# NERC GUIDANCE NOTE: A SAFE SYSTEM OF FIELDWORK

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*'it is better to be a live donkey than a dead lion'*

Sir Ernest Shackleton's comment to his wife
on having turned back only 97 miles from the South Pole in 1909

Author : D T Aldiss BGS

## Purpose

This document provides guidance and instruction to enable NERC staff and people working with them to undertake geological, geochemical, geophysical or hydrogeological fieldwork in the United Kingdom (including offshore islands, inland waters and coastal waters) without unacceptable risk to their health and safety. Although originally aimed specifically at geological fieldwork, extra material has been added which makes it relevant for all fieldwork in NERC.

For guidance on fieldwork overseas consult the NERC Working Overseas Procedure.

Separate instructions are provided by NERC and its Research Centres for work in some specific environments, such as landfill sites, contaminated ground and for work on board boats and ships. Additional or alternative advice may also be required in areas outside the United Kingdom.

Additional guidance will also be required for fieldwork in such places as military areas, airfields, motorways, racetracks, mineral workings, and working railways. Such guidance should be sought from the relevant controlling authority when permission for access is obtained: it is not provided by NERC.

This document is complementary to other sources of health and safety information including NERC Health and Safety Procedures, and the Risk Assessments prepared within individual fieldwork projects. These documents are complementary to each other and should be used together (Figure 1). Reference to other documents is made at appropriate points in the text, and a list of information sources given in Section 9.

This document is concerned with risk avoidance and mitigation; that is, reducing risk to an acceptable level, not with risk *elimination*, which is not achievable.

This document is intended to provide *information* and *guidance*. Unless stated otherwise, the guidance described here is a matter of joint responsibility: individuals are responsible for observing it and managers are responsible for ensuring that it is observed. Nevertheless, when in the field, it remains a matter of individual judgement as to which guidance is most relevant and the extent to which it must be followed. **The objective is always to take reasonable care in following safe working practice: this Safe System of Fieldwork is only a means to this end.**

## SUMMARY OF INSTRUCTIONS FOR SAFE FIELDWORK IN THE UK

**Section 1**

- *Take note of the information and advice in relevant sections of this Guidance Note and other documents to which it refers. If you do not understand what you read, or disagree with it, tell your Project Leader.*
- *Get appropriate training. Know how to use a map and compass.*
- *Take care of yourself and others around you.*

**Section 2**

- *Find out the particular risks of your work and plan for them.*

**Section 3**

- *Always be suitably clad and equipped for the local terrain and the possible weather extremes which could occur there.*
- *Get the protective clothing and safety equipment you need for your work, and use it properly.*

- *Always carry a small first aid kit (or have one readily available) and know how to use it.*

**Section 4**

- *Do not do fieldwork unless you are in good health.*
- *Maintain your tetanus coverage.*

**Section 5**

- *Always ensure that someone knows, or can easily find out, where you are working and when you are expected to return.*
- *Carry your official pass.*

**Section 6**

- *Know how to do basic first aid, including resuscitation.*
- *Know the international distress signals.*
- *Report accidents and illnesses.*

**Section 7**

- *Be aware of likely hazards in your particular working environment.*
- *Always move carefully over the ground.*
- *Take precautions against possible health and injury hazards.*
- *Do not concentrate on your work to the exclusion of hazard awareness.*
- *Do not let pressures of work over-ride your sense of self-preservation.*
- *Take no unnecessary risks.*

## CONTENTS

# 1 INTRODUCTION

This document is based on the collective experience of many past and present NERC staff. It is intended to serve the best interests of individual staff members by helping them remain healthy, uninjured and alive, and of NERC by helping to maintain an efficient workforce.

All NERC staff are covered by the provisions of the Health and Safety at Work Act 1974. The Act recognises that some risk is inherent in some occupations and seeks to provide means of limiting the risks to an acceptable level. It does this partly by requiring employers to prepare, issue and follow Codes of Practice on safe methods of working, and to update these codes from time to time as necessary. In NERC these take the form of Guidance Notes, of which this document is one. These are one of the three main elements of NERC health and safety documentation (Figure 1).

Responsibilities for health and safety within NERC management, staff and administration are set out formally in the 'NERC Safety Policy' which is posted on the NERC Extranet and is reviewed annually. Further policies cascade down from this overarching one and cover details of safety management arrangements at all NERC sites. In addition to any corporate responsibilities, all employees have a duty of care: to act responsibly and reasonably to protect the health and safety of themselves and others.

The small number of accidents and injuries which actually occur during fieldwork is a tribute to the skills and good judgement of NERC fieldworkers. This Safe System of Fieldwork is intended to assist the continued practice of those skills and to inform that judgement.

**Before undertaking fieldwork in the UK, NERC staff must have been given a copy of:**

- the current version of this Safe System of Fieldwork,
- significant findings of Risk Assessments (Section 2.2) relevant to their work,
- copies of other necessary guidance documents.

**They must have:**

- acknowledged receipt of these documents in writing or by e-mail to their Project Leader or Programme Manager,
- read and understood relevant parts of this Safe System of Fieldwork and other documents to which it refers,
- been given an opportunity to seek clarification of any relevant matter.

**Staff should take the Safe System of Fieldwork and other necessary documents to the field area for reference purposes. It is permissible and desirable to carry only relevant sections of the document; summaries in specific risk assessments for specific field projects are sensible.**

Project Leaders and Programme Managers in charge of fieldwork which includes lone working (Section 5) should also have a copy of the NERC Guidance Note for the Management of Lone Working, read and understood it, and acted on its relevant advice. Indeed, it is likely that all lone fieldworkers will find this document a useful source of guidance.

- This Safe System of Fieldwork is maintained by the Department Heads responsible for fieldworkers in the UK(or their delegates) and a copy is also held by the Local Health and Safety Adviser. A digital version is held on the NERC Extranet.
- Risk Assessments are prepared by the Project Leader for each project involving fieldwork. Copies are held by the corresponding Programme Manager (or a delegate) and by the Local Health and Safety Adviser.
- Copies of NERC Health and Safety documents can be obtained from the Local Health and Safety Adviser, and digital versions can be viewed on the NERC Extranet.

The NERC Health and Safety Adviser can be identified from the NERC Extranet. If a NERC fieldworker does not understand any relevant part of this documentation, believes it to be inaccurate or incomplete or otherwise disagrees with its provisions, they must draw this to the attention of their Project Leader or Programme Manager, or the Local

Health and Safety Adviser; there is a legal requirement for them to do so under the Management of Health & Safety at Work Regulation 1999.

If a NERC fieldworker feels that their Project Leader or some other colleague is not correctly meeting their responsibilities with regard to health and safety, they should discuss the matter with the person concerned. If the issue cannot then be resolved satisfactorily, it should be brought to the attention of the next level of management, to the relevant Department Head or the Local Health and Safety Adviser.

In compiling this 'Safe System of Fieldwork' it is assumed that NERC staff who undertake fieldwork have some experience of fieldwork or of analogous activities, for example recreational walking. It is expected that all NERC fieldworkers know how to use a map and compass for navigation.

If you feel that your own prior experience is inadequate to allow you to undertake your allocated work in safety, inform your line management who will arrange necessary training. (Note that in this context, 'experience' need have little to do with the age of the individual or the length of their employment by NERC). Project Leaders should assess individual abilities in identifying and handling health and safety issues during fieldwork, together with individual needs for extra training or supervision. Currently available health and safety training courses are listed on the NERC Extranet. If you have additional needs, discuss these with your Project Leader or with the Training Section. Fieldworkers are strongly recommended to seek appropriate first aid training; this will be a formal requirement for some field projects as identified in the risk assessment.

It is increasingly likely that NERC staff will do fieldwork with people from outside the organisation, including voluntary workers and casual workers. If such people are working under the supervision of NERC staff, they should be treated as NERC staff for health and safety purposes, and their corresponding obligations must be explained to them. Suitable training and safety equipment must be provided if required. Special provisions apply to people under the age of 18 (such as 'work experience' students). Consult your Programme Manager, the Local Health and Safety Adviser and Personnel before allowing minors to do fieldwork under your supervision.

If other people are working alongside NERC staff but under separate management, they should have their own health and safety procedures. In these circumstances, there is a duty for nominated competent representatives to co-ordinate and co-operate on health and safety guidance. It is important to establish areas of responsibility and to agree safe working practices before fieldwork starts. These will usually then be kept in a NERC Project Health and Safety File. Arrangements and responsibilities must be established in writing where multiple employers/management occurs to satisfy the requirements of Regulation 11 of the 'Management of health & Safety at Work Regulations'. It may be necessary for NERC staff to demonstrate the operation of their Safe Systems of Work in order to undertake commercial work, but these provisions also apply in the case of non-commercial collaboration, for example when working with university staff.

Some NERC staff will do work under the control of other organisations. They will then normally be governed by the health and safety regime in operation at the work site and must act accordingly, except in cases where NERC Health and Safety Guidance would provide a better level of safety cover. NERC staff should ensure that they have seen and had an opportunity to clarify relevant parts of the project risk assessment and other relevant documentation before work commences on site. If there is a contradiction between the provisions of the local systems and relevant NERC systems seek clarification before proceeding.

The duty of care extends to people in fieldwork parties, which in addition to professional scientists, engineers and the like may include students, members of amateur societies or members of the public attending on a voluntary basis. A Code of Conduct for leading fieldwork parties is set out in NERC Staff Notice 5/93.

In any case, anyone working with or accompanying NERC staff should be discouraged from any action which adversely influences their own health and safety or that of others.

# 2 PROJECT HEALTH AND SAFETY MANAGEMENT

## 2.1 Project Health and Safety Planning

Fieldwork must be planned so that it can be carried out in a safe manner, with appropriate and sufficient safety equipment. Fieldworkers must be thoroughly acquainted with all relevant safety aspects of the planned work.

The Project Leader must complete a Project Health and Safety Plan before work commences. Where appropriate a Project Health and Safety File is also produced. Forms and guidance to assist the completion of these documents are available on the local Intranet or from your local Health and Safety Adviser.

Some safety information is acquired by fieldworkers only when they visit landowners or farm managers to arrange access (for example, information on crop spraying activities, shooting, presence of dangerous animals, and so forth). Some projects allow too little time for systematic 'accessing', and this can increase the risk faced by fieldworkers. Project planning must take this into account. It is recognised that full advance risk assessment is difficult for field projects because the exact nature of hazards may not be clear. The important point is that these local factors are considered, even if this can only be done on arrival at the field site; lessons learnt from these on the spot assessments should then be fed into future risk assessments.

In some cases, it will be useful or necessary to prepare a Health and Safety Plan **before** tendering for commercial work in order to fully assess the cost implications of performing the work safely. In any case, when tendering for work, beware of undertaking contractual obligations which might require anyone to work without adequate provisions for health and safety.

## 2.2 Risk Assessment

Every project must be covered by an appropriate Risk Assessment. This is carried out by the Project Leader or a delegate, and is approved by the relevant Programme Manager and checked by the the local Health and Safety Adviser. Staff carrying out a Risk Assessment should be competent to do so, and should preferably have received appropriate training. Copies of the Risk Assessment are held by the Project Leader, the Programme Manager and the local Health and Safety Adviser. The significant findings of the Risk Assessment should be communicated to each member of the field team, including anyone who is not part ofNERC.

If people from outside NERC will do fieldwork on the project, the Risk Assessment should consider whether this could increase the risk in any way and what action should be taken as a consequence.

If the project plan allows insufficient time for systematic 'accessing', or knowledge of the field site is incomplete, the Risk Assessment should take account of any consequent increase in the risks faced by fieldworkers (Section 2.1).

For further information see the NERC Procedure on Risk Assessment and the Guidance Note for the Management of Lone Working (June 1993).

Note that Risk Assessments must be reviewed on a regular basis (at least annually) and following an incident.

# 3 SAFETY EQUIPMENT AND PROTECTIVE CLOTHING

## 3.1 General comments

Each fieldworker must be equipped with clothing which is suitable and fit for purpose, bearing in mind the nature of the work and the probable weather conditions (Section 7.11). They should be prepared to counter the effects of exposure if incapacitated or marooned by flood, tide or darkness. Project Leaders should ensure that their team members are adequately equipped. If a team member is not adequately equipped, they should rectify this, or draw it to the attention of the Project Leader in good time.

Field clothing and safety equipment should be maintained in sound condition. It should fit correctly the person for whom it is intended. Advice on the selection and use of some protective clothing is given in 'Safety on Mountains' (Section 9).

Checklists of protective clothing, safety equipment and chargeable consumable items are given in NERC Guidance Note 'Field Equipment' and NERC Guidance Note 'First Aid Kit Checklist'. The purchase cost of suitable and appropriate protective clothing will be refunded by NERC within reasonable limits. Each fieldworker will be provided with the safety equipment required for their work, either from NERC Stores or by special purchase. A specific case for the supply of the more expensive or less frequently used items may be required in writing. Fieldworkers are strongly recommended to carry a mobile telephone or other device for distant communication (Section 3.2) and specific risk assessments may require this

In addition, fieldworkers should take with them an adequate supply of the following, bearing in mind the duration and type of fieldwork:

- food and drink for normal use,
- water for washing, or cleansing wipes, or both,
- high sustenance food as an aid to survival in emergencies.

Note that hot drinks can be beneficial, especially in cold conditions. In some cases, it may be appropriate to carry a drinking vessel and water purification tablets during fieldwork. Any surface water should be assumed to be contaminated: even water in fast-flowing mountain streams may contain harmful bacteria or other organisms such as liver fluke. Bear in mind that water sterilisation tablets will not purify water contaminated by non-living matter, such as lead, nitrate or pesticide.

In some exceptional circumstances it may be useful to have matches (in waterproof container) or a small cigarette lighter, in order to light a fire for warmth or for signalling. Extreme care must be taken to keep such fires under control (Section 3.2).

