gross obesity require individual assessment. Those in whom exercise tolerance, mobility, general health, or personal hygiene are adversely affected are unacceptable.¹ As a general rule, those in whom the Body Mass Index exceeds 35 will probably be unacceptable.¹
- Well-controlled gout may be acceptable.

Genito-urinary System

- The presence of renal, ureteric or vesical calculi is generally unacceptable.¹ Recurrent renal colic without demonstrable calculi requires careful assessment. Successful treatment by surgery or lithotripsy may be acceptable;
- Recurring urinary infections are unacceptable¹ until investigated and treated.

¹ When used in this Annex the term *unacceptable* means the presence of the condition under circumstances whereby the condition would cause the person to be a safety or health hazard to him or herself or to others, where the conditions cannot be controlled by the measures as described in this document.

- Any renal disease which could lead to acute renal failure, i.e. nephritis, nephrosis, is unacceptable.¹ Polycystic disease, hydronephrosis or unilateral nephrectomy with disease in the remaining kidney, is unacceptable¹ unless otherwise indicated by a nephrologist.
- Renal transplant is unacceptable.¹
- Enuresis or incontinence, recent or active, is unacceptable.¹
- Prostatitis is unacceptable.¹ Prostatic hypertrophy, or urethral stricture interfering with adequate bladder evacuation is unacceptable.¹
- Gynaecological disorders, such as menorrhagia, disabling dysmenorrhoea, pelvic inflammatory disease or prolapse, are unacceptable.¹
- Hydrocoeles, or painful conditions of the testicles, require careful assessment.
- Sexually transmitted disease should be treated. A diagnosis of HIV positive need not debar from assignment. Such employees should receive regular surveillance.
- Pregnancy should be carefully evaluated with regard to the personal history and risk assessment. In general, the risks would be unacceptable.¹

Respiratory System

- A history of spontaneous pneumothorax is generally unacceptable¹, except for a single episode without recurrence for one year, or after a successful surgical procedure.
- Obstructive airways disease, such as chronic bronchitis, emphysema, and any other pulmonary disease causing significant disability or recurring illness, such as bronchiectasis, is unacceptable.¹
- Restrictive or fibrotic pulmonary disease resulting in significant symptoms or disability is unacceptable.¹
- Open pulmonary tuberculosis is unacceptable¹ until treatment is concluded and the attending physician has certified that the patient is no longer infectious.
- A history of asthma requiring frequent or recurrent medication including oral steroids requires careful assessment.

Ear, Nose and Throat

- *Ear*
 - Active otitis externa (acute or chronic) requires treatment.
 - Disorders of the tympanic membrane (e.g. dry perforations and grommets) and the middle ear require further assessment. Chronic middle ear disease is unacceptable¹ until treated.
 - Intractable inner ear disorders with severe motion sickness, vertigo, etc. (e.g. Meniere's disease) are probably unacceptable.¹
 - A functional hearing loss sufficient to interfere with communications or to impede safety (e.g. inability to hear audible warning devices) is unacceptable.¹ Intrinsically safe hearing aids may be worn, but the examinees should not be dependent on such an aid to hear a safety warning. Measurement of auditory acuity is best performed by screening audiometry.

¹ When used in this Annex the term *unacceptable* means the presence of the condition under circumstances whereby the condition would cause the person to be a safety or health hazard to him or herself or to others, where the conditions cannot be controlled by the measures as described in this document.

- *Nose*
Chronically infected sinuses, or frequently recurring sinusitis are generally unacceptable.¹
- *Throat*
Chronically infected tonsils or frequently recurring tonsillitis require careful assessment.

Eyes

- Any eye disease or visual defect rendering, or likely to render, the applicant incapable of carrying out job duties efficiently and safely, is unacceptable.¹ A history of conditions such as glaucoma, uveitis, require specialised assessment.
- A monocular individual is acceptable provided the job functions can be performed efficiently and safely.
- Colour perception should be adequate for the particular type of assignment to be undertaken.

Medicines

Individuals being treated with certain medicines require careful consideration:

- Individuals on anticoagulants, cytotoxic agents, insulin, anticonvulsants, immunosuppressants, and oral steroids.
- Individuals on psychotropic medications, e.g. tranquillisers, antidepressants, narcotics, hypnotics. A previous history of such treatment will also require further consideration.
- Any employee in possession of medications must report these to the Module 4 or 5 employee. The individual must ensure an adequate supply to last longer than the normal tour of duty. A change in dosage should also be reported.
- Any previous adverse drug reaction must be brought to the attention of the Module 4 or 5 employee.

Catering Crew

Food handling and hygiene are of paramount importance.

