

GUIDANCE NOTES FOR COMMERCIAL EXPLOSIVE ORDNANCE DISPOSAL OPERATIONS IN GREAT BRITAIN

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Lead Author:

K A Cross MBE CEng FIEpE

GUIDANCE NOTES FOR COMMERCIAL EXPLOSIVE ORDNANCE DISPOSAL (EOD) OPERATIONS

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1.0 PREFACE

This Guidance Note is produced by the Institute of Explosives Engineers (IExpE) in conjunction with the Health and Safety Executive Explosives Inspectorate (HSE). It would not have been possible without the support and detailed consultation with the following organisations:

Health and Safety Executive Explosives Inspectorate
Association of Chief Police Officers (ACPO)
Ministry of Defence (MOD)
Fire Service
The Crown Estate
EOD Contracts Ltd
MACC International
Ramora UK
Zetica Ltd

The expectation from HSE is that EOD operators will understand and comply with the law, but it is recognised that commercial EOD is a difficult and necessary operation that does not fit neatly into the existing guidance on the disposal of explosives that is primarily aimed at the disposal of commercial explosives during manufacture, storage or at point of use.

The aims of this Guidance Note are:

- To provide practical advice to local authorities, the emergency services, possible contracting organisations and, EOD contractors on the measures to be taken to reduce the risk to people and property when suspected munitions are discovered.
- To outline the potential risks and safety measures that need to be considered.
- To enable a contracting organisation to specify EOD Operations as a means to achieving their overall intent.
- To enable a commercial EOD company to meet the various operational and legislative requirements demanded of it in conducting EOD operations within Great Britain.
- To assure the regulator that commercial EOD companies working within GB know the framework of explosives legislation within which they must operate and that implementation of commercial EOD Operations comply with that legislation and best practice.
- To outline the procedures to be followed when suspected munitions are encountered.
- To remind companies, individuals and organisation that the risks from their operations should be ALARP.

This Guidance Note does not relieve individuals, companies or organisation from their duty to meet the legislative requirements of the Law.

It provides guidance on best working practices for dealing with potentially unexploded munitions discovered on the landmass of Great Britain or in its territorial waters. The Guidance Note is not a substitute for officially recognised training and qualifications but is intended to assist all involved in fulfilling their responsibilities for:

- the safety of employees, contractors and service personnel.
- the safety of people living or working in the vicinity of the EOD Operation.

2.0 INTRODUCTION

The distribution and density of exploded and unexploded munitions ('explosive ordnance') on land and the sea bed varies depending on the history of the area - for example whether it has been used for warfare, military training, disposal or weapons testing manufacture, storage, distribution or assembly.

The Ministry of Defence provides EOD support to the civil authorities within the UK under Military Aid to the Civil Authorities principles¹. The geographical dispersal of and response time for military EOD teams is formally agreed between the Home Office and the Ministry of Defence in a Service Level Agreement. Defence will respond at short notice where there is deemed to be a threat to life or potential for unacceptable economic damage. Outside these criteria, Defence will clear unexploded ordnance and consider requests for assisting in the clearance of other types of explosive. However, should there be a realistic expectation of encountering munitions during a commercial operation or private working, a competent commercial EOD contractor should be employed. The Metropolitan Police Service and a number of UK commercial companies maintain a range of EOD capabilities. The latter may also be engaged to support civil authorities.

The principles of EOD Operations set out in the International Mine Action Standards² and the competency standards agreed within the EU³, while intended for demining operations in former conflict areas nevertheless provide a sensible and proven safe framework for the conduct and management of non-military EOD operations in the United Kingdom.

General principles

EOD may be undertaken as a routine part of commercial operations or private working following the discovery of unexploded ordnance (UXO). UXO are typically discovered as a result of construction work, farming, dredging or house clearances. Such operations may involve a single item of UXO, or a number of items at a specified location such as a former artillery training area, WW2 air-dropped bomb or munitions lost or jettisoned overboard from a ship.

The effective management of an explosive hazard reduction programme includes, where necessary, the establishment and maintenance of a capability to conduct EOD in a safe and effective manner. This involves a formal risk assessment of the Explosive Remnants of War (ERW) hazards and the development of a safe and effective EOD capability. Such a capability shall include the preparation of appropriate procedures for neutralisation and disarming, the use of well trained and qualified EOD operators, and the use of effective and safe equipment, stores and supplies. In the UK the number of UXO incidents has remained steady at approximately 2700 EOD tasks per year over the past 10 years⁴. It is recognised that the explosives threat (UXO, IED and CBRN) in the UK requires a structured EOD capability combining military and commercial EOD response.

The development of a safe and effective EOD capability requires the establishment of levels and sets of expertise to cope with a range of hazards and operational requirements. As a general principle, operators should deal only with those items and situations for which they have been trained and authorised, i.e. are deemed competent. All other cases should be referred to the next higher level of expertise or skill set. Individuals should maintain a log book of EOD training, operations and validation; Organisations should maintain an auditable competence management system.

All operations shall be subject to an initial Risk Assessment, subsequent Method Statement/Specific Site Procedures and emergency procedures.

Commercial EOD organisations coming across unexploded ordnance should not use MACP to remove them unless there is a threat to life or potential for unacceptable economic damage.

¹ Joint Doctrine Publication 02 (2nd Edition) - Addendum: Operations in the UK: A Guide for Civil Responders, published February 2010

² IMAS 09.30 Second Edition (01 October 2008)

³ CEN 15464:2005 - Workshop Agreement for EOD Competency Standards for Humanitarian Mine Action Parts 1-5

⁴ JSEODOC Statistics

3.0 GLOSSARY

ADR - The European Agreement on the International Carriage of Dangerous Goods by Road 2011 (ADR 2011).

The Agreement itself is short and simple. The key article is the second, which says that apart from some excessively dangerous goods, other dangerous goods may be carried internationally in road vehicles subject to compliance with:

- the conditions laid down in Annex A for the goods in question, in particular as regards their packaging and labelling,; and
- the conditions laid down in Annex B, in particular as regards the construction, equipment and operation of the vehicle carrying the goods in question.