## 3.2 Devices for distant communication

In many cases, the increased risks of lone working can be adequately offset by carrying one or more devices for distant communication. If you have not been provided with such a device, and you feel you need one, tell your Project Leader, Programme Manager or the local Health and Safety Adviser. If you intend to carry any such device during fieldwork, make sure other team members know how you can be contacted.

The advantages and limitations of various devices for distant communications are discussed further in the NERC Guidance Note: Devices for Distant Communication. These include:

- Mobile telephone (Section 3.4)
- Two-way radio, including CB radio
- Satellite phones
- Emergency beacon
- Assault alarm

- Personal location markers, such as the 'Skystreme' kite
- Signal flares
- Signal fires. To be used only if really essential AND if there is no risk of the fire spreading. Note that fires are prohibited by the Country Code and by many organisations such as the Forestry Commission and National Park authorities. Individuals who start fires will be held responsible for any damage which results.

In addition to these portable devices, remember that the BT public telephone network is a useful standby for when you have no mobile telephone, or for when it is not working.

## 3.3 Use of safety equipment and protective clothing

Where it is provided, **the fieldworker must become familiar with the use of safety equipment (including personal protective equipment and protective clothing) before commencing fieldwork**. Where instructions are provided by the manufacturer these must be read carefully before first use. The fieldworker must seek additional guidance, clarification or training if required.

Safety equipment remains the property of NERC: it is not available for private use. It is the responsibility of the fieldworker to ensure that the equipment is maintained in good, functioning condition. Any loss or defect must be rectified or reported to the Project Leader or the local Health and Safety Adviser promptly.

The battery condition of equipment such as radios, mobile telephones, GPS units, torches, etc. should be checked before leaving for the field. Spare batteries, or the means of recharging them, should be taken.

The 'use-by' date of hard hats and items in the first-aid kit should be checked at the start of each field season.

The use of a hard hat and boots with protective toecaps, usually together with high visibility clothing, is mandatory at most construction sites, on drilling rigs and in active workings (Section 7.2). Otherwise, the use of the equipment is generally at the discretion of the fieldworker: if in doubt, use it.

Hard hats fit best when worn without any intervening material. If a hard hat is worn over a balaclava helmet, rain hood, scarf, or similar garment, then a chin strap should be used. A chin-strap should also be used if working in windy conditions.

Safety equipment which is likely to be required during fieldwork must be kept available in the field area so that it can be used without delay as the need arises.

The following items should be carried during fieldwork:

- high-visibility waistcoat or jacket,
- protective gloves,
- safety goggles,
- compass,
- whistle,
- small first aid kit
- Other items where provided for safety purposes, such as:
    - mobile telephone,
    - personal assault alarm,
    - portable radio communicator,
    - dog repeller

  (These items should be kept close to hand, not packed deep within a rucksack, for example).
- Other items where necessary, such as:
    - safety helmet (with chin strap if required)
    - ear defenders,
    - torch,
    - signal flares,
    - safety blanket/survival bag,
    - maps or aerial photographs

It is usually sufficient to keep the rest of the safety equipment in the vehicle used for field transport until it is specifically required.

Traditionally fieldworkers tend to use a rucksack or daybag to carry their equipment, including health and safety equipment. Increasingly, however, fieldworkers find it more convenient to use smaller bags and pouches which can be worn on a belt, perhaps together with a hammer sling and so forth. This arrangement enables all the less bulky items of equipment to be kept at hand at all times, and so is highly recommended. However, with the possible exception of small items (such as pen knives), equipment should not be carried on a belt which is also used to secure clothing: in case of entanglement with vegetation, fencing, machinery, etc., or to be able to move more quickly in an emergency, it should be possible to take off a belt used to carry equipment easily and quickly.

It is strongly recommended that all fieldworkers attend at least a basic first aid course, including training in basic resuscitation techniques and the use of the 'recovery' position.

Ear defenders may be needed when working in proximity to machinery or aircraft. However, bear in mind that if you use ear defenders you will possibly not be able to hear otherwise audible warnings of danger and so appropriate precautions must be taken.

If an assault alarm is used, observe sensible precautions to prevent potential damage to your own and other people's hearing.

## 3.4 Use of mobile telephones

Mobile telephones should normally be left switched on, if carried during fieldwork. In some instances, a colleague or a landowner, for example, will need to make contact with you during fieldwork, perhaps to arrange a meeting or to give a warning of a possible hazard. It is good professional practice to be available. However, if there is no opportunity to recharge the mobile telephone battery as required (as when working from a field camp, for example), telephone use should be restricted to providing safety cover. In particular, transmission should then be kept to a minimum. Daily call-in or listening schedules should be arranged.

Care must be taken to avoid stowing mobile telephones so that the buttons can be pressed accidentally: particular care must be taken to avoid unintentional '999' calls. Most mobile telephone keypads can be locked, but if necessary a phone with a hard cover or carrying case should be used.

Do not use mobile phones while driving (NERC Management of Road Risk Procedure) or while you are doing anything else where interference with your concentration could compromise safety.

Note that mobile phones emit low-energy radiation. It is not known for certain whether such radiation can be harmful or not: current Government advice is to adopt a 'precautionary approach' to the use of mobile phones. You can choose to minimise your exposure to mobile phone radiation by keeping your calls short, and using phones with relatively low SAR (specific absorption rate) values. The effectiveness of hands-free kits in reducing SAR is still uncertain. For further information contact the Department of Health, or the National Radiological Protection Board.

Some mobile telephones are liable to poor reception in some areas. If you find that this is a problem, bear in mind that another network might give better reception. Get local advice.

Mobile telephones are tempting targets for theft. To reduce the risk of having your phone stolen:

- Avoid using the phone in the street
- Keep it out of sight as much as possible
- Where feasible, use 'vibrate' rather than 'ring'

To mitigate the impact of its loss:

- Use the PIN to lock it
- Enable 'prevent new SIM' option, if your phone provides one
- Record the IMEI number

Most mobile telephones can be uniquely identified by their IMEI serial number. This is generally printed under the battery, and can also be revealed by dialing *#06#. Record this number and be prepared to provide it to the Police and to your service provider if your telephone is lost or stolen.

# 4 PERSONAL FITNESS FOR FIELDWORK

Individuals must consider whether they are physically and medically fit for the intended fieldwork, bearing in mind both routine work and foreseeable emergencies which may impose additional physical and mental burdens. If they think that a problem might arise in safely carrying out the work they have been asked to do, they should inform their Project Leader or Programme Manager promptly. Medical checks can be arranged through the NERC Occupational Health Schemes by contacting NERC or local Personnel Administration or the Local Health and Safety Adviser, in confidence if preferred.

Project leaders should check that their team members feel themselves to be sufficiently fit for the planned fieldwork, and discuss any reasonable modifications to the project plan, intended field techniques or health and safety provisions that might be appropriate. This is particularly important before a worker starts fieldwork in a new area. Note that it is not intended to disqualify a person from fieldwork unless there is clearly no alternative, but to mitigate any increased risk which might follow from that person's physical condition.

It is recommended that fieldworkers carry a card (or other record) with any personal health details relevant to emergency treatment following an accident. These might include comments on disabilities, chronic conditions, known allergies, blood group, or current medication, for example.

Keep your coverage against tetanus up-to-date (Section 7.12.2). If your fieldwork is likely to bring you into contact with contaminated water or contaminated ground, seek medical advice on the advisability of immunisation against other diseases, such as hepatitis.

Do not take part in fieldwork unless you are in good health. While it may be tempting to 'struggle on' when an illness (even an apparently minor one) develops during fieldwork, this is generally counter-productive. Be cautious about driving home from the field area when ill: take extra rest breaks. If in doubt over your ability to drive safely, make alternative arrangements: get a lift with a colleague or use public transport. Consider asking your line manager to send a driver out to collect you or the car.

In general, if you experience any unusual rashes, pains, or shortness of breath, or if you have an injury which you cannot treat adequately by yourself, desist from any activity which might exacerbate it and seek medical advice at the earliest opportunity (Section 6). NHS medical centres close to the field area should accept you as an emergency patient. Alternatively, attend a hospital Accident and Emergency clinic.

If an illness is or might be work-related, report it through the local accident reporting system. Certain injuries and illnesses have to be reported to the Health and Safety Executive.

Any level of intoxication by alcohol or by other substances will tend to impair your co-ordination and judgement and so from the health and safety point of view must be regarded as incompatible with fieldwork. In addition, alcohol consumption can increase the risk of exposure and promote dehydration.

# 5 LONE WORKING

## 5.1 General observations

'Employees may work alone provided that the employer has made a full Risk Assessment of the situation and is satisfied that a reasonably practicable safe system of work is being employed to ensure their health and safety'. 'Lone workers should not be exposed to a significantly greater risk than employees who work together' (NERC Guidance Note for the Management of Lone Working, June 1993). **The universal, essential requirement of lone working is to ensure that always someone knows, or can easily find out, where you are working and when you are expected to return.**

For most people, simply being alone does not in itself present a risk. However, many risks are significantly exacerbated by lone working. This is either because something is more likely to happen to a lone worker (assault being the most obvious example) or because something becomes more serious when there is no immediate help (for example, an immobilising injury).

In many cases, the increased risks of lone working can be adequately offset by carrying one or more devices for distant communication (Section 3.2). If you have not been provided with such a device, and you feel you need one, tell your Project Leader, Programme Manager or your Local Health and Safety Adviser. If you intend to carry any such device during fieldwork, make sure other team members know how you can be contacted.

Project leaders and team members (if necessary in discussion with Programme Managers) must consider whether the increased risks presented by lone working in a particular area are unacceptable or are likely to become so. If an unacceptable risk is thought to be faced by a person working alone, an alternative system of work must be devised. The work must be done in a different way or at a different time, with different equipment, or by more than one person.

In some circumstances, sufficient safety cover can be provided within a field party of two or more working in proximity, particularly if they are provided with some means of distant communication (Section 3.2). Members of such field parties should make contact with each other at pre-arranged intervals so as to lessen the period without help following an accident. This is in addition to any requirement to report safe return to a monitoring centre (Section 5.2).

If you need to work with a companion, arrange this with your Project Leader. If you are accompanied by another person for safety reasons, you must satisfy yourself that they are aware of the work to be done, the potential risks involved, and action to be taken in case of an incident. You are as responsible for the safety of a companion as they are for yours.

If no suitable NERC staff are available to provide field safety cover, then employment of a casual worker can be considered. Anyone employing a casual worker must satisfy themselves that the candidate is fully competent and sufficiently fit to meet the requirements of the work. The same health and safety provisions are applicable to casual employees as to NERC staff, including any need for training and equipment. Prior approval to employ a casual worker must be obtained from the Project Leader or Programme Manager.

Further general guidance on working alone is given in HSE leaflet 'Working Alone in Safety' (March 1998).

## 5.2 Ensuring 'safe return'

Some fieldworkers, either lone or accompanied, may find themselves unable to return to safety because of an accident or marooning by flood, tide, or darkness. In some circumstances they may be unable to seek help for themselves. The 'Safe Return' procedures are intended to ensure that they then receive assistance as promptly as possible. These procedures will also help ensure that any searchers can deploy their resources most effectively. **Fieldworkers must be familiar with any local procedures before setting out.**

To facilitate searches, it is required that fieldworkers leave a dated note or map at their office or lodgings describing their intended daily whereabouts, probable route and expected time of return. Details of their vehicle should also be

left, as should a description of its likely location and the part of the vehicle where further details will be left (see next paragraph). This information should be left where it can easily be found.

Fieldwork plans may change during the day, or searchers may not be able to gain access to a fieldworker's lodgings. Therefore, a dated note or map should also be left in the field vehicle describing the intended whereabouts and duration of work. For security reasons this information should not usually be left on view: people initiating a search must be prepared to break into the vehicle. It is therefore best to leave such details in the body of the car (not locked in the boot), preferably in sight (in the passenger door pocket, for example) but with any details hidden from view (Section 7.8.1).

Fieldworkers must also leave comprehensive contact details with all relevant people: always including the Programme Manager, Project Leader and other team members (if any), and where appropriate including family members and host at field lodgings. Also provide written instructions on alert procedures if you become overdue.

Note that no procedure for ensuring safe return should depend on the host at a fieldworker's lodgings to raise the alarm. Nevertheless, field accommodation will inevitably be checked in case of alarm over a fieldworker's whereabouts, so contact details should be left with the host or in a conspicuous place at the lodgings.

Similarly, family members should not be required to be part of a safe return monitoring system. They should, however, be provided with the means of enquiring after the safe return of a fieldworker.

Fieldworkers should carry an official pass, or some other means of identification.

# 6 ACTIONS IN CASE OF EMERGENCY

Further discussion of this topic is given in 'Safety on Mountains' and 'Mountaincraft and Leadership' (Section 9).

## 6.1 Immediate actions in the field

If there is an accident in the field or on a journey, or if a fieldworker is taken ill:

1. Make the situation safe, as far as possible.

2. Apply First Aid, if required. (Consult your First Aid Manual. Fieldworkers are strongly recommended to seek appropriate First Aid training).

3. Summon help, if required (Section 6.2).

Consider danger to yourself as well as to the casualty; do not make yourself another casualty. If there is any possibility of spinal injury do not move the casualty, unless there is immediate danger to life. If the casualty is unconscious, follow recommended First Aid procedures.

Record and report to hospital or doctor all possible information about the accident or illness, the casualty's condition and any changes seen, and any treatment given.

If the emergency services are not required, it may still be wise for the casualty to seek medical attention before returning home. Local doctor's surgeries should accept non-registered patients on an emergency basis. Failing this, attend the nearest hospital Accident and Emergency Department. If you have any doubt about your ability to drive yourself safely, call a colleague, an ambulance or a taxi.