Before assignment, and regularly thereafter, the following procedures may be followed in the case of anyone handling, or likely to handle food:

- Thorough clinical examination of potential communicable disease sites, e.g., skin, ears, upper respiratory tract and gastro-intestinal tract.
- Chest X-ray in the preassignment medical examination will be required only on clinical indication. The individual's medical history, clinical examination findings or current medical practice will determine the need for further chest X-rays.

Additional investigation may be required if the employee has been absent due to infectious disease.

¹ When used in this Annex the term *unacceptable* means the presence of the condition under circumstances whereby the condition would cause the person to be a safety or health hazard to him or herself or to others, where the conditions cannot be controlled by the measures as described in this document.

ANNEX 4: HEALTH RISK MANAGEMENT

Taken from E&P Forum Report No. 6.30/190, *Health Management*

Guidelines for Remote Land-based Geophysical Operations.

● *Description of Modules*

Modules 0–3: Non-professional personnel (personnel trained in first aid procedures)

Module 4: In-field doctor or nurse

Module 5: Doctor

Training requirements and professional standards for each Module are provided below:

■ **Module 0**

All staff.

The induction training given to all personnel by local contractor staff should include instruction on camp hygiene as well as what to do and who to contact in the event of an injury.

■ **Module 1**

Personnel trained in Basic Lifesaving Action. viz:

Cardio-Pulmonary Resuscitation (CPR) and the control of external bleeding;

Training should be given by a competent First Aid Instructor to remote team leaders, deputies and could be offered to other personnel.

■ **Module 2**

First aiders. Training requirements:

First Aid Course. The course should be of adequate length to properly cover the following curriculum:

- resuscitation;
- control of bleeding;
- management of the unconscious patient;
- treatment of shock;
- treatment of hypothermia and heat stroke;
- treatment of immersion;
- treatment of injuries;
- treatment of burns and scalds and inhalation of hot gases and fumes;
- personal hygiene in dealing with wounds;
- dressing and immobilisation of injured parts; and
- description and use of Module 2 first aid kit.

Training should be by certified First Aid Instructor and refreshed at regular intervals.

■ **Module 3**

Personnel trained in Advanced First Aid.

An Advanced First Aider first aid course to include additional training to a Module 2 person, such as food hygiene, and administration of certain drugs under supervision.

Training should be by certified instructors in the relevant disciplines and should be refreshed at regular intervals.

■ Module 4

This position can be held by a registered doctor or qualified nurse who is familiar with Modules 1 to 3 and fulfils the following stipulations:

Doctor: Preferably at least 5 years postgraduate experience required. Should never be newly qualified. Must have experience in accident and emergency, tropical medicine and occupational health. The doctor should have good administrative and communication skills, and be familiar with all available medical facilities adjacent to the operating area that could be used for medical referral. The doctor's qualification and experience should be professionally assessed.

Nurse (Certified registered nurse): Should preferably have had previous experience in isolated situations working single handed. Should have had recent practical refresher training to include accident and emergency. Should have direct reporting and accessibility to Module 4 or 5 doctor. The nurse's qualifications and experience should be professionally assessed.

■ Module 5

Medical adviser who must be familiar with all aspects of Modules 1 to 4, have good accident and emergency experience, have an understanding of occupational health and a knowledge of specific diseases local to the operating area. The doctor should have good administrative and communication skills, and be familiar with all available medical facilities adjacent to the operating area that could be used for medical referral. The doctor would be the medical coordinator and professional supervisor of that country or area, and be responsible for treatment procedures and any prophylactic measures required for local staff.

The doctor could be full-time or part-time as necessary, and could be employed either by Company or Contractor.

If three or more Module 4 persons are utilized, then one Module 5 doctor would be required.

● Equipment

It is the responsibility of Contractor local management, with guidance from the relevant medical personnel, to ensure the necessary equipment is in place, and that it is kept clean and where appropriate in a sterile condition. The supply of the appropriate medical equipment as defined in these guidelines is the responsibility of the Contractor and should be included in the contract document.

The equipment listed in Appendix 6 should be available for each modular trained individual.

Sufficient number of kits should be provided for all Module 1 and 2 persons to have immediate access. A number 3 Module person should have reasonable access to Module 3 equipment. It is the responsibility of the module individuals through their line management to ensure kits are kept secure and up-to-date, and that storage facilities are suitable for the contents.

ANNEX 5: JOURNEY MANAGEMENT PLANNING

Taken from E&P Forum Report No. 6.50/238, *Land Transport Safety Guidelines*

Journey Management Objectives

- to assure the health and safety of all travellers and reduce risk exposure;
- to challenge the need for unnecessary journeys and to undertake only the minimum number of journeys necessary;
- to maximise the efficiency of each journey;
- to avoid or minimise the effect of all identified hazards likely to be encountered;
- to be able to recover in a timely manner from any incident;
- to monitor journey performance; and
- to ensure that drivers are fully aware of journey plans and any hazards.