Annexes A and B have been regularly amended and updated since the entry into force of ADR. Consequently to the amendments for entry into force on 1 January 2011, a revised consolidated version has been published as document ECE/TRANS/215, Vol 1 and 2 ("ADR 2011")

AXO⁵ - Abandoned Explosive Ordnance: in the international context, AXO refers to explosive ordnance that has not been used during an armed conflict, that has been left behind or dumped by a party to an armed conflict, and which is no longer under control of the party that left it behind or dumped it. Abandoned explosive ordnance may or may not have been primed, fused, armed or otherwise prepared for use. (CCW protocol V⁶). In the context of this GN, AXO also includes explosive substances and articles, including pyrotechnics and propellants, abandoned or lost from civil or commercial use, outside the control of the proper owner of the explosive substance or article.

Explosive Ordnance (EO)⁷ - refers to all munitions containing explosives, nuclear fission or fusion materials and biological and chemical agents. This includes bombs and warheads; guided and ballistic missiles; artillery, mortar, rocket and small arms ammunition; all mines, torpedoes and depth charges; pyrotechnics; cluster bombs and dispensers; cartridge and propellant actuated devices; electro-explosive devices; clandestine and improvised explosive devices; and all similar or related items or components explosive in nature.

NB. Within the context of this Guidance Note, all non-military explosive substances and articles (including pyrotechnics) will be included in the term EO.

Explosive Remnants of War (ERW)⁸ - refers to Unexploded Ordnance (UXO) and Abandoned Explosive Ordnance (AXO), excluding landmines.

Explosive Substances and Articles (ESA) -

Explosive substance⁹ means a solid or liquid substance (or a mixture of substances), which is either:

- capable by chemical reaction in itself of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings.
- designed to produce an effect by heat, light, sound, gas or smoke, or a combination of these as a result of a non-detonative, self-sustaining, exothermic reaction

⁵ IMAS 04.10 Second Edition (01 January 2003)

⁶ Protocol V (Explosive Remnants of War) to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects (CCW)

⁷ AAP-6(2006) NATO Glossary of Terms and Definitions (English and French).

⁸ IMAS 04.10 Second Edition (01 January 2003)

⁹ MSER 2005, Regulation 2

Explosive article¹⁰ means an article containing one or more explosive substances.

Explosive Ordnance Disposal (EOD)¹¹ - The detection, identification, on-site evaluation, rendering safe, recovery and final disposal of unexploded explosive ordnance. It may also include explosive ordnance which has become hazardous by damage or deterioration.

EOD Procedures¹² - Those particular courses or modes of action taken by explosive ordnance disposal personnel for access to, diagnosis, rendering safe, recovery and final disposal of explosive ordnance or any hazardous material associated with an explosive ordnance disposal incident.

- a. Access procedures - Those actions taken to locate exactly and to gain access to unexploded explosive ordnance.
- b. Diagnostic procedures - Those actions taken to identify and evaluate unexploded explosive ordnance.
- c. Render-safe procedures - The portion of the explosive ordnance disposal procedures involving the application of special explosive ordnance disposal methods and tools to provide for the interruption of functions or separation of essential components of unexploded explosive ordnance to prevent an unacceptable explosive event.
- d. Recovery procedures - Those actions taken to recover unexploded explosive ordnance.
- e. Final disposal procedures - The final disposal of explosive ordnance which may include demolition or burning in place, removal to a disposal area or other appropriate means.

EOR - Explosive Ordnance Reconnaissance.

IExpE¹³ - Institute of Explosives Engineers

IMCSE¹⁴ - Institute of Munitions Clearance and Search Engineers

JSEODOC - Joint Service EOD Operations Centre

MP – Miscellaneous Pyrotechnics. A specific category of UXO which includes those pyrotechnic articles which might otherwise be called TEP (Time Expired Pyrotechnics) and also items which have been simply lost or discarded by their owners..

Munition - A complete device charged with explosives, propellants, pyrotechnics, initiating composition, or nuclear, biological or chemical material for use in military operations, including demolitions. This includes those munitions that have been suitably modified for use in training, ceremonial or non-operational purposes.

Throughout this Guidance Note, munitions are considered under three distinct categories although live and blind are both unexploded:

inert - contain no explosives whatsoever.

live - contain explosives and have not been fired.

blind - have fired but failed to function as intended.

PUCA - Pick Up and Carry Away.

¹⁰ MSER 2005, Regulation 2

¹¹ AAP-6(2006) NATO Glossary of Terms and Definitions (English and French).

¹² AAP-6(2006) NATO Glossary of Terms and Definitions (English and French).

¹³ <http://www.iexpe.org/>

¹⁴ www.imcse.org

Pyrotechnic¹⁵ - an explosive article or substance of a kind designed to produce an effect by heat, light, sound, gas or smoke, or a combination of any of these, as a result of non-detonative, self-sustaining, exothermic chemical reactions.

Stray ordnance or explosives. Explosives or explosive articles that have simply been misplaced or lost and have appeared in a location different from where they were intended. See also AXO.

UXO - Unexploded Explosive Ordnance. Explosive ordnance which has been primed, fuzed, armed or otherwise prepared for action, and which has been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, installations, personnel or material and remains unexploded either by malfunction or design or for any other cause.

4.0 SCOPE OF THE GUIDANCE NOTE

This Guidance Note covers all types of munitions or stray explosive substances and articles including pyrotechnics, likely to be encountered on land or in the maritime environment which remain potentially dangerous even when they have been buried or submerged for many years. There is also a role for commercial EOD organisations in the disposal of time expired explosives (principally pyrotechnics), old stock (primarily propellant) and seized or abandoned explosives and the disposal of unserviceable explosive substances and articles identified during routine manufacture, storage, preparation for use and use of those ESA, including the disposal of misfired articles, which are the responsibility of the owner/duty holder at that point in the life-cycle of the ESA but who does not have the capability to conduct disposal themselves. This activity is deemed to be a requirement of support to resilience rather than the UK's Counter-terrorism response.