If there is any potential for further accidents report it immediately to the site Safety Officer In any case, report the incident promptly (Section 6.3).

## 6.2 Emergency assistance and distress signals

In an emergency, summon help by dialling '999'. As well as the Fire and Rescue, Police, and Ambulance services, this will serve to put you in contact with the Coastguard, and teams for mountain rescue, cave rescue, and mine rescue.

Make contact with the Coastguard if you are on the coastline or tidal waters, and with the Police if elsewhere on land or non-tidal waters. The Coastguard or Police will if necessary call out services such as the Lifeboat, mountain rescue team, or search-and-rescue helicopters. Be prepared to guide the rescue party to your position.

In an emergency you may need to make contact with search-and-rescue parties who are looking for you. The Mountain Distress Signal is:

> Six shouts, or whistle blasts, or torch flashes in quick succession... pause for one minute … repeat.

Do not continue until exhausted. If you become fatigued, rest for a while before repeating.

The answer will be 3 whistle blasts, shouts or torch flashes, followed by 3 more after an interval of a minute; this signal will be repeated several times. This signal should not be given by rescuers until those in distress have been precisely located.

These signals may be supplemented by flares.

## 6.3 Accident Reporting

Report all accidents promptly to your line management. All accidents must be recorded in the local accident reporting system as soon as possible afterwards. If cases of ill health are related to a work activity these should also be entered into the Accident Book. In some cases, NERC will have a legal requirement to report the accident immediately to the Health and Safety Executive. If a colleague has suffered serious injury or has died, also tell NERC Personnel Administration as soon as possible.

Staff should report 'near-misses', that is accidents which didn't actually cause an injury but showed a potential for more serious consequences, especially those which could inform modifications to current best practice. 'Incidents', damage to property without effects on people, should also be recorded.

When reporting an accident, the following information will be required:

1. Name and address of casualty (or in the case of a 'near-miss', who was at risk)
2. Time, date and place where accident or illness occurred.
3. How accident occurred.
4. Injuries or illness sustained.
5. Time worked by casualty on day of accident.
6. Name and addresses of witnesses.
7. Hospital treatment, if any; which hospital; and was casualty detained.
8. Damage to equipment.
9. Name of person reporting the accident.
10. Date and method of reporting.
11. Assessment of actions required to prevent occurrence.

Further information is provided in the NERC 'Accident Reporting and Investigation' Procedure.

Project Leaders must ensure that relevant Risk Assessments are reviewed after an accident or significant 'near-miss'.

# 7 RISK AVOIDANCE

*Hazard: something with the potential to cause harm.*

*Risk: likelihood that the harm from a particular hazard will be realised.*

This section lists the perceived hazards which are likely to be encountered during fieldwork in the United Kingdom, and provides guidance on how the consequent risk can be avoided or mitigated. In all cases, individual judgement and care are required in identifying and avoiding risks.

Note that one's judgement and co-ordination can be impaired when hungry (i.e. when blood sugar levels are low), tired, cold, or anxious. Recall that conscious care should be exercised particularly when these factors may act in combination, as at the end of a day of winter fieldwork, for example.

This section does not necessarily describe every type of hazard that will be encountered during fieldwork. Some other hazards are discussed in the NERC Guidance Note for the Management of Lone Working, together with appropriate action to be taken.

## 7.1 Hazards associated with the terrain

- Always move carefully over the ground, especially where it is uneven, rocky or vegetation-covered, avoiding loose boulders, burrows etc.
- Never run down screes or steep hills
- Take care not to dislodge loose rocks or other objects. If you do start a boulder rolling, shout a warning.
- Beware of potentially soft or slippery ground.
- Only climb a fence or dry-stone wall when absolutely necessary - use a stile or gate wherever possible.
- Beware of decrepit walls or fences.

Further information is given in publications such as British Mountaineering Council's booklet 'Safety on Mountains' and the Mountain Leader Training Board's handbook 'Mountaincraft and Leadership'.

See also Section 7.13.1.

### 7.1.1 Mountains and moorlands

All staff working in such areas should be conversant with the British Mountaineering Council's booklet 'Safety on Mountains', especially the pages which summarise safety precautions and deal with accident procedures and first aid. The Mountain Leader Training Board's handbook 'Mountaincraft and Leadership' also includes useful information.

Take particular note of local weather forecasts.

Avoid solo fieldwork where the terrain is particularly difficult or remote, especially in winter or when adverse weather conditions are expected.

- Wear good clothing, including windproof and waterproof garments.
- Carry a reserve of warm clothing (including head gear) and high sustenance food.
- Avoid getting overtired. Do not go too long without energy-giving foods.
- If any member of a party is becoming tired, cold and wet, the group should go down into a more sheltered area.
- Always carry a survival bag. In winter, also carry a sleeping bag. If you are immobilised for any reason, put on all spare clothing and use your survival bag without delay.
- Know how to summon aid by distress signals outlined in Section 6.2.

### 7.1.2 Cliffs or quarry faces

See also Section 7.2.

Where work has to be carried out below rock faces or other steep slopes, always wear a hard hat or climbing helmet. Always take care not to dislodge loose rocks or other objects, unless it is essential to make such material safe. Then do so only if you can see that its entire path of fall is clear.

In quarries, whenever feasible work in pairs with one person acting as a lookout. When working beneath sea cliffs take care not to be cut off by a rising tide. Do not work alone in intertidal areas (Section 7.1.6).

Beware of loose material which may be liable to fall from cliffs or quarry faces, especially during a thaw or after heavy rain (Section 7.1.3). It has been known for significant falls of rock from cliffs to be caused by birds.

Do not attempt to climb rock faces or steep or dangerous slopes if alone, and take no risks on ledges. If you need to gain access to a rock face, use a ladder (in which case the base must be secured) or a mechanical platform (such as a 'cherry-picker'), where feasible. It is then advisable to wear a helmet with a chin-strap. Do not use any machinery not specifically designed to carry people (such as the bucket of a mechanical excavator) to gain access to steep faces. However, an excavator might be used to build an access ramp, if practical.

If climbing is really essential, it should be carried out with at least one companion. All members of the climbing party should be properly trained in the use of ropes and safe climbing techniques, including proper belaying procedures, and at least one member of the party must be an experienced rock climber. You are responsible for ensuring that any equipment is in full working order. Prior approval from the Project Leader and from the relevant Programme Manager must be obtained for any work requiring the use of ropes, safety harnesses and the like. It is expected that such climbing will very rarely be needed.

### 7.1.3 Landslips

Treat landslips of all types with caution, especially after periods of heavy rain or if the landslip has been disturbed by excavation or increased loading. Look for evidence of very recent movement, such as displaced vegetation or breaks in the soil surface. Some landslips can enclose relatively deep pools of water or soft mud. Keep away from the top of the back-scar.

Avoid working under sea cliffs after periods of heavy rain.

### 7.1.4 Woods and forests

Difficulty of movement and limited visibility are the main safety hazards of woods and forests. Consequently, it is easier to become lost, and if you do have an accident, it may be difficult to find you. Try to keep your position continually in mind. If you do become lost, backtracking is generally more helpful than carrying on in the hope that things will improve. If you are using a GPS unit, ensure that it is already tracking satellites before you enter woodland.

Bear in mind that work in woods and forests is commonly more tiring than elsewhere, and that traverses may take longer than on open ground. At dusk, woodland interiors can become dark surprisingly quickly. Plan your work accordingly.

Try to avoid areas where growth is dense; it may obscure the nature of the ground and any obstructions or holes. Old mineshafts and worked out veins are particularly hazardous if obscured by undergrowth. Rocks and fallen trees in forests commonly bear a covering of moss and are slippery when wet. Fallen timber may be unstable or too weak to bear your weight. Screes in forests should be avoided whenever practicable. If climbing steep slopes, take great care not to rely on vegetation for support; it may not be as firmly fixed as you hope. Watch for overhanging branches. Note that small branches can become effectively invisible when they pass within the limit of focus in peripheral vision. Beware of whiplash by branches, especially if accompanied.

Be alert to the possibility of fire when working in woodland or heathland, especially during the summer. Take note of local warnings. Be prepared to move quickly to a safe area at the first sign of danger. It is recommended not to smoke in forested areas, and particularly not at times of high fire risk, or as decreed by local forestry regulations. Take care not to leave anything that might start a fire - glass for example.

Keep clear of logging activities, or areas where other forestry work is underway. Do not climb on or crawl under felled timber.

Do not park your vehicle so as to block tracks or fire breaks. Do not climb forest observation towers or shooting platforms unless you are accompanied. Never do so if there is any sign that such towers have not been maintained in good order.

### 7.1.5 Bogs, swamps, mires and marshes

Do not attempt to cross a bog of any type, unless it is unavoidable. Never do so if alone. If it is essential to cross a bog, probe ahead with a pole or auger. Try to keep to the drier upstanding parts, preferably to any tussocks of grassy plants, and avoid continuous carpets of sphagnum or peaty mud and other unvegetated areas.

Areas where a raft of vegetation overlies water are particularly dangerous; they may be distinguished by their undulating movement when you walk on them (See also Section 7.3.3).

If you find yourself sinking:

- immediately lie flat on your back,
- call for assistance,
- keep calm,
- if possible free your legs and feet to the horizontal

If you are carrying a survival bag or other inflatable object try to inflate it to give you buoyancy. Even a plastic bag or waterproof garment may be used to trap air and so provide limited support. Still lying flat, move back in the direction of your approach using any tussocks for support.

If you become marooned try to get behind some vegetation for shelter from the wind, put on spare clothing and use a survival bag.

Take extra precautions during prolonged spells of hot dry weather when fire becomes a potential hazard, even in bogs.

### 7.1.6 Coastlines

Including rocky coasts, estuaries, mudflats and salt marshes. See also Section 7.1.7.

Do not work alone in intertidal areas. Work only against a falling tide. Careful preparation is important before you undertake work in these areas which are, in general, very exposed and can be extremely cold.

If working close to the open sea, especially on a rocky coast and particularly on one exposed to ocean waves, remember that some individual waves (‘freak waves’) can be significantly larger than the average at a given time. Such waves can sweep a person into deep water very suddenly.

### 7.1.7 Rivers, lakes, reservoirs and other water courses

The ability to swim is not a guarantee of safety if you fall into water. If you are working close to the water’s edge, do not work alone. Consider using self-inflating buoyancy aids (‘life-jackets’). Note that self-inflating life-jackets must be worn outside **all** layers of clothing, and must **not** be worn under a rucksack harness.

Be aware of risks of exposure. You may need extra protective and warm clothing. You may need wet suits or survival suits, depending upon the season and on local circumstances.

Prior approval from the Project Leader and from the relevant Programme Manager must be obtained for any work requiring the use of boats. If you need to use small boats or inflatables consult experts in SAMS (Oban) or NMFD (Southampton) who may be contacted direct or through corporate Health & Safety in Swindon Office. Training

courses are available for Small Boat Handling and for Sea Survival. These are strongly recommended where relevant to fieldworkers. Every boat crew must include at least one person who has received training in Small Boat Handling or who is otherwise held to be competent. Expertise for work on larger boats is available in BAS or NMFD (Southampton) who may be contacted direct or through corporate Health & Safety in Swindon Office.

Be aware of possible health risks from contaminated water, especially in streams, drains, ditches and ponds on intensively farmed land and on industrial sites. Although many links with ill-health remain unproven, all contact with water possibly polluted by pesticides, fertilisers or animal dip chemicals should be avoided. If you work in water or in wet areas, take the precautions against zoonotic infections outlined in Section 7.12.

Any surface water should be assumed to be contaminated for drinking purposes. Even water in fast-flowing mountain streams may contain harmful bacteria and other organisms such as liver fluke. Bear in mind that water sterilisation tablets will not purify water contaminated by non-living matter, such as lead, nitrate or pesticide.

If you do need to enter water, do so very cautiously. If you cannot see the bottom, test the depth first. If you are alone, do not enter water which is more than knee-deep.

River margins below water level can present unseen hazards; they may be steep-sided or consist of soft deep mud with concealed rubbish, broken bottles, scrap metal etc. Take care when wading, or when boarding or leaving small boats. Keep your boots on (take your socks off if you want to keep them dry, but put your boots back on). If you have gaiters, put them on too. Remove baggy clothing such as overtrousers. Keep your rucksack on but release your waist belt.

If you are working in a watercourse, consider using a wet-suit or waders. Be extremely careful when using waders, especially if you are not used to them: you might be tempted to enter deeper, faster-flowing water than otherwise, where the size of the waders may make it difficult to keep to your feet. If you do fall over, you may find it difficult to stand up again. Use a wading pole to steady yourself. Dress warmly inside waders, even in summer.

Look out for deep pools under steep banks, on the outside of river bends and around obstacles. Keep out of water with standing waves if it is more than knee-deep. If you really need to cross a river, choose your line first. It is generally best to cross between bends rather than at bends, and where the river widens or divides. Use gravel shoals where possible. It is generally easier to go diagonally downstream rather than straight across. Face upstream or with your back half-turned in the direction you want to go: the current will then tend to push you in that direction. Use a wading pole placed upstream to steady yourself. Proceed by a series of sideways steps or shuffles, moving only one foot or the pole at a time. Do not cross your legs.

Methods of using a rope to safeguard a river crossing are described in ‘Mountaincraft and Leadership’.

## 7.2 Hazards associated with worked ground

### 7.2.1 Large excavations

These include quarries, opencast workings, sand, gravel and clay pits, and civil engineering excavations.