Journey Planning

Once the need for a journey has been established then aspects of journey management should be introduced which will assist in reducing the risk of an incident. Systems need to be in place for:

- selecting appropriate vehicle for the task—maximise payload carried to minimise number of journeys;
- establishing and controlling maximum speeds;
- controlling duty hours and rest periods;
- establishing standard journey times;
- implementing optimum time for travel and driver shift patterns;
- route identification and planning, avoiding high risk areas where possible (poor road surface, delay situations, urban congestion);
- setting designated routes for certain categories of vehicles (height, width, length, weight, cargo);
- provision of auxiliary equipment, e.g. tow chains, shovels, ice chains, survival kits, extra wheels, extra fuel, vehicle parts (lamps, fuses, filters, fan belts, radios, emergency flares, emergency locator beacons);
- checking survival kit contents, e.g. to verify that they are the correct type for the season and sufficient for the number of travellers;
- checking that sufficient fuel is provided for the journey, allowing for detours or long stretches of slow speeds and that fuel is available *en route*;
- checking that correct maps and, where appropriate, compasses or Global Satellite Positioning System (GPS) units are carried;
- the provision of communication systems in the vehicle (e.g. mobile phones or radios etc.);
- establishing agreed stopover points *en route* and reporting status back to base at regular intervals;
- authorising and recording deviations from the planned route;
- designating contact points for advising base, both *en route* and at end of journey;
- recording the journey details, times, locations to be visited and number of people travelling;
- the driver to maintain a log of the journey details;
- emergency response and provision of resources for search and rescue;
- recording of travellers with special skills e.g. first aid, survival training, recovery training;
- awareness of special health hazards associated with the region where vehicles will transit;
- avoiding roadworks; and
- implementing changes due to weather conditions.

ANNEX 6: MEDICAL AND FIRST AID EQUIPMENT

Taken from E&P Forum Report No. 6.30/190, *Health Management Guidelines for Remote Land-based Geophysical Operations*

The contents of each kit should be professionally reviewed to an appropriate level.

Module 0

None required

Module 1

Basic first aid kit plus C.P.R. mask and gloves, i.e.:

- guidance card;
- individually wrapped sterile adhesive dressings;
- sterile eye pads with attachment;
- sterile triangular bandages;
- safety pins;
- medium sterile unmedicated dressings;
- large sterile unmedicated dressings;
- extra large sterile unmedicated dressings; and
- alcohol free cleansing wipes.

Module 2

The Module 2 first aid kit should include:

- guidance leaflet;
- adhesive dressings (assorted);
- sterile eye pads;
- various sterile dressings;
- sterile triangular bandages;
- butterfly closures;
- crepe bandages (6");
- elastic adhesive bandages (4");
- various Band-Aids™;
- surgical scissors;
- splints (inflatable or vacuum plus cervical collar);
- thermometer (digital);
- a clinical low reading thermometer²;
- forceps;
- burns packet;
- antiseptic solution;
- burn blanket;
- hypothermia bag;
- paracetamol;
- rehydration sachets;
- eye antiseptic;
- antihistamine;
- antacid;
- antiseptic skin cream;
- sterile gloves;
- mouth ointment;
- C.P.R. mask and gloves;
- tweezers²;
- total sun block/lip balm²;
- water purification tablets²;

Module 3

Content to be as Module 2 plus the addition of as much of the following items in which the user is competently trained or certified to administer:

- suture set;
- sphygmomanometer;
- stethoscope;
- oro-pharyngeal airway;
- intramuscular injection needles and syringes;
- laxative;
- cough pastilles;
- antidiarrheal medication;
- metronidazole;
- eye antiseptic;
- suppositories for haemorrhoids;
- antispasmodics³;
- doxycycline³;
- curative anti-malarial tablets³;
- 1% Hydrocortisone (topical)³;
- throat lozenges;
- anti fungal preparation (topical);
- ear drops;
- xylocaine 1% (no adrenalin)³;
- potent analgesic³;
- antiemetic³;
- broad spectrum antibiotics²;
- manufacturers' prescribing information must be available in the pack.

Module 4

Content to include complete Module 3 set plus:

- intravenous giving sets and fluids;
- cut down set;
- endotracheal set;
- laryngoscope;
- ambubag or doctors resuscitation kit; and
- supply of pharmaceuticals as agreed with contractor's medical officer or Module 5 person.

The quantities would depend on whether in the field or the base camp. At base camp, one may consider a cardiovascular emergency kit, anti-shock kit, and a resuscitator.

If anti-snake venom is provided, the Module 4 person must be fully trained and experienced in its use and its dangers. Only the appropriate anti-venom(s) for that area should be provided.

² These items are in addition to the first aid kit referenced in E&P Forum Report No. 6.30/190

³ The Module 3 person should contact a Module 4 or 5 person prior to use.



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