This Guidance Note applies to the following disciplines within the overall field of EOD:

- Explosive Ordnance Reconnaissance (EOR).
- Explosive Ordnance Clearance (EOC), also referred to as Area Clearance.
- Conventional Munitions Disposal (CMD).

It applies to those disciplines when being conducted on land or underwater within the internationally agreed boundaries of GB jurisdiction.

The Guidance covers 2 distinct types of EOD operation:

1. Pre-planned or pre-emptive
2. Reactive

This Guidance Note **does not** apply to:

- The disposal of chemical, biological, radiological or nuclear weapons (CBRN), which remain the responsibility of MOD.
- The disposal of improvised explosive devices (IEDD), which may be emplaced by pranksters, criminals or terrorists.
- The disposal of conventional munitions disposal (CMD) where there is a threat to life or potential for unacceptable economic damage.
- The disposal of unserviceable explosive substances and articles identified during routine manufacture, storage, preparation for use and use of those ESA, including the disposal of misfired articles, which remains the responsibility of the owner/duty holder at that point in the life-cycle of the ESA.

The MOD will maintain a niche capability for CBRN, IEDD¹⁶ and CMD. Munitions with highly toxic or carcinogenic components, once identified by the EOD Operator, must be dealt with by a suitably qualified MOD or civil EOD Operator.

¹⁵ MSER 2005, Regulation 2

¹⁶ JDP02 (Ed 2) Addendum - An Explosive Ordnance Disposal capability including a Chemical, Biological, Radiological and Nuclear elements, an air surveillance, policing and defence system, a land, air and maritime counter terrorism capability and a maritime Search and Rescue capability.

This Guidance Note takes cognisance of specific guidance on dealing with munitions in marine sediments¹⁷.

This Guidance Note should be read in conjunction with existing guidance on the disposal of explosives¹⁸.

This Guidance Note should be read in conjunction with existing guidance on management of UXO in the construction industry¹⁹.

5.0 LEGISLATIVE REQUIREMENTS

Remember that ignorance is no excuse in law; ensure that you always have the most up to date version of relevant legislation, for example, ADR is reviewed biennially and the HSE is conducting a review of all UK explosives legislation at the time of writing.

Health and Safety Requirements

A considerable amount of health and safety legislation has a bearing on the management and conduct of commercial EOD operations. The following list highlights the principal legislation relating to the management of disposal of explosives and this guidance should be read in conjunction with these publications:

Explosives

1. Manufacture and Storage of Explosives Regulations 2005 (MSER)
2. The Explosives Act 1875
3. The Control of Explosives Regulations 1991 (COER)
4. Placing on the Market and Supervision of Transfers of Explosives Regulations 1993 (POMSTER)
5. Identification and Traceability of Explosives Regulations 2013 (ITOER)
6. Dangerous Substances in Harbour Areas Regulations 1987 (DSHAR)

General

7. Management of Health and Safety at Work Regulations 1999
8. Health and Safety at Work, etc Act 1974
9. Control of Noise at Work Regulations 2005
10. Electricity at Work Regulations 1989
11. Manual Handling Operations Regulations 1992
12. Workplace (Health, Safety and Welfare) Regulations 1992
13. Personal Protective Equipment at Work Regulations 1992
14. Provision and Use of Work Equipment Regulations 1998
15. Lifting Operations and Lifting Equipment Regulations 1998
16. Control of Major Accident Hazard Regulations 1999 (COMAH)
17. Control of Substances Hazardous to Health Regulations 2002 (COSHH)
18. Control of Lead at Work Regulations 2002
19. Dangerous Substances and Explosive Atmospheres Regulations 2002
20. Carriage of Dangerous Goods and Use of Transportable Pressure Vessels Regulations 2009 (CDG 2009)
21. Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (CHIP 3)

The relevance of each of these regulations is outlined below:

Manufacture and Storage of Explosives Regulations 2005 (MSER)

MSER requires that, with certain exceptions, explosives may only be manufactured in a facility licensed under the regulations, and only be kept at a licensed facility or premises registered under the regulations. All licenses and the conditions of registration of premises specify the locations where explosives may be stored and manufactured, and the maximum quantities and types of explosives, which may be present at

¹⁷ Guidance Note March 2010. Dealing with munitions in marine sediments. ISBN 978-1-906410-14-8

¹⁸ CBI Explosives Industry Group. Guidance for the Safe Management of the Disposal of Explosives. A guide to the safe disposal of explosives, the relevant legislation, the techniques used for disposal and associated risk control systems. January 2007

¹⁹ CIRIA Book C681 - Unexploded ordnance (UXO) A guide for the construction industry

each location. The regulations also require that any person who disposes of explosives shall ensure, so far as is reasonably practicable, that they are disposed of safely and that any person who decontaminates explosive-contaminated items shall ensure, so far as is reasonably practicable, that they are decontaminated safely.

Further guidance is available in the Approved Code of Practice²⁰

The Explosives Act 1875

Most of the provisions of the Explosives Act 1875 have been repealed or amended. Details of most of the sections of the act that have been repealed or amended by MSER are detailed within schedule 5 to MSER 2005.

The most relevant of the remaining, albeit amended, provisions under the act are the requirements under Section 23 of the Act and the requirements under Order of Secretary of State 11 (3). Section 23 requires the occupier of every premises at which explosives are manufactured or stored to take all due precaution for preventing unauthorised persons having access to the premises or to the gunpowder therein. Order of Secretary of State 11 (3) requires persons not to deposit explosives in receptacles or places appropriated for refuse and states that explosives shall not to be handed or forwarded to persons or vehicles employed or appropriated for the removal or conveyance of refuse.

Control of Explosives Regulations 1991 (COER) (as amended)

These regulations require that an explosives certificate is issued by the chief officer of police or the HSE to acquire or to acquire and keep most explosives, with some specified exceptions. The regulations describe those records of explosives possessed that are to be made, preserved and produced on demand. Commercial EOD organisations and operators will recognise that it is essential that accurate records of any explosives used and explosive items dealt with during an EOD operation are part of the controls applied to those items. Any loss of explosives is to be reported to the chief officer of police in the area in which the loss occurs.