Always announce your arrival **and** departure to the person in charge. Managers and owners are responsible for the safety of workers and visitors; this applies equally to working and disused quarries and pits, unless they have been specifically abandoned. You are legally obliged to comply with local management instructions on safety whilst in the area for which they are responsible. You must take account of any specific local hazards and danger warning procedures and be aware of normal blasting times. If you are not told, ask for this information. Be suspicious of periods when everything becomes quiet during normal working hours. Respond promptly to warnings by leaving the danger area, which normally includes the entire quarry. Do not be tempted to linger ‘just to finish the job’.

Some site operators require visitors to sign an indemnity form. However, it seems that such forms do not actually affect the liability of either party. Fieldworkers may therefore sign such forms if required to do so, but should nevertheless append the words ‘For and on behalf of the Natural Environment Research Council’ after their signature.

Whilst within excavations you must wear a hard hat and footwear with protective toe caps. High visibility clothing is recommended although not mandatory unless it is a local safety requirement. Wherever feasible work in pairs, with one person acting as a lookout.

Approach the top of excavations with extreme caution: if possible, inspect quarry faces for instability from below first. Avoid loose or unstable rock faces and spoil heaps and take care not to dislodge loose stones or other objects. Avoid steep recently cut or blasted faces. Particular care is needed after wet weather or frost. Note that blasting may cause rock in other parts of the quarry to become unstable. Avoid any wires, etc., which might protrude from piles of blasted rock: there is a chance that they remain attached to unexploded charges. Keep away from quarry buildings, machinery, explosives, vehicles, cables and other services wherever possible. Moving vehicles must always be given priority. Assume that drivers and machine operators are unaware of your presence unless you have clear evidence to the contrary.

Keep away from flooded areas. Depressions are likely to collect loose unconsolidated materials which, if covered by water, can be very hazardous. Likewise, keep away from settling ponds and washery tailings which can look deceptively firm, but which may be soft under a dried crust.

In sand and gravel pits, beware of steep slopes in unconsolidated material. Slopes in clay pits can be very soft and can become unstable, particularly following wet weather.

In disused pits, beware of uncompacted rubbish, slurry or other farm waste. This may be covered in vegetation: do not attempt to force your way through thick vegetation in the bottom of old pits. Do not jump down the side of old pits (See Section 7.3).

Do not attempt to climb rock faces or steep or dangerous slopes if alone, and take no risks on ledges. If you need to gain access to a rock face, use a ladder (in which case the base must be secured) or a mechanical platform (such as a ‘cherry-picker’), where feasible. It is then advisable to wear a helmet with a chin-strap. Do not use any machinery not specifically designed to carry people (such as the bucket of a mechanical excavator) to gain access to steep faces. However, an excavator might be used to build an access ramp, if practical. Only climb rock faces if you are accompanied, properly trained and equipped for it, and are using appropriate rock climbing safety procedures (See Section 7.1.2).

### 7.2.2 Trenches

Never enter a trench or pit without testing for carbon dioxide ($CO_2$).

Trenches constitute a special hazard because of their inherent instability. The excavation, support, maintenance and safety of trenches is strictly governed by law but avoidable injuries still happen. Where they are over 1.2 m deep, the sides **must** be adequately supported. You may only enter them with the specific permission of the person in charge and never when you are alone. You must wear a hard hat and footwear with protective toe-caps.

Guidance on the construction and use of trial pits up to 4 m deep and about 1 m wide can be obtained from NERC. Deeper pits should be excavated by a specialist contractor.

### 7.2.3 Wells, boreholes and shafts

Always treat the surface around shafts, wells and boreholes with caution; the original excavated area may be covered by materials that decay with time, or the cover may not be properly supported. Furthermore, it is possible that pumping over a period from a poorly-constructed well or borehole which abstracts water from, say, a sand aquifer, may excavate a cavity at depth which will make the surface dangerously unstable.

Never enter wells, wellhead sumps, basements that contain a well or borehole, sampling or inspection pits without first testing for gas. Carry out testing continuously while you are working in such environments, because a fall in atmospheric pressure while you are working will allow gas (especially carbon dioxide or foul air) to discharge from the well or borehole. Other, heavier-than-air, dangerous gases from internal combustion engines working on the surface nearby, and from spills of petrol and diesel, can collect in these low places.

Use authorised flame safety lamps or gas detection apparatus to carry out the tests, which must also be made below the working level. Never use a naked light if you suspect explosive gas such as methane. Do not lower the detector on a nylon line because of the risk of generating static electricity in an explosive atmosphere.

It is extremely rarely necessary to enter shafts, wells, or boreholes during the course of fieldwork. Prior approval from the Project Leader and from the relevant Programme Manager must be obtained for such work.
You can enter wellhead sumps wearing breathing apparatus connected to an airline that extends some distance from the wellhead. You must be properly trained in the use of the breathing apparatus beforehand.

For further details, refer to 'Safety in wells and boreholes', published by the Institution of Civil Engineers.

### 7.2.4 Mines, adits, tunnels and caves

It is not usually necessary to go underground during the course of fieldwork. Prior approval from the Project Leader and from the relevant Programme Manager must be obtained for any work underground, except at sites normally visited by the public (such as public road tunnels and tourist sites). Get prior approval from the land or mine owner.

Never go underground alone, even if you are experienced underground.

When you go underground, leave someone to 'stand guard' at the entrance. In the case of tunnels, a guard should be placed at the up-wind entrance. It has been known for vandals to light fires at the entrance to a tunnel in which staff were working.

### 7.2.5 Ground liable to collapse

Ground above some mine workings, especially shallow workings which have been abandoned, is liable to sudden collapse. This can result in the formation of steep-sided openings, such as crown holes, many tens of metres in depth and diameter. These may be flooded. Sudden collapse can also cause outbursts of water and debris.

Similar catastrophic ground collapse has been known to occur over natural karst solution features in limestone (including chalk), salt or gypsum.

People caught in such subsidence events, or who fall into the resulting cavity, are very likely to suffer serious, perhaps fatal, injury, or drowning.

In general, do not approach the immediate vicinity of shafts, adits, and so forth which are known to have suffered recent collapse, or which are thought to be liable to collapse. Take heed of any warning signs. Do not cross fences at the perimeter of such structures.

If it is specifically required to work on ground which is liable to collapse, as for example during a project to investigate or monitor subsidence, site-specific risk assessments must be made which take account of the history and type of ground movement in the area. Safe working practice must be designed accordingly. The risk assessment and safe working practice should be reviewed in the light of any change which is then detected, no matter how slight.

If you are in a past or present mining area, or a karst area, be observant for evidence of recent ground movements such as breaks in the soil surface, deformed turf, leaning vegetation, distorted or broken fencing, broken overhead cables, disrupted water mains or other underground pipe or cable work, or damaged buildings. Evidence of ground movement could also include subterranean rumblings, or sudden expulsion of gas, vapour or water from the ground.

Local authority planning departments, landowners, and utility companies may be able to provide information relevant to recent ground movements. These parties should be consulted particularly where a strong possibility of movement has been predicted.

Be especially vigilant after periods of heavy rain or snow melt. If you notice ground movement or other signs of imminent collapse near you, retreat *immediately*: do not stop to collect equipment. Do not attempt to retrieve equipment until the risk has been re-assessed.

## 7.3 Hazards associated with contaminated ground and landfill sites

### 7.3.1 General comments

Fieldworkers on contaminated land risk exposure to potentially harmful agents, either during fieldwork or during subsequent sample analysis. Such hazards are most likely to occur on or near landfill sites (active or not), pits used for unregulated dumping (including 'disposal' of toxic agrochemicals or animal carcasses), on land contaminated with industrial residues or other pollution, and on land contaminated by biological agents known to present significant risks to health. The latter can include areas near some farm buildings and on farmland spread with slurry or sewage sludge.

If work on contaminated ground is not a specific requirement of your project, avoid such ground. Each contaminated site will normally require its own risk assessment. If you are in doubt whether some ground has been significantly contaminated or not, assume it has. Local policies and procedures on working on contaminated land are available in NERC; ask your safety adviser.

### 7.3.2 Landfill sites

Fieldworkers who might make occasional or unplanned visits to landfill sites should recall the potential risks associated with them:

- Take particular care in areas of land fill, tailings and slurry ponds, tips and spoil heaps, where 'quick' conditions may exist or uneven compaction may have led to instability.
- Look out particularly for weakness resulting from underground combustion, or decomposition, and for any toxic substances that may be present. Wet weather may make such conditions more dangerous.
- Avoid areas which might be liable to collapse, where suffocating or toxic gases might be emitted, or hollows where they might collect. Such areas commonly include the foot of exposures at the margin of a landfill.
- Polluted water can occur in marginal drainage ditches.

Do not work on a landfill site by yourself.

### 7.3.3 Slurry pits

Slurry pits present a particular danger, especially when disused and vegetated. Many are merely 'holes in the ground', dug without regard to long-term stability. The edges are commonly slippery or unstable, the sides are usually steep with no easy exit, and there is usually no safety equipment provided nearby.

- Stay away from the edge.
- Do not jump down the side of pits, even if the base appears firm.
- Do not tread on a floating mat of vegetation ('shaking ground'). In some old slurry pits (including old pits used as slurry lagoons) liquid waste can remain beneath an apparently stable mat of vegetation. Ask the landowner about such sites.
- Look for evidence that an excavation may once have been used for slurry, such as proximity to animal sheds, the presence of drains leading into or out of a pit, or retaining walls blocking the mouth of the pit.
- On the floor of such a pit, look out for evidence of poor drainage, and probe the ground ahead of you with a soil auger or narrow stick.
- Do not try and force your way through thick vegetation in the floor of a pit.

If there is any doubt about the safety of gaining access to exposures in a slurry pit, do not attempt to reach them.

## 7.4 Hazards associated with machinery

### 7.4.1 Farm machinery

Stay away from farm machinery whether in use or not. Assume that operators are unaware of your presence unless you have clear evidence to the contrary.

### 7.4.2 Drilling rigs

NERC fieldworkers should not operate drilling rigs, nor assist with their operation, unless they have received appropriate training.

The safe operation of drilling rigs and the safety of associated personnel are usually governed by the safety regulations of the site contractors. The driller in charge of the site is responsible for the implementation of their code of practice and for the safety of visitors. All staff must comply with this code If there is a possible ambiguity over the responsibility for ensuring safe working practice at a particular drill site, for example if a drilling company is working under the supervision of NERC staff, this should be resolved before work starts.

### 7.4.3 Machine fluids

Minimise skin contact with engine oils, fuels, coolants, electrolytes and hydraulic fluids: use protective clothing if appropriate. Such substances may be toxic, corrosive, carcinogenic, or liable to cause dermatitis or other conditions.

Clean-up as soon as possible after contact with such fluids, following manufacturer's instructions or other guidance, as provided in a workshop, for example.

## 7.5 Hazards associated with radiation

Some frequencies of non-ionising radiation used for communication (radio waves, microwaves) can be hazardous. In normal conditions they should present no immediate risk to people at ground level, unless an aerial or reflector has been dislodged and is pointing towards the ground. Check over any masts that you will be working close to.

In usual circumstances, you will not be at risk from radiation unless you climb an aerial mast. For people near the foot of a mast, greater hazards are presented by falling objects (especially if people are working on the mast) or lightning.

### 7.5.1 Mobile phone base transmitters

Follow warning instructions displayed at the transmitter site. Do not linger in the vicinity.

If you need to remain close to a transmitter site for some time, for example to examine an exposure or to take a series of measurements, seek advice from the operating company.

### 7.5.2 Radio transmission stations

VHF radiation is generally considered to be more hazardous than microwave radiation. VHF transmissions are often non-directive and are therefore dangerous from all angles, but generally only within a few metres of the aerial.

Do not enter the enclosures around large radio aerials unless you have a specific assurance from the operating organisation that it is safe to do so.

## 7.6 Hazards associated with the countryside

### 7.6.1 Exposure to toxic chemicals

- Avoid toxic liquids and powders, including those used in agricultural or silvicultural spraying or dusting, or which might be released when drilling (i.e. sowing an agricultural crop).
- Beware of wind-carried spray or dust and be prepared to leave the area promptly if necessary. Stay upwind of the spraying operations.

- Crop sprays may be harmful until the residue has dried. Do not enter forests or fields with standing crops which have been sprayed recently. If you can smell pesticide in the air, or can see oily drops on the vegetation, leave the work until the next day, if at all possible. If in doubt, ask.
- Ask about plans for crop-spraying when arranging access.

If you are caught in spraying operations, affected by spray drift or inadvertently enter an area where the crops are still wet from spray, retreat to a place unaffected by spray as quickly as you can. Try to find out what spray is being used so that you can take the necessary precautions. Wash any affected skin copiously in running water or use medical wipes. Try to avoid inhaling spray drift; even a handkerchief held over the mouth and nose will help.

Do not wear clothes that may have pesticides on them for any longer than you need to; chemicals can eventually soak through and make skin contact, while vapour will linger in clothes. Remove contaminated clothes carefully; avoid skin contact on your hands and neck as the overalls are removed. Make sure that overalls to be washed present no hazard to launderers. Remove contaminants locally before you send them to the laundry.

Wear rubber gloves when handling samples or equipment which could have been sprayed, or left in areas which were sprayed. (Note: surgical gloves may be the most comfortable, but offer very limited protection against most chemicals. Rubber gloves impermeable to oily chemicals are best, for example blue nitrile gloves from the Marigold range.)

If you develop symptoms of illness, contact your GP and explain that you might have been exposed to agrochemicals. If your GP is uncertain of effects or treatment, ask him/her to contact the National Poisons Unit, based at Guy's Hospital, London.

Further guidance is provided by the Health and Safety Executive publication 'Approved code of practice: safe use of pesticides for non-agricultural purposes', and the 'UK pesticide guide'.

### 7.6.2 Fences

Field traverses are sometimes blocked by fences. If a fence cannot be crossed without damage to yourself, your clothing or to the fence itself, you will have to go another way. However, many fences can be crossed without serious risk.