It is important for commercial EOD organisations to note that the HSE “may exempt any person or class of persons or any explosive or class of explosives from any requirements or prohibitions imposed by COER, and any such exemptions may be granted subject to conditions and to a limit of time and may be revoked by a certificate in writing at any time”.

Placing on the Market and Supervision of Transfers of Explosives Regulations 1993 (POMSTER)

Regulation 8 states that "transfer" means any physical movement of explosives apart from movement within one site. The EOD Company will need to acquire, keep and transfer its own serviceable explosives and may, of necessity, be required to transfer the item for disposal to a site other than that where it was discovered.

The Regulations are applicable to explosives from all origins, ie EC Member States and third countries, emphasising that transfer controls require competent authorities to approve movements of such within, through and between Member States. These measures supplement domestic security arrangements enforced under Control of Explosive Regulations (1991).

These regulations include requirements for certain explosives to undergo testing and meet certain essential safety requirements before they are placed on the market. They also require that certain security controls be complied with. The transfer of UXO/AXO from the site where it is discovered to an off-site disposal area is a foreseeable activity which will require authority.

The ACoP to the regulations states that this regulation provides a system of security controls on transfers of explosives which places responsibilities on a range of persons involved in the transfer chain. Before transfer of any explosive covered by the Regulations can take place, including movements wholly within GB, **the consignee** must obtain the written approval of the **competent authority** for the country where the

²⁰ <http://www.hse.gov.uk/pubns/books/l139.htm>

transfer will terminate - HSE in the case of movements terminating in GB. The recipient competent authority document ('transfer document'), or a certified true copy, must accompany the explosives throughout their journey. These requirements supplement domestic security controls on acquisition and keeping of explosives under COER and export licensing provisions under Export of Goods Control legislation.

Identification and Traceability of Explosives Regulations 2013 (ITOER)²¹

ITOER 2013 sets out a system for the identification and traceability of explosives intended for civil use. Similar Regulations have been introduced across Europe to enable identification and traceability of explosives at every point in the supply chain. This followed security issues raised by the Madrid train bombings in 2004, which killed 191 people, and injured over 1800 others.

ITOER 2013 applies to all civil use explosives, covered by European Commission Directive 93/15/EC²², manufactured or imported after 5 April 2013. Marking requirements come into force from 5 April 2013 and record keeping requirements from 5 April 2015.

ITOER 2013 does not apply to civil use explosives manufactured or imported before 5 April 2013 which can be placed on the market and transported throughout the EU provided that all other requirements of Directive 93/15/EC are met.

The following civil use explosives are out of scope of ITOER 2013:

- Fuses, including safety fuses, and cap-type primers
- Pyrotechnic articles, for example flares or fireworks
- Explosives transported and delivered unpackaged or in pump trucks for their direct loading into a blast hole;
- Explosives manufactured at the blasting sites, and that are loaded immediately after being produced (in situ production).
- Ammunition (the acquisition of which is regulated or prohibited by the Firearms Act 1968 to 1997) or in Northern Ireland, by the Firearms (Northern Ireland) Order 2004.
- Explosives intended for use by the military or the Police.

Dangerous Substances in Harbour Areas Regulations 1987 (DSHAR)²³

Part 9 of DSHAR relates specifically to explosives. Because of the inherent danger of most explosives, their handling between land and sea is generally only permitted in a harbour or harbour area if it has been licensed. To avoid the possibility that explosives which are loaded or unloaded other than in a harbour or harbour area might escape the licensing controls, Regulations 34 to 36 also apply to the loading or unloading of any explosive into or from a vessel on the coast of Great Britain, in any tidal water or within territorial waters. An explosives licence is not, however required for offshore installations. There are exceptions to the explosives licensing requirements. These exceptions relate either to explosives which do not present a significant risk because of their inherent nature, or amount present, or because the conditions under which they are handled do not warrant a licence. They are listed in Regulation 33(2).

Regulations 37 to 42 apply to all explosives in harbours and harbour areas irrespective of whether an explosives licence is required or not.

Management of Health and Safety at Work Regulations 1999 (MHSWR)

Implementation of these regulations is a key driver for safe EOD operations as they are the legal requirement for risk assessments of work activity. An important requirement of these regulations is for an employer to make a suitable and sufficient assessment of the risks to the health and safety of employees and other persons arising from the employer's undertaking in order to identify the measures the employer needs to take to comply with health and safety legislation. Similar duties are placed on the self-employed.

²¹ <http://www.legislation.gov.uk/ukxi/2013/449/contents/made>

²² <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1993:121:0020:0036:EN:PDF>

²³ <http://www.hse.gov.uk/pubns/priced/hsr27.pdf>

These regulations also (in Schedule 1) lay down a set of principles to be followed in identifying the appropriate protective measures to control the risks identified by the risk assessment. There is an approved code of practice and guidance for these regulations²⁴.

Health and Safety at Work etc Act 1974 (HSWA)

This Act covers the health and safety of people at risk through work activities. It has a number of objectives, primarily to secure the health, safety and welfare of persons at work. It applies to all persons at work irrespective of the work done or the premises where it is done.

Under Section 2, employers are required to ensure, so far as is reasonably practicable, the health and safety at work of their employees.

Duties placed on employers and the self-employed under Section 3 of HSWA are relevant to persons who are not employees, for example contractors. The Act also protects people other than those at work (i.e. the general public) against risks to their health and safety arising out of work activities.

The Act imposes duties on everyone concerned with work activities ranging from employers, employees, self-employed, manufacturers, designers, suppliers and importers, people in control of premises and even extends to members of the public

Control of Noise at Work Regulations 2005

These are relevant to the control of noise exposure in working areas. There is guidance on these regulations "Controlling noise at work - The control of Noise at Work Regulations 2005" L108.

The regulations set exposure action values and exposure limit values. The lower exposure action values are:

- (a) a daily or weekly personal noise exposure of 80 dB (A-weighted);
- and
- (b) a peak sound pressure of 135 dB (C-weighted).

The upper exposure action values are:

- (a) a daily or weekly personal noise exposure of 85 dB (A-weighted);
- and
- (b) a peak sound pressure of 137 dB (C-weighted).

The exposure limit values are:

- (a) a daily or weekly personal noise exposure of 87 dB (A-weighted);
- and
- (b) a peak sound pressure of 140 dB (C-weighted).

The regulations require an employer who carries out work which is liable to expose any employees to noise at or above a lower exposure action value to make a suitable and sufficient assessment of the risk from that noise to the health and safety of those employees. The risk assessment needs to identify the measures which need to be taken to meet the requirements of these Regulations. In conducting the risk assessment, the employer needs to assess the levels of noise to which workers are exposed by means of:

- a) observation of specific working practices;
- (b) reference to relevant information on the probable levels of noise corresponding to any equipment used in the particular working conditions
- and
- (c) if necessary, measurement of the level of noise to which his employees are likely to be exposed and the employer needs to assess whether any employees are likely to be exposed to noise at or above a lower exposure action value, an upper exposure action value, or an exposure limit value.

²⁴ <https://books.hse.gov.uk/public/saleproduct.jsf;jsessionid=262DABA65B3FDC98F584DDA9DADEE794.plukweb3?catalogueCode=9780717624881>

Many EOD operations will occur without significant noise being generated, provided that the necessary controls to prevent an unplanned explosive event are in place. It is important to recognise that the selection of appropriate techniques for the disposal of explosives that appropriately control the risks of an explosion occurring are also likely to form at least some of the controls with respect to persons exposure to noise whilst at work.

The quantity-distance relationships given in Annex F to the Explosives Industry Group (EIG) Guidance follow the essentially precautionary approach previously taken in legislation and guidance intended to control many of the risks associated with operations involving explosives. These risks include deficiencies in the characterisation of all of the behaviours of explosives substances and articles as well as deviations from working procedures and recognised good practice. The quantity-distance relationships describe potential hazards to which people may be exposed as a consequence of the potential explosive event that could occur during disposal and destruction operations (e.g. blast effects). They assume that the risks associated with noise have been appropriately controlled and that precautions have been put in place to prevent noisy events, where this is reasonably practicable.

Without the necessary controls to prevent an explosive event there is a potential for persons in the open, (and potentially persons within buildings) to be subject to levels of noise at or above the peak threshold of 140dB(C). Therefore a suitable and sufficient assessment of the risks associated with potential noise effects should have been made for all destruction processes and controls must be in place to prevent an explosion where it has been identified that an explosion is possible but unlikely, or possible but unexpected. Compliance with the guidance given and techniques described in this document should identify those controls.

Consideration should be made of the controls that could be implemented to mitigate the effects of not only any destruction activity where it is expected that noise will be generated but also those that have the potential to result in an explosion or other significant noise. These could include:

- Destroying explosives in the smallest unit quantity conducive to the control of the explosive risks such that the potential impulse of any blast effect is minimised
- The use of blast mitigation systems.
- Designing the disposal location such that the effects of any explosion are contained, absorbed or deflected.
- The application of exclusion zones greater than those detailed in this guidance.
- The soundproofing of occupied buildings including those provided as refuges
- The provision of suitable hearing protection to employees.

Where the only reasonably practicable disposal technique is one where the balance of risks are such that an explosion is to be expected it will be necessary to ensure that persons are located at distances that will prevent them being exposed to noise above the relevant action levels or to ensure that they are otherwise protected from the effects of noise.

Where such disposal activities take place on a routine basis it is expected that they would be subjected to routine noise monitoring.

In any case, if it is anticipated that any employee is likely to be exposed to noise at or above the upper exposure values then the wearing of hearing protection becomes mandatory. The hearing protection should be effective enough to reduce the exposure to below the limit value. If exposure above the upper action values occurs regularly then it is recommended that employee should be provided with hearing checks. For more information see L108²⁵.

Electricity at Work Regulations 1989

These regulations place duties on employers, the self-employed and employees and apply to all workplaces. In the context of this guide, their requirements will need to be complied with in relation to any item of electrical equipment which forms part of the workplace.

²⁵ Guidance on Regulations - Control of Noise at Work Regulations 2005

Amongst the areas that the Regulations address, there are two that are especially important in relation to equipment in explosives working areas. Regulation 6 deals with adverse or hazardous environments, and requires, among others, that electrical equipment which may reasonably foreseeably be exposed to any flammable or explosive substance including dusts, vapours or gases shall be of such construction or, as necessary, protected to prevent, so far as is reasonably practicable, danger arising from such exposure.

Regulation 8 deals with earthing or other suitable precautions. There is general Health and Safety Guidance on these regulations. There is Health and Safety Executive Guidance Note PM82, which gives detailed advice relevant to meeting the requirements of Regulations 6 and 8 for electrical equipment for use in and around explosives working areas.

Manual Handling Operations Regulations 1992 (MHOR)

The requirements of these Regulations need to be considered for any activity involving manual handling. There is Health and Safety Executive guidance on these Regulations²⁶, which includes tools for the conducting of manual handling risk assessments.

Workplace (Health, Safety and Welfare) Regulations 1992

The requirements of these regulations need to be met to ensure that workplace facilities meet certain standards. There is Health and Safety Executive guidance on these Regulations²⁷.

Personal Protective Equipment at Work Regulations 1992

MHSWR requires employers to identify and assess risks to health and safety in the workplace. The risks should then be reduced to an acceptable level by the most appropriate means. Engineering controls or safe systems of work should be considered first in the hierarchy of controls. PPE should be regarded as the last resort to protect against risks. However given the nature of most disposal operations there is likely to be a requirement for some kind of PPE at some stage of the process.

When PPE is necessary, it only protects the person wearing it, theoretical maximum levels of protection are seldom achieved and PPE often restricts the wearer by limiting mobility or visibility. It is therefore essential that appropriate PPE and training in its use is provided when there is a risk to health and safety that cannot be adequately controlled by other means.

The regulations place requirements on employers to provide PPE that is suitable for the purpose, that is maintained or replaced as necessary, that is provided with suitable accommodation when not in use and that suitable information, instruction and training is given in its use. The regulations also place duties on employees to make full and proper use of PPE when it is provided. Employees also have a duty to report any loss or defect.