Most fences can be crossed by crawling beneath the bottom strand, bending between strands, or straddling the top strand. If you straddle a strand of barbed wire, wear abrasion-resistant gloves to hold it down, or cover a portion with a item of clothing or an open map case. Do not use other materials which may be at hand, such as sacking or cardboard, as these might be contaminated. If suitable materials are available, it is sometimes possible to place a 'mounting block' on either side of the fence and step over the fence from one to another. Do this only if you are certain that the blocks will not shift between your weight.

If insufficient space has been left below the strands, and the top strand is too high to straddle, you may be tempted to climb the fence posts. Do not do this unless you are certain that the fence will bear your weight: beware of rot or corrosion which may have weakened it. Do not step up on sloping braces: these are usually slippery. Wear abrasion resistant gloves and grasp the top strand firmly.

In all cases, move slowly and cautiously.

### 7.6.3 Electric fences

Keep clear of electric fences. If you have to cross an electric fence of the kind used to confine livestock, assume it is live. Use insulated handles where provided. Otherwise deflect the fence downwards with a non-conductive object (such as a map case) or lay a coat across it. The insulating effect of dry Wellington boots is said to provide protection against electric shock from agricultural livestock fences.

### 7.6.4 Shooting

In areas where game shooting takes place, seek information about shooting when arranging access and when you meet gamekeepers. Plan accordingly. Wear high visibility clothing in the appropriate season.

Note that deer stalking is carried out on some estates in southern and eastern England, as well as in the Scottish Highlands. Much shooting for deer takes place from 'high seats', or at dawn or dusk, thus minimising risk to third parties. Nevertheless, you should find out if shooting is likely to occur where you are doing fieldwork.

Although there are strictly defined seasons for shooting game birds and deer, shooting of 'pest species' can take place at any time.

The main seasons are as follows:

- Pheasant: October 1st to February 1st
- Grouse: August 12th to December 10th
- Red Stags, Fallow Bucks, Sika Stags: August 1st to April 30th
- Roebucks: April 1st to October 30th
- All female deer: November 1st to February 28th
- There is no Statutory close season for Muntjac, but generally speaking an open season of October to April is observed.

For more information, including the open seasons for other species, and regulatory variations in the different nations of the UK, contact the British Association for Shooting and Conservation.

If you become aware that you may be at imminent risk from shooting nearby, draw attention to yourself with your whistle or assault alarm, or by waving high visibility clothing.

### 7.6.5 Firing ranges

Look out for and heed red warning flags, notices, etc. If you notice unexpected activity on a firing range, keep well clear, even if no flag is flying.

If access to MoD ranges is arranged, a safety briefing will be provided. Follow the instructions given !

If working close to firing ranges be aware that the boundaries may have changed over the years (some areas have been used as military ranges for well over a century) or that live ordnance may have been lost outside the range. If you are working in or near disused firing ranges, or areas once used as military installations of any kind, bear in mind that live ordnance may remain. Watch where you step. Do not touch suspect objects – advise the appropriate authorities. If you need to dig in such an area, use a metal detector to check that the ground is clear.

### 7.6.6 Golf

Be alert when working on or crossing golf courses. Do not work on or close to fairways without an adequate lookout.

### 7.6.7 Animals

Nearly all wild animals (and many domestic ones) will flee from people, if able to do so. Any animal which feels threatened and which cannot flee is liable to attack. This includes, for example, rats. Domestic and farm animals (especially dogs) will react to your body language. If you do not behave confidently in their presence you have more reason to avoid them.

Avoid animals which appear to be behaving strangely, in particular any wild animal which appears unusually tame: they might be unpredictably aggressive as a result of disease.

#### 7.6.7.1 Dogs

In general, ignore dogs: they will then tend to ignore you. Heed signs warning of aggressive dogs. When visiting sites where potentially aggressive dogs are loose, shout or use the car horn to attract attention, if required.

If you encounter an aggressive dog, stand your ground quietly. Make no gesture towards the dog. Some dogs have learnt that a stooping gesture can be followed by a thrown stone and so will retreat, but others may regard this as a cue to make an attack. Keep your head up, looking above the dog but watching it in your peripheral vision. Do not meet its gaze: a stare will be interpreted as aggression. If the dog persists, it is worth trying the firmly spoken commands 'NO' or 'SIT', as many dogs learn those if nothing else. Otherwise, back away gently.

A pocket electronic dog repeller (e.g. Dazer) can be of use in discouraging aggressive dogs (other than trained dogs).

#### 7.6.7.2 Farm animals and equines

Enquire about potentially dangerous animals when arranging access. Watch out for potentially dangerous animals during fieldwork. While uncastrated male animals and females with young present the most obvious dangers, any farm animal or equine (horse, pony, donkey, etc.) is large enough to injure or kill a human. Goats of either gender can be unpredictable. Do not enter an enclosure with pigs unless you are closely accompanied by someone who knows them.

Many large domesticated animals, especially equines and young cattle, will approach a walker out of curiosity. Usually, this is only a problem if it makes *you* uncomfortable. If so, avoid situations in which you could be 'cornered'. Most animals will eventually lose interest in a static fieldworker. Gentle discouragement (such as a light tap on the muzzle) sometimes works for the more persistent. Avoid rapid or violent actions: these might just serve to excite the animals, without driving them away. Inquisitive animals will normally give ground if you walk slowly towards them. If you feel that animals are following you too closely, stop and face them.

#### 7.6.7.3 Wild animals

Beware of territorial behaviour by stags on their rutting grounds. The rutting season is typically between late September and early November, except for Roe Deer which rut between mid-July and the end of August. Aggressive stags usually make their presence known by their noise: they should be avoided.

Wild boar occur in woodlands in parts of Dorset, Kent and West Sussex. Adults average 1 m in height and weigh about 200 kg, but are largely secretive and nocturnal. Their presence is normally revealed by muddy wallows, rubbed trees and areas of disturbed soil. The rut is from late November to March. Sows will defend young and boars may be aggressive if threatened, but otherwise wild boar are harmless.

Swans can also be extremely territorial, especially when nesting, although this is normally only a problem on or near inland water bodies. Do not confront aggressive swans: they are more likely to attack than give ground, and are capable of inflicting serious injury.

Otherwise, wild animals (including snakes) are only likely to present a hazard if startled at close quarters. Most fieldworkers usually make enough noise to warn animals of their approach. In areas where wild boar or deer might be encountered it is sensible to ensure that you do so, particularly when there is a lot of wind noise. There are persistent reports of feral panthers and similar 'big cats' in some areas. In their native ranges, such creatures normally flee from humans and circumstantial evidence suggests that any which might live wild in the UK do likewise.

All seals are heavy creatures and most have large teeth and powerful jaws. A seal could easily knock over and injure a person and in very dense colonies anyone falling could be crushed by moving seals; seals may become aggressive during the breeding season and some species can move surprisingly rapidly over short distances. Keep out of seal colonies and avoid solitary seals. Note that if alarmed, seals tend to make for the nearest water by the shortest route, even if a person is in the way.

#### 7.6.7.4 Snakes

As with other wild animals, snakes are only likely to present a hazard if startled at close quarters. If you work in an area where Adders are known to be present, watch where you step and where you place your hands. Familiarise yourself with appropriate first aid procedures If bitten by a venomous snake, do NOT do any of the following:

- cut the skin,
- suck the bite,
- rub the bite,
- apply a tourniquet or ligature.

If you can summon help, do so. If you cannot, walk to safety, exerting yourself as little as possible.

Bear in mind that even if bitten by a venomous snake, significant envenomation has not necessarily occurred. However, identification of the offending snake is important so that the appropriate anti-venom can be used, if required. The only venomous native snake, the Adder, is easily identifiable. It and the two other native species are protected by law. Deaths from Adder bites are exceedingly rare.

There is a chance that some exotic species might be encountered in the UK. If it is likely that the snake is not a native species, capture or kill it (if this can be done without further risk) and keep for later identification. Handle by the tail only.

7.6.7.5 Bees and wasps

Bees and other insects are attracted by some colours, particularly some shades of yellow. To avoid possible consequent nuisance, avoid wearing yellow clothing during fieldwork – with the obvious exception of high-visibility clothing, if that is required.

Bees are unlikely to sting unless annoyed. Swarms of bees can be intimidating but are relatively harmless if left alone. However, some bees are more aggressive than others and all bees tend to be more so in windy or thundery weather. Bee hives can present a hazard because each colony has members whose specific role is to guard the hive. These will attack a potential threat to the colony, but in general operate in a zone around the hive entrance. If it is necessary to approach or to pass by a bee hive, do so from behind. If working in sand pits, look out for narrow burrows which may mark solitary bee nests.

Similarly, wasps will sting only if they are threatened. The nests of wasps (or of wild bees) may be defended aggressively by the occupants. Watch out for wasp nests on trees, walls, or crags, especially under overhangs. The inmates will react to vibration of the nest or injury to one of their fellows. Avoid working nearby. If you do disturb a wasp nest, your best defence is to remain perfectly still: nest-defending wasps will chase and sting anything that moves. Wait for their activity to quieten before making a slow and careful retreat. Only run if you can move fast and have at least a 50-metre clear path.

Wasp stings are not barbed and are in general retracted after stinging. The bee sting is barbed and includes a sac of venom, which continues to pump venom into the wound even if torn out of the bee's abdomen. Thus once stung by a bee it is important to remove the sting as soon as possible, without squeezing the sac. Either grasp the sting below the venom sac and pull it out, or scrape the sting off the skin with a knife blade or finger nail.

If stung by either a bee or a wasp, wash the wound as soon as possible and apply a clean dressing. Antihistamine creams or sprays may bring pain relief, as will an ice pack. A sting in the mouth or throat can cause swelling which might restrict breathing: seek medical attention promptly.

Note that it is possible for someone to develop an allergy to bee or wasp venom. This will tend to become progressively more severe each time the person is stung, possibly leading to anaphylactic shock, a life-threatening condition requiring emergency attention. If you suspect you may have such an allergy, seek medical advice. If you do have such an allergy, take particular care to avoid bees and wasps and follow the medical advice you have been given. Discuss with your project leader and any field companions appropriate action to be taken if you are stung (see also Section 7.12.7).

7.6.7.6 Bats:

Some species of British bats may carry rabies; many more species overseas carry the disease. Do not handle either live or dead bats unless you have received full vaccination against rabies (handling of live bats requires licensing

anyway since they are protected species). Avoid bat roosts since rabies can be contracted via aerosols. If a bat bites you, seek medical advice IMMEDIATELY and inform local management and the NERC Safety Adviser.

## 7.7 Hazards associated with other people

### 7.7.1 The general public

Fieldworkers are at some risk of assault by members of the public, especially if the latter are under the influence of alcohol, drugs or solvents, or are contemplating theft. This risk will be greatest in some urban areas, but secluded countryside close to towns also presents some risk. Consider contacting the local Police to identify areas of risk if this information has not been included in the project Risk Assessment.

Most such risks can be avoided by:

- being aware of your surroundings,
- being cautious but acting confidently,
- avoiding confrontations,
- working with a companion.

In areas thought to present greater risk:

- avoid working during the afternoon, especially after school hours, and at any time during school holidays, including those in mid-term.
- be particularly cautious if working away from roads or footpaths.
- consider getting a lift into the area from a colleague, or use public transport.

In urban areas, consider wearing a high-visibility jacket. As well as making yourself visible to passing traffic, it may help defer suspicion when you are working in the neighbourhood of schools, or in parks or other recreation areas. Do not enter the grounds of schools, hospitals, etc. for fieldwork without first informing someone in authority.

Fieldworkers can be the subject of suspicion, especially in rural areas. Always be ready to explain yourself and to show your official pass. Give people the opportunity to express their curiosity.

If you feel you are likely to be exposed to an undue risk of assault, discuss appropriate measures with your Project Leader, Programme Manager or the local Health and Safety Adviser.

### 7.7.2 Travellers

Many travellers have reason to be suspicious of strangers, particularly those who might be taken to represent ‘the Authorities’. As is the case with local residents, suspicions may be allayed by politely introducing yourself and describing what you are doing or intend to do. Do not ‘creep about’ travellers’ encampments: consider wearing a high visibility jacket. If you encounter hostility, withdraw promptly.

## 7.8 Hazards associated with road traffic and motor vehicles

### 7.8.1 As a driver

Use an appropriate vehicle for your needs. For example, avoid using off-road vehicles if your journey does not require them. Ensure that your vehicle has sufficient seats with safety harness and head restraint for the intended number of passengers. Ensure that you have appropriate training for the type of vehicle that you will be using. Special training is a requirement of driving off-road vehicles, and is strongly recommended for minibuses, even if your driving licence is valid for these classes of vehicle.

If you have little experience of driving diesel-engined vehicles, take particular care when you are moving out into flowing traffic: diesels tend not to accelerate as quickly as petrol-engined vehicles, especially going uphill.

Check that your vehicle is in fit condition before leaving base following the guidelines in the log book:

- check vehicle fluids (oil, water, screen wash, battery, brake/clutch fluid, and tyres, including the spare). These checks should be repeated each week, at least.
- check the location of the jack and wheel brace, and that these are appropriate to the vehicle. (Off-road vehicles should be supplied with an effective wheel chock.)
- check the location of the first aid kit, fire extinguisher and warning triangle, ensuring that they are in easy reach (for example, not packed beneath the load, or with the spare wheel).
- check that all rear-view mirrors are correctly aligned before driving off.
- check that head restraints (where fitted) are correctly positioned to protect occupants from whip-lash injury.
- If you suspect that the vehicle may not be fit for use, contact the Transport Controller or the Vehicle Workshop.

Stow all equipment and luggage securely. This is to prevent damage or injury if part of the load shifts while driving or during an accident. It is particularly important when driving off-road vehicles. It may be appropriate to install a net or other barrier between the load and any people riding in the vehicle.