Further guidance on the use of PPE in an explosives environment is available²⁸.

Provision and Use of Work Equipment Regulations 1998 (PUWER 98)

PUWER 98 applies to the provision and use of all work equipment, including mobile and lifting equipment, and to all workplaces and work situations where HSWA applies. PUWER 98 came into force in December 1998, but some of the regulations dealing with mobile work equipment did not come into effect until 5 December 2002. The Regulations define work equipment as "any machinery, appliance, apparatus, tool or installation for use at work (whether exclusively or not)".

Regulation 4 deals with the suitability of work equipment. In Regulation 5 there is a requirement that work equipment is maintained in an efficient state, in efficient working order, and in good repair. Regulation 6 deals with inspection, including inspection of equipment after installation or reinstallation, before it is put into service and inspection of equipment such as complex automated equipment where the safe operation is critically dependent on its condition in use and deterioration would lead to a significant risk to the operator or other worker. This Regulation also requires that a record of the latest inspection is kept until the next inspection has been recorded.

²⁶ www.hse.gov.uk/msd/mac

²⁷ <http://www.hse.gov.uk/pubns/books/l24.htm>

²⁸ Fire Protective Clothing and Head and Eye Protection, CBI EIG Guide, ISBN 0852015135

Regulation 7 addresses cases where the use of work equipment is likely to involve a specific risk to health or safety. In such cases, this Regulation requires that equipment is only allowed to be used by those whose task it is to use it, and that repairs, modifications etc shall only be carried out by a specifically designated person (who could also be the operator of the equipment). Regulation 8 deals with information and instruction and Regulation 9 with training. Regulation 10 covers the conformity of work equipment with legislation, which brings into effect the requirements of EC Directives on product safety, such as the Supply of Machinery (Safety) Regulations 1992 as amended.

Regulations 11 to 24 of PUWER 98 deal with the physical aspects of work equipment. They cover for example, the guarding of dangerous parts of work equipment, the provision of appropriate controls and suitable warning markings or devices.

There is an approved code of practice and guidance for PUWER 98²⁹.

Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)

Although PUWER 98 applies to all lifting equipment, LOLER applies over and above the general requirements of PUWER 98 with regard to specific hazards and risks associated with lifting equipment and lifting operations. There is an approved code of practice³⁰ and guidance for these regulations.

Control of Major Accident Hazards Regulations 1999 (COMAH)

These regulations apply to any establishment, which has, or anticipates having, any substance specified in Schedule 1 to COMAH above the qualifying quantity. The qualifying quantities of explosives for the application of COMAH are such that currently there are relatively few sites licensed under the Manufacture and Storage of Explosives Regulations 2005 which are subject to COMAH. At establishments where COMAH does apply, advice in the guide will be relevant to various aspects of the general duty under the regulations for the operator of the establishment to take all measures necessary to prevent major accidents and limit their consequences to people and the environment. It should be emphasised however that the protection of the environment per se is out with the scope of this publication.

Although the EOD Company and its operations are unlikely to require licensing under these Regulations in their own right, there may be occasions when EOD Operations are undertaken on a COMAH licensed premises. The EOD company must understand the local COMAH requirements and incorporate local plans into their own, as well as dovetailing the EOD and COMAH risk assessments.

There is Health and Safety Guidance³¹ on these regulations.

Control of Substances Hazardous to Health Regulations 2002 (COSHH)

COSHH applies to substances that have already been classified as being very toxic, toxic or harmful, corrosive, or irritant under the Chemicals (Hazard Information and Packaging for Supply Regulations) 2002 (CHIP 3) as amended, and to those substances, which have maximum exposure limits (MELs) or occupational exposure standards (OESs). COSHH also covers other substances that have chronic or delayed effects, for example substances that are carcinogenic, mutagenic or teratogenic and biological agents. A substance should be regarded as hazardous to health if it is hazardous in the form in which it occurs in the work activity, whether or not its mode of causing injury to health is known, and whether or not the active constituent has been identified. A substance hazardous to health includes mixtures as well as single substances. Regulation 3 places duties on an employer in respect of employees and extends to any other person who may be affected by the work of the employer. These regulations apply to a self-employed person as if that person were both an employer and an employee. Regulation 6 requires that a suitable and sufficient assessment to be undertaken of the health risks created by work involving substances hazardous to health, and Regulation 7 requires that exposure to substances hazardous to health is prevented, or failing this, controlled. Regulation 8 places duties on employers and employees to properly use or apply control measures. Regulation 9 deals with the maintenance, examination and test of control measures, Regulation 10 with workplace monitoring and Regulation 11 with health surveillance. Regulation 12 deals with information, instruction and training.

²⁹ <http://www.hse.gov.uk/pubns/books/puwer.htm>

³⁰ <http://www.hse.gov.uk/pubns/books/lole.htm>

³¹ <http://www.hse.gov.uk/comah/guidance.htm>

Regulation 5 exempts certain substances, which are subject to more specific legislation on the control of health hazards, such as asbestos and lead, from the requirements of Regulations 6 to 12 inclusive of COSHH.

There is an approved code of practice for these regulations.

Control of Lead at Work Regulations 2002 (CLAW)

An EOD Company could expect to be tasked to dispose of surplus small arms or sporting gun ammunition, or other ESA with a high lead content.

The main requirements for employers are:

- to assess health risks created by work involving exposure to lead
- to prevent or control exposure to lead
- to provide controls on eating, drinking and smoking
- to maintain, examine and test control measures
- to undertake air monitoring
- to undertake medical surveillance
- to provide information, instruction and training

There is an approved code of practice for these Regulations.

Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR)

The Regulations apply to the majority of work activities, including those carried out in moveable structures, outdoor areas and domestic premises, where:

- work is being carried out by an employer (or self-employed person);
- a dangerous substance is present (or is liable to be present or generated) at the workplace;
- a potentially explosive atmosphere may occur;
- the dangerous substance and/or potentially explosive atmosphere could be a risk to the safety of people as a result of fires, explosions or similar energetic events.

An EOD company running a permanent or semi-permanent disposal plant should consider the application of DSEAR to its activities.