While loading or unloading, ensure that the vehicle has been parked on stable, reasonably level ground, with sufficient space to work in safety (bearing in mind other possible activities in the vicinity), and with the parking brake engaged. Bear in mind the effects of weather (especially when windy), and of pressure waves and spray from passing vehicles. Allow extra time or arrange assistance if there may be problems with unloading at your destination. Wear appropriate clothing for the task, especially footwear. (See also section 7.13.2).

Do not exceed loading ratings for the particular vehicle or trailer. In particular, beware of overloading the roof rack or roof box, especially full-length roof racks on Landrovers. Distribute the load evenly, where feasible placing the heaviest material over the axle(s). If required, get a bigger vehicle, or a second vehicle, or a trailer, or divide the load over more than one journey. If your vehicle is heavily laden, drive with particular caution, especially if it is of a class that you do not usually drive.

The transport of some items (for example gas cylinders, radioactive or explosive materials) may be covered by specific regulations, guidance or codes of practice. Check with the Health and Safety Adviser.

Do not tow any trailer, caravan, or the like unless you have been trained to do so, or have adequate experience. If required, seek advice from an experienced colleague or from your Local Health and Safety Adviser. Check the condition of the trailer before you set off. Particularly note the secure condition of the wheels, that the load is secure, that caravan doors and windows are closed and locked, and that warning lights and any safety braking system on the trailer operate correctly. Observe relevant instructions in the Highway Code.

Follow instructions given in the NERC Management of Road Risk Procedure. Report any accident or fault, however slight, to the Local Transport Officer. Even hitting a kerb can cause significant damage. Look out for damage which might have been caused by others while the vehicle was parked.

Before your journey, check traffic news on television information services or the Internet. Route finder facilities are provided by the motoring organisations on their web sites. Carry a suitable road map on your journey (but do not consult it while actually driving).

Use seat belts where provided. Do not use mobile phones while driving: even using a hands-free set while driving will distract you and hands-free use is forbidden in NERC.

Some of the greatest risks encountered by most fieldworkers are those experienced when driving, especially when travelling at the end of a week. Follow the instructions in the NERC Management of Raod Risk Procedure. Normally, include driving time within your working day, making allowance for likely delays. Take regular breaks, stopping at places where you can get out of your vehicle. Take a break if you feel drowsy while driving: short naps while parked can be very beneficial. If you are concerned about falling asleep for too long if you stop for a nap, you are probably too tired to be driving and should certainly stop.

Some advice on avoidance of possible ‘road rage’ is given below:

- Try to be understanding if other drivers cause problems; they may be inexperienced or not know the area well (ask yourself: how would I react if I knew that driver to be a friend of mine ?).
- Be patient; remember that anyone can make a mistake.
- Do not allow yourself to become agitated or involved if someone is behaving badly on the road. This will only make the situation worse. Pull over, calm down and, when you feel relaxed, continue your journey.
- Slow down and hold back if a vehicle pulls out into your path at a junction. Allow it to get clear. Do not over-react by driving too close behind it.

Watch out for other drivers using mobile phones: they may not be concentrating sufficiently on their driving.

If any of your passengers express disquiet about the way you are driving, modify it accordingly. Although you may be driving in perfect safety (or think that you are), your passengers might nevertheless feel insecure or uncomfortable and should not have to 'suffer in silence'. Bear in mind that it is usual for a driver to feel more secure than a passenger in the same vehicle (Section 7.8.2).

Risks associated with the loss of vehicle keys or vehicle theft should not be underestimated. At best this is an inconvenience, but it could also leave the fieldworker exposed to hostile weather conditions, prevented from obtaining first aid or other emergency help, or vulnerable to assault. Stress generated by such an event, allied to tiredness, may lead to misguided actions. Similar risks are associated with vehicle break-ins, together with the possibilities that the vehicle may have been tampered with, a person may be hiding within the vehicle, or some item hidden or planted in the vehicle. Therefore, take particular care to avoid losing the vehicle keys in the field, for example by putting them in a zipped pocket or attaching them to your person. Avoid carrying them in your rucksack (you might lose the rucksack).

If you lose the vehicle keys contact the AA (or other breakdown rescue organisation as appropriate), who should be able to open the vehicle and move it to a secure location.
Take care where you leave your car during fieldwork. Lock it and fit the steering locks provided, even if planning to leave the car only for a short period of time. In general, either leave the car in plain sight in a public area (which should be well-lit, if after dark), or hide it from public view as much as possible, ideally on private land. If possible, avoid lay-bys, or public picnic areas and the like (especially if these are secluded), as these are common targets for car theft. If working in a high risk area, consider getting a lift into the area from a colleague, or use public transport. It may not be possible to put all your field equipment, luggage, etc., in the boot, but do hide any briefcases and the like, and anything of obvious value. Do not leave the agency fuel card in the vehicle, in case of theft.

If you intend to drive to a very remote area (as in the Scottish Highlands, for example) where you would be faced with a long walk if you could not restart the vehicle, and where your mobile telephone might not be effective, consider taking a bicycle with you as stand-by, in case of breakdown or loss of the car keys.

Leave your business card or (if you do not wish to identify yourself) a NERC letterhead under the windscreen. This identifies the car to local landowners and, if necessary, to searchers. Leave details of your day's work in the body of the car (not locked in the boot), preferably in sight (in the passenger door pocket, for example) but with any details hidden from view (Section 5.2).

When you return to the vehicle, check the exterior and interior before entering.

If your vehicle suffers a puncture while driving, stop only where you are safe from other traffic. Put on the hazard warning lights. If you are on a busy road, or motorway hard shoulder, or if you are not confident about changing the wheel yourself, call the AA (or other breakdown rescue organisation as appropriate). If there is no danger from passing traffic, and if you are confident that you can change the wheel correctly and safely (bearing in mind that wheels are heavy), follow the instructions in the vehicle handbook. In general, put the car in gear and the handbrake on, before loosening wheel-nuts and jacking-up. Chock the opposing wheel if you can. In some types of off-road vehicle it is advised to engage the differential lock(s) as well.

Similar advice applies if your vehicle breaks down. Park it as far off the carriageway as possible, but beware of soft or steep verges. Put on the hazard warning lights. Set out the warning triangle at least 50 m from the rear of the vehicle. On a motorway, walk along the verge to the nearest emergency phone to summon assistance. Return to wait near your vehicle but stay on the verge. Do not wait inside the vehicle.

#### 7.8.1.1 Off-road driving

Drivers of vehicles designed for off-road use must have been given appropriate training in their use. Off-road vehicles handle differently to ordinary motor cars and corresponding care must be taken when driving them.

Seat belts should be used for comfort and safety when driving off-road.

#### 7.8.1.2 Use of 'quad' motorbikes

Some projects may be well served by the use of four-wheeled motorbikes ('quads') or other types of all-terrain vehicle (ATV). An ATV should be used only after the operator has received appropriate training in its use and has been judged competent by a qualified instructor.

### 7.8.2 As a passenger

If you feel uncomfortable or insecure as a consequence of a driver's behaviour, tell the driver and tactfully request that the behaviour be modified (Section 7.8.1). In extreme cases, consider feigning sickness.

### 7.8.3 As a pedestrian

Fieldworkers operating on or beside a road should wear high visibility clothing. Beware of creating hazards to road users. Prevent loose material from falling into the road. If material does fall into the road, clear it up. Be extra careful if there is a strong wind blowing because it can mask the sound of approaching vehicles. In general, avoid signalling to drivers: you are likely to be held liable if an accident then occurs.

If you need to work alongside a motorway, you must obtain specific prior permission from the agency or company responsible for the upkeep of that section of road. Having obtained that permission, you should also advise the local Police. You must comply with any safety regulations laid down by these authorities. You must have a second person to act as lookout. Avoid distracting passing motorists.

You do not need permission to work on or alongside roads other than motorways (unless your intended work involves damage to the fabric of the carriageway).

- If possible, avoid morning and evening periods of increased road traffic.
- Display a clear warning signal when you are working near bends, hill crests, in narrow cuttings, or in any place where other road users' range of vision is restricted.
- Use a lookout if this is feasible.
- Avoid road tunnels lacking a footpath if possible, but if such work is essential, post a lookout and prominent warning signals or signs at least 100 metres away.

However, note that warning signs are unlikely to be effective at a distance of more than about 250 metres: traffic may slow down when a sign is passed, but will soon regain speed if no hazard is encountered. If in doubt, seek advice from the local Police.

## 7.9 Hazards associated with railways

Do not trespass on working railways. It is illegal and can be extremely dangerous to yourself and others.

If you do need to work along a railway line, you must apply to the local operating authority (for example, Railtrack) for a permit before work starts. High visibility clothing is obligatory, as is at least one lookout. Normally Railtrack will require at least one of their employees to be present as the person in control of the work, and will charge for this provision. You should exercise particular care in rock cuttings where space is generally limited and should never enter tunnels without specific prior authority.

## 7.10 Hazards associated with aircraft

In some cases, fieldworkers may be involved with the use of light aircraft, including helicopters, operating from small airfields. This may expose them to hazards and risks associated with noise, aircraft movement, ground traffic, fire (especially during refuelling), inadvertent tampering with equipment or aircraft controls, and distraction of the pilot during pre-flight checks or in flight.

Normally, safety briefings will be provided by the operator of the airfield or the aircraft before you leave the public area or terminal building.
In particular, when you approach or leave a fixed wing aircraft or helicopter on the ground, keep clear of propellers, rotors, intakes, and exhausts.

## 7.11 Hazards associated with weather conditions

Know what weather to expect, from radio or television broadcasts, telephone information lines or the Internet. Go prepared for the weather. Watch the weather as you go.

Further advice to be followed is given in publications such as the British Mountaineering Council's booklet 'Safety on Mountains' and the Mountain Leader Training Board's handbook 'Mountaincraft and Leadership'. (Section 9).

### 7.11.1 Hypothermia

Hypothermia results from dangerous loss of body heat. A drop in body temperature of only 2º from the normal 37ºC indicates the onset of hypothermia and a drop of 4º is life-threatening. The main causes of hypothermia are wind chill through inadequate clothing in land-based operations and accidental immersion in cold water in waterway and marine operations. It is a serious condition. The early stages of hypothermia are insidious because the victim usually cannot recognise them. Symptoms include slowness of movement, a lessening of critical faculties and will to live, slurring of speech, irrational or violent behaviour, abnormality of vision, complaints of cold, tiredness and cramp, ashen pallor, falling, stumbling or fainting, and ultimately collapse and coma.

Provide immediate rest and shelter, protecting from further heat loss with insulating materials. Remove all wet clothes and replace with dry ones. Use a survival bag. Cover for the head, face and neck is a great help. Encourage shivering and other muscular activity. However, rapid external re-heating can be dangerous: do not rub the victim's limbs or apply local heat (such as hot water bottles). Provide hot food and drink whenever possible, shelter from wind and keep dry. Do not allow the victim to drink alcohol. In a serious case it may be necessary to strip the victim and put him or her in a sleeping bag with another person, also stripped. Skin to skin contact is the safest and most effective emergency treatment.

If there is no significant improvement after a short time, get help to move the victim to shelter and professional treatment. You need to balance your ability to re-heat the victim gradually against the possibility of rapid evacuation to a medical centre for professional treatment. Do not attempt to persuade the victim to walk out. If the victim becomes unconscious, monitor breathing and heart beat: use resuscitation techniques as required.

To avoid hypothermia, wear good clothing, including windproof and waterproof garments; avoid getting overtired; do not go too long without energy-giving foods; if possible, take 'shelter breaks', for example in a warm vehicle. If any member of a party is becoming tired, cold and wet, the group should move to a more sheltered area.

Note in particular the potentially lethal effect of otherwise minor exposure when combined with medical shock following an accident. Be prepared to counter the effects of exposure if incapacitated or marooned. It can be better to risk further injury by moving the victim to a dry, sheltered position.

### 7.11.2 Heat Exhaustion

This can arise through depletion of water or of salt in the body. If due to water depletion, the symptoms include thirst, fatigue, giddiness, a rapid pulse, raised body temperature, and low urine output. If left untreated it can lead to delirium, coma and death. The only remedy is to re-establish the water balance of the body. Provide cool water to

drink but keep the rate of intake moderate to avoid stomach cramp or vomiting. Very cold drinks or drinks containing alcohol should not be taken.

If due to salt depletion, heat exhaustion leads to similar symptoms though without a marked rise in body temperature, but almost always with severe muscle cramp. It is treated by adding salt to the diet.

### 7.11.3 Hyperthermia

Hyperthermia (or 'heat-stroke') results from a dangerous gain in body heat, and is commonly associated with dehydration. Excessive rise in body temperature, by say, 5ºC, can lead to brain damage and death. The casualty typically becomes disorientated, often with severe headaches, feels extremely hot and dry, ceases to sweat, has a rapid thready pulse, may breath noisily and lose consciousness. Symptoms can also include lassitude, muscle cramp and vomiting.

The main causes of hyperthermia are muscular activity in hot sunshine and/or high ambient air temperature. High humidity will accentuate these conditions by reducing the body's ability to lose heat by perspiration with consequent risk of dehydration. If faced with these conditions, do not exert yourself and keep in the shade as much as possible. Maintain adequate intake of fluids and salt.

Keep hyperthermia victims still, in shade and receiving the maximum of any breeze available. Sponge with tepid water and soak clothing to provide evaporative cooling. If possible, immerse in a stream. Provide cool water to drink but keep the rate of intake moderate to avoid stomach cramp or vomiting. Obtain professional treatment where possible.

### 7.11.4 Poor visibility

The descent of mist or fog in upland areas, or in coastal environments such as mudflats or salt marshes, can have a significantly chilling and disorientating effect. The best reassurance is to be properly equipped, and to know how to navigate by compass.