These regulations apply to all dangerous substances at nearly every business in Great Britain. They set minimum requirements for the protection of workers from fire, explosion and similar (energy releasing) events, which are caused by dangerous substances and potentially explosive atmospheres. The regulations are complementary to the general duty to manage risks under the Management of Health and Safety at Work Regulations 1999. The main requirements are that employers and the self-employed must:

- Carry out a risk assessment of work activities involving dangerous substances
- Provide technical and organisational measures to eliminate or reduce as far as is reasonably practicable the identified risks
- Provide equipment and procedures to deal with accidents and emergencies
- Provide information and training to employees
- Classify places where explosive atmospheres may occur into zones, and mark the zones where necessary.

There are approved codes of practice for these Regulations³².

Chemicals (Hazard Information and Packaging for Supply Regulations) 2002 (CHIP 3)

CHIP 3 applies to suppliers of dangerous chemicals. Its purpose is to protect people and the environment from the effects of these chemicals by requiring suppliers to give information and to package them safely. The idea is that when people know about the dangers of a chemical, and what they can do to avoid them, they will be less likely to harm themselves, others or the environment.

³² <http://www.hse.gov.uk/pubns/books/l138.htm>

CHIP applies to most chemicals. The exceptions, which are identified in regulation 3(1), are specialised chemicals such as cosmetics, medicines, wastes and several others all of which are covered by other regulations.

It is a fundamental requirement for suppliers to decide, using a set of rules, whether a chemical is dangerous or not. If the supplier decides that the chemical is dangerous (i.e. 'classified') then a number of further requirements are triggered.

HSE is of the view that any finished and closed munitions or other explosive articles (which have no exposed explosive composition) should be generically considered complete articles, rather than substances or preparations, and, therefore, are outside the scope of the current CHIP regulations. If work causes composition to become exposed as part of an action by users etc. then there will be duties under the HSWA to provide necessary information for ensuring health and safety with respect to any chemical hazard.

There is an Approved Code of Practice and further guidance for these Regulations³³.

The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (CDG)

CDG regulations³⁴ essentially bring the provisions of the European agreement for the transport of dangerous goods by road (ADR³⁵) into British law. The Carriage Regulations set the legal framework in Great Britain, as ADR itself has no provision for enforcement. The regulations include a number of exemptions and make substantial changes to the previous requirements for the domestic carriage of many explosives. The main duties are now covered by a single regulation, namely Regulation 5.

Variations in GB which arise from derogations are now in a DfT Approved Document "Carriage of Dangerous Goods: Approved Derogations and Transitional Provisions".³⁶

Information on the operation of the regulations may be found in the CDG Manual³⁷.

Environmental Requirements

Comprehensive guidance on environmental matters is available from other sources e.g. the Environment Agency (EA) and Scottish Environment Protection Agency (SEPA), both of which are the regulatory authorities for waste management activities, regulation of discharges to controlled waters, IPC/PPC (Part A(1)) and designated Part IIA special sites. Specific legislation applicable to EOD Operations includes:

- The Clean Air (Emission of Dark Smoke (Exemption)) Regulations 1968
- Environmental Protection Act 1990
 - NB.** Section 79(2) of this Act specifically excludes smoke and noise from the definition of statutory nuisance in certain circumstances

It is important to note that Article 2.1(e) of DIRECTIVE 2008/98/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 November 2008 on waste and repealing certain Directives excludes decommissioned explosives from the scope of that directive.

Dealing with noise and vibration

Noise and vibration issues are stringently regulated and the operator must be in compliance with a number of key regulations and constraints, including:

³³ <http://www.hse.gov.uk/chip/>

³⁴ <http://www.legislation.gov.uk/ukxi/2009/1348/contents/made>

³⁵ <http://www.unece.org/trans/danger/publi/adr/adr2011/11contentse.html>

³⁶ <http://assets.dft.gov.uk/publications/carriage-of-dangerous-goods-approved-derogations-transitional-provisions/approved-derogations-transitional-provisions.pdf>

³⁷ <http://www.hse.gov.uk/cdg/manual/index.htm>

1. The Quarries Regulations 1999 and the accompanying code of practice³⁸, which introduce regulation to reduce the incidence of high levels of ground vibration. The Environment Act 1995³⁹, which limits blasting to 10.00-12.00 and 14.00-16.00 on Mondays to Fridays, and 10.00-12.00 on Saturdays. BS6472:1992⁴⁰ Appendix C "Guide to the evaluation of vibration induced by blasting" which discusses the possible effect that various types of structural vibration can have upon a building's inhabitants together with how and where such vibration should be measured.
2. BS 5228-2:2009⁴¹ "Code of practice for noise and vibration control on construction and open sites - Part 2: Vibration which refers to the need for the protection against noise and vibration of persons living and working in the vicinity of, and those working on, construction and open sites. It recommends procedures for noise and vibration control in respect of construction operations and aims to assist architects, contractors and site operatives, designers, developers, engineers, local authority environmental health officers and planners.
3. The EC directive 'Noise Emissions in the Environment by Equipment for Use Outdoors'⁴², which sets noise limits for certain types of plant and equipment. The Directive was implemented into UK law by the Noise Emission in the Environment by Equipment for Use Outdoors Regulations 2001 (SI 2001/1701), as amended by SI 2001/3958 and SI 2005 No3525⁴³.
4. The Construction Plant and Equipment Regulations 1988⁴⁴, which set maximum noise outputs for plants.

Local guidance may also be in force that further reduces allowable noise and vibration. The regulation of quarry noise is the responsibility of council environmental health departments and therefore is usually enforced through the setting of planning conditions⁴⁵.

Other Requirements

Construction (Design and Management) Regulations 2007 (CDM2007). CDM2007 brings together good practice for safe and efficient working on construction sites. The regulations define construction work and state the roles, responsibilities and relationships between clients, contractors and the HSE during all phases of a construction project. They also require the provision of necessary information to contractors and the co-ordination of activities of all clients and contractors for safe and efficient working on-site. It is important to note that Regulation 2 defines construction work as "the carrying out of any building, civil engineering or engineering construction work" and includes at sub-paragraph (b), "the preparation for an intended structure, including site clearance, exploration, investigation (but not site survey) and excavation, and the clearance or preparation of the site or structure for use or occupation at its conclusion" during which phases of a construction project it is likely that any EOD activity might be conducted.