If you notice mist descending, take compass bearings quickly if required to confirm your position before the opportunity is lost. If you become disorientated in craggy terrain, it may be best to remain where you are until visibility improves.

### 7.11.5 Over-exposure to the sun

Over-exposure to natural sunlight, specifically short wavelength radiation such as ultraviolet (UV) light, can cause sunburn and skin cancer (melanoma). The risk of developing skin cancer is a long-delayed hazard of sunburn. The risk of skin cancer varies with skin type, being greatest for fair skins which burn easily.

Note that cloud cover does not much diminish exposure to UV radiation, while conditions of blue sky, midday sun, and reflection from snow or water greatly increase it. The risk of over-exposure is greatest under windy or cool conditions, such as while driving or on mountains, as then the heat of the sun may be less apparent.

To reduce the risk of over-exposure: cover your skin with clothing as far as possible. Remember to protect your neck and scalp. Wear long-sleeved shirts of tightly-woven cotton and with a collar, long trousers and a broad-brimmed hat.. Keep in the shade where possible. Use a sun-screen cream or lotion with an appropriate protection factor. Use good quality sun glasses.

Skin cancers usually appear as a pigmented patch in an exposed area such as the face, hand or arm. Use the following check-list for self-diagnosis of any such patch which appears on the skin:

- does it itch or feel different?
- is its diameter one centimetre or larger?
- is its size increasing?
- is its border irregular in shape?
- does the density of black/brown colour vary within the patch?
- is the patch inflamed?

- is there bleeding or crusting?

If you answer yes to three or more of these questions, see your doctor promptly.

### 7.11.6 Lightning

Although lightning claims the lives of a few people every year, it is not a major hazard for fieldworkers. In spite of the apparently impartial way it chooses its victims, the physical process of lightning strikes is fairly well understood. You can take simple precautions to avoid a strike.

- Be aware of weather conditions that generate lightning.
- The sound of thunder travels at approximately 1 km in 3 seconds (1 mile per 5 seconds). Take avoiding action when you notice warning of an approaching electrical storm.
- Stop work, avoid handling metal tools and electrical equipment.
- Retreat to inside your vehicle if possible.
- Avoid the vicinity of tall masts.
- Otherwise, it is safer to sit the storm out in the open than to seek shelter, for example beneath trees. Sit on a rucksack with your knees up and hands in your lap. The object is to keep your points of contact with the ground as close together as possible and avoid any electrical current passing through vital parts of the body.
- Lightning strikes are concentrated on mountain tops, ridges and projections from the general surroundings; adjacent depressions provide a relatively safe zone. Move off high ground but avoid being tucked in against a cliff, since you are likely to receive earth currents shed from the mountain tops.
- Avoid sheltering under trees, in caves, in natural fissures and under boulders because they are likely conduits for earth currents.

### 7.11.7 Wind

Strong winds are capable of pushing people over or lifting them from the ground. They can cause trees, branches or man-made structures to fall. Wind-blown objects and debris can be hazardous. Wind noise can be dis-orienting, or can obscure audible warnings of other hazards (such as motor traffic).

Take extra care under windy conditions, especially if the wind is gusting, or if working in an exposed position, or where the wind could be ‘funnelled’, for example between buildings or in gullies.

If working under a cliff or quarry face, beware of objects or debris being blown off or above the face.

If necessary, secure yourself and your equipment. If you are wearing a safety helmet, wear a chin strap.

Do not rest or park under mature trees during high winds.

## 7.12 Personal health hazards

See also Sections 7.1.7 and 7.3.

### 7.12.1 Zoonotic infections – general comments

Zoonotic infections, i.e. animal diseases that are transmissible to humans, are relatively rare. However, people working in proximity to animals, including those such as fieldworkers who have only indirect contact with animals, are potentially at risk. Some of the potentially most serious zoonotic infections are discussed in the following sections (tetanus, leptospirosis, tick-borne diseases, including Lyme Disease and the risk of rabies contracted from bats). Guard against others by avoiding direct contact with farm animals, or in the case of crypto-sporidioses, camplyo-bacteriosis, listeriosis and the like, by maintaining good personal and kitchen hygiene.

Cuts or abrasions incurred during fieldwork should be thoroughly cleaned as soon as possible, and then covered by a clean dressing. Many zoonoses begin with flu-like symptoms. These should never be ignored.

Summary descriptions of the main zoonotic diseases are given in a pamphlet published by the trade union Prospect (IPMS).

It is a legal requirement to report certain diseases, including leptospirosis and tetanus. Report occurrences of these infections as for an accident (Section 6.3).

### 7.12.2 Tetanus

Tetanus can affect any person whose work involves contact with the soil. The organism can enter the body through any break in the skin, including thorn-pricks. Tetanus is potentially fatal: immunisation **before** infection is the only certain way of dealing with it.

Ensure you are immunised against tetanus at least 14 days before starting fieldwork. Keep your tetanus coverage 'up-to-date'. You may arrange anti-tetanus injections or boosters through your own doctor and reclaim any charges from NERC. Seek medical advice on the recommended interval for tetanus boosters, which is typically no more than 10 years.

If you have to handle soil or water during your work, keep any cuts or grazes on your hands or forearms covered by a waterproof dressing. Use gloves whenever practical.

### 7.12.3 Leptospirosis (Weil's Disease)

NERC fieldworkers could be exposed to Leptospirosis (Weil's Disease). This is an acute infection caused by bacteria known as leptospira. Human infection results from direct contact with the urine or tissues of an infected animal (particularly rats, cattle, pigs and dogs), or indirectly from contaminated water, soil or sewage. Infection may occur through mucous membranes, including the mouth and eyes, through breaks in the skin, or by inhalation.

This disease is usually contracted in or near canals, stagnant ponds, landfill sites and bodies of still or slow-moving water which have been contaminated with urine from infected animals. Avoid contact with such water, and treat any area which you know or suspect to be infested by rodents, or which has been contaminated by farm animals, with caution.

Protect yourself against infection by wearing protective clothing, particularly gloves, wherever possible. Barrier creams may also provide some protection where the manufacturers specify their suitability for the intended use.

After working in contact with material which may have been contaminated by rodents or farm animals, wash your hands and forearms thoroughly with soap and water. If your clothes or footwear may have been contaminated, wash thoroughly after handling them. This is particularly important before eating, drinking, smoking, applying cosmetics or chewing gum. Wet protective clothing should be dried as soon as possible. Avoid rubbing your nose or mouth with your hands during work.

Act quickly to wash thoroughly in soap and water any cut, scratch or abrasion of the skin, whenever it occurs. Apply a clean dry dressing and protect it with a waterproof adhesive dressing. Keep the wound covered, re-dressing when necessary until it is quite healed. If clean water for washing is not available, use medical wipes.

Consult your doctor promptly if you sustain a wound which may have been contaminated. In the early stages leptospirosis may resemble a number of other diseases, particularly influenza. If you become ill seek medical advice promptly. When you go to a doctor, inform him or her of your potential contact with leptospirosis. The Civil Service Occupational Health Service issues a card to be carried in the purse, wallet or pocket which warns of the risk of leptospirosis and gives brief notes for GPs. Copies of this card are available from your local safety adviser or the NERC safety adviser. This should be carried by fieldworkers who are regularly at risk of exposure to leptospirosis.

### 7.12.4 Ticks and Lyme Disease

Lyme Disease (Borreliosis) is an infection caused by a bacterial spirochaete transmitted to man by the bite of sheep ticks and related species such as deer ticks. Other diseases can also be transmitted by ticks. Ticks are most common during the months of May-October with concentrations during the Spring and Autumn, but they may feed at any time

of the year, particularly in mild weather. Optimum conditions for ticks are provided by some woodland, dense under-grazed grassland, heath and moorland (Section 7.12.6).

Symptoms of Lyme Disease normally start between a week and a month after being bitten. The first sign is often (not always) a skin rash around the site of the bite (not to be confused with a normal sensitive reaction to the bite itself) or flu-like symptoms (headache, slight fever, neck stiffness, chills, tiredness, joint pains, loss of appetite, inability to sleep), or both. Other tick-borne diseases can produce similar symptoms although without the initial rash. If you develop these symptoms, seek medical advice promptly. Early treatment is generally effective. More serious arthritic, neurological or cardiac complications can develop weeks or months later. Serological tests for Lyme Disease are very unreliable except when the disease has progressed to the chronic stage, and even then antibody levels may not be diagnostic. During the first few weeks of infection only a third of sufferers have a raised antibody level. As serological tests are therefore of little value as screening tools, it is all the more important to take the following precautions.

Take the following precautions to avoid being bitten if you are working in 'tick habitat':

- wear appropriate clothing, especially to cover your legs. For trousers, fine close woven material is better than coarser fabrics to which a tick can more easily adhere.
- wear high boots or Wellingtons, or cover the gap between footwear and trousers with smooth gaiters. At the least, tuck your trousers into your socks.
- keep your arms covered wherever possible.
- tuck your shirt into your trousers.
- Insect repellent sprayed onto boots and ankles may help.

Remove ticks promptly. Although not all tick bits result in infection, the sooner you remove the tick the chance there is.

- If you notice ticks during the day, remove them without delay.
- If you have to make a long journey after working in a tick-infested area, change out of your working clothes first. (Bag the working clothes securely for washing).
- Inspect your clothing and skin for ticks when changing after work.

Before and after removing ticks, wash your hands in soap and water, or clean them with a disposable wipe. Take special care not to leave the mouth parts in the skin; the following method of removal is intended to minimise that possibility. The feeding tick lies parallel to the skin with its mouth parts at right angles to the skin. Gently grasp the mouth parts using fine tweezers, specially designed tick extractors or a medical wipe. Raise the body of the tick so that it is in line with the mouth parts. Twist it slowly without pulling or jerking. This may take 4 or 6 half-turns, but the tick will eventually come out cleanly. Be patient. If the tick is gorged (swollen) do not burst it during this process. Ticks may bite areas of the body which are not easily reached; apply petroleum jelly to make it easier to remove them from tender places.

Clean the place where it has been with a medical wipe and apply antiseptic. Kill the tick by crushing, burning or dropping in alcohol. Do not crush it between your fingernails.

If the mouth parts do break off under the skin, or any skin rash or undiagnosed illness follows tick bites or work in areas where ticks abound, get prompt medical advice. Alert your doctor so that Lyme Disease can be considered in his/her diagnosis.

Further information is given in the paper 'Ticks and Lyme Disease', copies of which are available from the Health and Safety adviser, and on the web page http://www.lymediseaseinformation.com/, which includes photographs of typical Lyme Disease rashes as well as details of two other tick-borne diseases. A NERC card summarising Lyme disease is available from the Safety Adviser.

### 7.12.5 Rabies

Some species of British bats may carry rabies; many more species overseas carry the disease. Do not handle either live or dead bats unless you have received full vaccination against rabies (handling of live bats requires licensing

anyway since they are protected species). Avoid bat roosts since rabies can be contracted via aerosols. If a bat bites you, seek medical advice IMMEDIATELY and inform local management and the NERC Safety Adviser.

### 7.12.6 Toxic blue-green algae

If you do fieldwork on lakes, reservoirs, ponds, canals or rivers, or handle samples from such locations in the laboratory, you should be aware of the potential dangers of touching or swallowing water containing high concentrations of blue-green algae.

Blue-green algae, or cyanobacteria, are natural inhabitants of many inland waters. Though microscopic, they may multiply sufficiently in summer months to colour the water green, blue-green or brown. In calm weather, these blue-green algae can float to the surface, forming a scum which may be carried downwind by light breezes and deposited on the shore. The material may appear as broad streaks, flecks or a thick paste, rather as if oil-based paint has been spilled. Algae washed up on the shoreline may appear white after a few days because the pigments have been leached from the material, which has a very unpleasant odour.

All the blue-green algae which may form such scums are known to be capable of producing toxins. Ingestion of toxic algae can lead to vomiting, diarrhoea, flu-like symptoms and liver damage; they are also poisonous to animals, causing severe illness and death. Contact with toxic scum material may lead to skin irritation and rashes; wearers of wet- and dry-suits are especially prone to these symptoms. Not all scums are toxic, and the degree of toxicity of those that are is known to vary through time. Even if the alga is non-toxic, decomposing scum may contain harmful bacteria and other pathogens. It is sensible to regard all such scums as being potentially harmful: avoid contact with scums and the water in the immediate vicinity, wherever possible. Away from scums, the much lower concentrations of algae are correspondingly less hazardous.

When working in or near water affected by blue-green algae, wear protective gloves where possible and avoid skin contact with the water. Take particular care when launching boats, handling equipment or dragging nets, etc. through water. Use tap water carried especially for the purpose (or medicated wipes if water is not available) to remove any splashes and clean hands thoroughly before eating, drinking or smoking.

If you cannot avoid contact with scum and you develop symptoms of poisoning within 48 hours, seek immediate medical advice.

### 7.12.7 Bracken

Bracken is known to be toxic and carcinogenic to livestock, and carcinogenic to experimental animals. It also forms an ideal habitat for the ticks which may carry Lyme disease (Section 7.12.4).

Wherever possible avoid walking through bracken, or handling bracken. This is particularly important during periods of spore release, typically during the Autumn. If you cannot avoid sporulating bracken, wear a mask.

If you cut, handle or work in bracken, consult the Safety Adviser..

### 7.12.8 Allergies

It is assumed that fieldworkers will be aware of their own individual allergies, if any, and the appropriate precautions and treatments. Advise your colleagues if you might be at risk from a serious allergic reaction during fieldwork (for example, from bee-stings) and what they should do if this occurs.

Be aware, however, that individual sensitivities may change with time and that individuals might be exposed to novel allergens during fieldwork. If you suspect that you are suffering from an allergic reaction, seek medical advice promptly.

Contact with the sap of giant hogweed can cause serious skin irritation. Avoid it.

Oil seed rape is suspected of causing allergic reactions in some individuals who have no previously known sensitivities. Do not attempt to force a way through or past a standing crop, especially when it is in flower.

## 7.13 Personal injury hazards

### 7.13.1 Walking

Trips, slips and falls are a common hazard of all fieldwork environments (Section 7.1). Take care how and where you place your feet, especially when you are carrying a load. Some people find a walking pole a useful aid in negotiating steep or uneven ground.

Note that one's judgement and co-ordination can be impaired when tired, cold or hungry (i.e. when blood sugar levels are low). Recall that conscious care should be exercised particularly when these factors may act in combination, as at the end of a day of winter fieldwork, for example.

Plan field traverses to avoid returning to base in the dark, especially if this is by an unfamiliar route or if you have to pass through woodland (Section 7.1.4).

Consider performing warm-up exercises before starting fieldwork for the day, especially if your muscles are 'stiff' from previous exertions or if you are otherwise relatively unfit at the start of a field season. When walking across muddy areas, be careful when shaking mud from your boots.

Further advice to be followed is given in publications such as the British Mountaineering Council's booklet 'Safety on Mountains' and the Mountain Leader Training Board's handbook 'Mountaincraft and Leadership'.

### 7.13.2 Lifting and handling

In general, assess the weight and shape of the object to be lifted before you pick it up and any risks in doing so. Stooping, twisting or stretching when you lift will increase the risk of injury. Make sure that your route is clear and well-lit, and that what you will tread on is not uneven, soft or slippery. Wear appropriate clothing for the task, especially footwear. Consider performing warm-up or stretching exercises before lifting or moving heavy objects, especially if your muscles are 'stiff' from previous exertions, or after a journey. Be prepared to leave the task until you can get suitable help or equipment.

When you lift:

- keep your back straight,
- make sure of a firm footing,
- do not twist from the waist,
- keep the weight of the object as close to your body as possible,
- lift gently and smoothly using your legs,
- do not rush the operation – take particular care if you are under pressure (e.g. for a waiting vehicle) or if it is wet.

Bear in mind that injuries caused by lifting and handling do not necessarily cause pain, either immediately or later. For example, an abdominal hernia can be presented as just a small, soft, pain-free swelling. If you find that you are injured, or might be injured, seek medical advice promptly.

When packing equipment and samples, pay regard to the ultimate weight of each package in relation to the circumstances in which it must be lifted, and the individuals who will do so.

Further advice is offered by the NERC Health and Safety Procedure 'Safe handling, lifting and moving of loads ' and by HSE Guidance Note L23: Manual handling. The Health and Safety Adviser can also provide further information. A training course on manual handling techniques is available.

### 7.13.3 Injury from neck pendants and jewellery

It is usual to carry small instruments (such as a hand lens, compass clinometer, GPS unit) on a string hanging around one's neck. There is a consequent risk of injury (abrasion, laceration or choking) if such a pendant becomes entangled during a fall, or when negotiating an obstacle (such as a barbed wire fence).

This risk can be mitigated by keeping the string as short as possible, never tying it with a running knot, and wearing it under a collar. Additional protection can be conferred by using a light chain with a sufficiently weak link, instead of string.

In general, do not wear personal jewellery (such as rings, necklaces, ear-rings, and the like) during fieldwork, unless it is covered by clothing. If you normally wear rings or bracelets semi-permanently (such as wedding rings, or medi-alert bracelets) take particular care to avoid entanglement.

If you are working with machinery with moving parts, remove or securely cover neck pendants and jewellery. Metal jewellery and bracelets (including metal wrist watch straps) should be removed before working on engines or the like. These items can become trapped in tight spaces, and if they create a short circuit between live electrical wiring and an earth (such as car bodywork), serious burns can result.

## 7.14 Hazards especially associated with geological fieldwork

Several types of activity associated particularly with geological fieldwork are potentially hazardous.
These activities include:

- Use of a geological hammer
- Use of acid
- Use of a hand auger
- Sediment testing
- Upper limb injuries

## 7.15 Hazards especially associated with geochemical fieldwork

Several types of activity associated particularly with geochemical fieldwork are potentially hazardous.

These activities include:

- Soil sampling
- Sampling on contaminated land
- Stream sampling for water or sediment

If you need to dig or bore holes to take samples observe the precautions outlined in NERC Guidance Note ‘Hazards especially associated with geological fieldwork’. If there is a risk of hitting buried pipes, cables, etc., use a metal detector to check the site before you start.

## 7.16 Hazards especially associated with geophysical fieldwork

Several types of activity associated particularly with geophysical fieldwork are potentially hazardous.
These activities include:

- Lifting and handling heavy equipment (Section 7.13.2).
- Excavations
- Using hired equipment
- Using electrical equipment: general comments
- Batteries
- Use of portable generators
- Use of earth leakage circuit breakers

- Use of borehole logging equipment
- Induced polarisation (IP), resistivity and seismic tomography (sparker source) surveys
- Magnetometer surveys
- Electro-kinetic (EKS) and seismic refraction (hammer and plate acoustic source) surveys
- Seismic tomography survey (air gun acoustic source)
- Use of explosives
- Climbing masts
- Geophysical surveys in coastal or inland waters

## 7.17 Hazards associated with field accommodation

In general, lone workers should not camp out in a tent or stay in caravans or other self-catering accommodation by themselves. If this cannot be avoided, procedures for ensuring 'safe return' must be followed particularly carefully (Section 5.2).

### 7.17.1 Tents

Follow advice given in 'Safety on Mountains' (British Mountaineering Council) and other publications, such as the Mountain Leader Training Board's handbook 'Mountaincraft and Leadership'.

### 7.17.2 Caravans

If you are using a caravan during fieldwork, keep it tidy and clean. If using gas appliances for cooking or heating, check hoses and connectors periodically. Install a carbon monoxide detector. Small, cheap detectors are available from good hardware and DIY stores.

Keep a fire extinguisher, a fire blanket and medical kit in the caravan. Maintain the fire extinguisher in good working order. Replenish the medical kit after use or if its shelf life has been exceeded.

Where possible, use an approved caravan site. If not possible, ensure adequate supplies of clean water and adequate sanitary arrangements.

If you need to tow a caravan, ensure that you use an appropriate vehicle and that the caravan is in sound mechanical condition. Do not tow any trailer or caravan unless you have been trained to do so, or have adequate experience otherwise. If required, seek advice from an experienced colleague or from the local Health and Safety Adviser. Check the condition of the caravan before you set off. Particularly note the secure condition of the wheels, that the load is secure, that doors and windows are closed and locked, and that warning lights operate correctly. Observe relevant instructions in the Highway Code.

### 7.17.3 Lodgings

When you arrive at your lodgings, take note of any special precautions required to prevent fire, fire alarm procedures and fire escape routes. In hotels, these will be subject to independent assessment but it may be advisable to check that escape routes have been kept clear. Most bed and breakfast accommodation will not have been checked for fire safety, even if the establishment has been given a tourist board rating. If they are not already apparent, seek clarification of emergency procedures with your host. If any item of equipment in your rooms appears possibly unsafe, draw this to the attention of your host.

If your lodgings relies on gas appliances for cooking, water or space heating, there is potential for the build-up of carbon monoxide gas. If the area around a gas appliance is not well-ventilated a carbon monoxide detector should be provided. If not, get your own detector before using the appliances. Small, cheap detectors are available from good hardware and DIY stores.

If you have any reason not to feel safe in your lodgings, move as soon as you can, being sure to inform your host. Reasonable additional expenditure for emergency overnight accommodation is justified in these circumstances.

# 8 ACKNOWLEDGMENTS

This document and the allied NERC Guidance Notes are based in large part on the BGS Guidance Notes 'Safety in Fieldwork', together with information gleaned from numerous Land Survey project risk assessments, generic risk assessments for geophysical fieldwork prepared by Peter Greenwood, the GBASE Project Health and Safety File and the individual experience of many fieldworkers. Draft versions have been extensively reviewed by past and present BGS colleagues, and this version includes modifications in the light of comments or advice by Maxine Akhurst, Keith Ambrose, Mark Barron, Clive Barton, Katy Booth, Steve Booth, George Bowick, Dave Buckley, Jon Busby, Greg Chapman, Tim Charsley, Dick Crofts, Peter Dunkley, Richard Ellison, Russ Evans, Andy Farrant, Alan Forster, Richard Hamblin, Peter Hopson, Ed Hough, Andy Howard, Adrian Humpage, Holger Kessler, Dave Lowe, John Mendum, Dave Millward, Brian Moorlock, Tony Morigi, Kevin Northmore, Roger Peart, Mike Petterson, John Powell, John Rees, John Riddick, Kate Royse, Alan Smith, Martin Smith, Ralph Southworth, David Stephenson (on behalf of fieldworkers based at Murchison House), Kevin Tait, Geoff Warke, Colin Waters, Mark Woods, and others whose comments have been anonymous.

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I am very grateful to all my colleagues who have taken time to contribute to this compilation.

# 9 REFERENCES

## 9.1 Documents mentioned in the Safe System of Fieldwork

- Barry, J, and Jepson, T. 1988. *Safety on Mountains: an approach to mountain adventure for beginners*. (British Mountaineering Council.)
- Langmuir, E. 1995. *Mountaincraft and Leadership*. (Mountain Leader Training Board/The Scottish Sports Council.)

- NERC Guidance Note 'Safety in Fieldwork' (March 1997)
- NERC Health and Safety Procedure Safe handling, lifting and moving of loads
- NERC Guidance Note for the Management of Lone Working (June 1993)
- NERC Health and Safety Notices:
  - HS2/94: Accident awareness and reporting
  - HS3/99: Guidance Note on driving hours and behaviour
- NERC Staff Notice 5/93

- HSE (Health and Safety Executive) leaflet 'Working Alone in Safety' (March 1998)
- HSE Guidance Note L23: Manual handling
- HSE Approved code of practice: safe use of pesticides for non-agricultural purposes

- The UK pesticide guide.

- The Highway Code

## 9.2 Additional sources of information

1. *Code of practice for exploration of disused mines.*
Issued by The National Association of Mining History Organisations and the National Caving Association.

2. Code of practice for geological visits to quarries, mines and caves. Geological Society of London.

3. Health and Safety Executive.

4. Royal Society for the Prevention of Accidents (RoSPA)

# APPENDIX 1: CHECKLISTS

## A: Accessing

When contacting landowners, farmers or estate managers ask about:

- livestock which should be avoided
- shooting
- crop-spraying (note that you do not need to ask about the type of spray being used: any recently sprayed field should be avoided)
- location of slurry pits (especially disused ones)
- since the foot and mouth outbreak in 2001 some farmers have been wary about allowing people on to their land. They may insist that you follow the guidelines in http://webarchive.nationalarchives.gov.uk/20130123162956/http://www.defra.gov.uk/animal-diseases/biosecurity/ Ask landowners, when seeking permission to use their land, if they want you to follow particular hygiene precautions. If they do, ask if they have facilities you could use to meet their requirements (for example: areas where you could wash down vehicles, clean boots etc. and guidance on whether they use disinfectants themselves). If the landowner requires you to follow these guidelines, you would have to do so. Whether they would want you to do so would probably relate to how close you might come to livestock and whether you were entering farm yards/buildings. Some farmers would certainly want to keep you away from yards but would be less worried about fields. CEH has quite extensive information on the COSHH implications of disinfectants from experience during the foot and mouth outbreak

When entering large excavations, ask about:

- local health and safety guidance
- normal working periods
- blasting times
- specific areas to avoid

## B: Activities requiring prior formal arrangement with other authorities

Fieldwork in any of the following:

- along railways
- along motorways
- airfields
- MoD property
- landfill sites
- construction sites
- quarries

## C: Activities requiring registration

Fieldwork which is expected to include any of the following requires prior permission from Programme Managers and specific registration with the NERC Health and Safety Adviser:

- exposure to hazardous substances
- work on contaminated ground
- work underground
- work on steep terrain
- work on cliff faces
- lone working in high risk environments

- any work requiring the use of safety harnesses or ropes
- work in boats

## D: Activities requiring special permission

Fieldwork which is expected to include any of the following requires prior permission from Project Leaders or Programme Managers:

- Employment of casual workers
- Fieldwork with minors

## E: Actions required by project leaders

This list is based on the guidance and information provided in the BGS Guidance Note 'A Safe System of Fieldwork'.:

- Consult relevant NERC or local Health and Safety Policy documentation
- Complete a Project Health and Safety Plan and, where appropriate, establish a Project Health and Safety File (Section 2.1)
    - seek additional resources (time, OR, equipment, training) and take any other action required by the Plan
- Prepare an approved Project Risk Assessment (RA) (Section 2.2)
- Provide copies of the RA to the Programme Manager and the Local Health and Safety Adviser
- Ensure that each fieldworker (including any 'specialists' who might make brief field visits) has a copy of :
    - the current version of this Safe System of Fieldwork (SSF),
    - significant findings of Risk Assessments relevant to their work.
- Check if any fieldworker requires clarification of the SSF or other documents, or has any concern to related to Health and Safety matters (Section 1)
- If working with staff from another organisation, co-ordinate H&S guidance
- Assess individual needs for additional H&S training or supervision during fieldwork
- Ensure that fieldworkers have all necessary protective clothing and safety equipment (Section 3)
- Check, as far as practical, that fieldworkers are fit for fieldwork (Section 4)
- Through discussion with the field team, decide on an appropriate system of reporting 'safe return' (Section 5)
- Ensure that the agreed system of reporting 'safe return' is maintained during fieldwork
- Following an accident, or 'near-miss', apart from any emergency measures, ensure that the event is recorded in the local accident reporting system. Review and revise the Risk Assessment (Section 6).