Firearms Act 1968 & Firearms(Amendment) Act 1988. The Firearms Act 1968 provides in Section 5 (Prohibition of certain weapons) as follows:

"5(1)(c)any cartridge with a bullet designed to explode on or immediately before impact, any ammunition containing or designed or adapted to contain any such noxious thing as is mentioned in paragraph (b) above and, if capable of being used with a firearm of any description, any grenade, bomb (or other like missile), or rocket or shell designed to explode as aforesaid." and at 5(1A)(b) "any rocket or ammunition or ammunition not falling within paragraph (c) of subsection (1) of this section which consists in or incorporates a missile designed to explode on or immediately before impact and is for military use".

It follows that, with the exception of 'free fall bombs' which are not, according to Home Office guidance, regarded as 'ammunition' under the Act, all UXO may fall into the provision of this Act and therefore require the authority of the Secretary of State to hold said munition. Commercial EOD organisations will need to have to be a Registered Firearms Dealer (RFD) and hold a Section 5 Firearms Licence.

³⁸ <http://www.hse.gov.uk/pubns/priced/l118.pdf>

³⁹ <http://www.legislation.gov.uk/ukpga/1995/25/contents>

⁴⁰ <http://shop.bsigroup.com/en/ProductDetail/?pid=000000000000263651>

⁴¹ <http://shop.bsigroup.com/en/ProductDetail/?pid=00000000000030141423>

⁴² <http://webarchive.nationalarchives.gov.uk/+http://www.dti.gov.uk/innovation/strd/ecdirect/page12562.html>

⁴³ <http://www.legislation.gov.uk/uksi/2005/3525/contents/made>

⁴⁴ <http://www.legislation.gov.uk/uksi/1988/361/made/data.pdf>

⁴⁵ <http://www.bgs.ac.uk/planning4minerals/glossary.htm#planningconditions>

6.0 ROLES AND RESPONSIBILITIES

Health and Safety Executive (HSE)

HSE regulates the manufacture, storage, carriage, classification and use of explosives.

Under the Manufacture and Storage of Explosives Regulations 2005 HSE is the authority responsible for the licensing and regulation of manufacture of explosives, storage of more than 2000kg of explosives generally and storage of up to 2000kg explosives at mines and in harbour areas. The police have responsibility for licensing the storage of up to 2000kg of those explosives that require a police certificate to acquire or keep or where the storage is for smokeless powder for which an explosive certificate is not required. Local authorities are responsible for licensing storage of up to 2000kg of those explosives not requiring a police certificate.

Explosives Industry Forum

The EIF aims, through co-operation between the Health and Safety Executive and the Explosives Industry to deliver continuous improvement in health and safety standards and performance to the benefit of the Explosives Industry and all its stakeholders. Its objectives are to develop and deliver a strategy for improving standards of health and safety in the explosives industry by:

- a) Ensuring active communication of health and safety objectives and targets.
- b) Monitoring and reporting performance trends.
- c) Providing a forum for HSE to explain the legal requirements and clarify enforcement policies and priorities
- d) Targeting and prioritising advice and guidance to the explosives sector.
- e) Acting as a stimulus for identifying and meeting the health and safety research needs of the explosives sector
- f) Sharing good practices from across the Industry.

Explosives Industry Group (EIG)

The Explosives Industry Group of the CBI acts as a lobby group and information source for members and represents the majority of the UK industry explosive companies.

Institute of Explosives Engineers (IExpE)

The IExpE promotes the occupational competency, education and professional standing of those who work with explosives and provides consultative facilities for organisations and government departments within the explosives field.

Sector Skills Strategy Group (SSSG)

The SSSG will set strategic goals with regard to the mapping of all existing UK EOD qualifications against national and international standards. The SSSG will initiate and, where necessary, fund, work packages related to the training and competency of commercial EOD Operators and Operations Managers to be conducted by the Development Office for Explosives Standards (DOES) and Standards Setting Body (SSB).

Standards Setting Body (SSB)

The SSB will conduct necessary work to define and maintain occupational standards that provide assurance of competency to regulators and contracting organisations.

Fire and Rescue Services (FRS)

Metropolitan fire and rescue authorities are responsible for licensing storage of up to 2000kg of those explosives that do not require a police certificate in their area. The FRS will license storage in certain geographic areas of non COER explosives. They also have a legislative role under the Regulatory Reform (Fire Safety) order 2005 which requires all licensing authorities to notify a FRS of licenses and registrations so that the FRS can make representations on fire safety matters.

A commercial EOD organisation planning an operation should inform the local FRS in case an emergency response should be required. The FRS is also a useful point source of information about the local infrastructure environment that would inform and enable blast protection design.

The FRS may also be able to assist with the provision of some mitigation.

Local Authorities

Local authorities are responsible for licensing storage of up to 2000kg of those explosives that do not require a police certificate, where all explosives stored are non-COER attractive. Example - a site which is recovering UXO that are solely SAA or non-COER misfired smoke producing pyrotechnics.

Emergency Planning Officers or Town Planners may also be able to assist with evacuation planning, infrastructure, local history (especially of known explosives use or bombardment), and remediation facilities or organisations in the area.

Police Services

Where the EOD Operation is taking place on land entirely within the control of the customer, there is no regulation requiring that the police are informed. However, it is good practice to keep all parties who might be affected by EOD Operations informed. If the EOD Operation impinges on any public space, e.g. if the safety trace for in-situ destruction by detonation overlaps the public space, then the police must be informed. The police will be responsible for coordinating the emergency services in the event of an incident. This will include establishing a cordon and evacuating people from the area. The police will always be the enforcing authority for COER and licencing/enforcing authority for MSER where COER explosives under 2000kg are to be kept and at such places of keeping, security required by Section 23 of the Explosives Act.

Utilities

The statutory services and utility providers, e.g. gas, water, electricity, telephones and cable TV will have an interest in explosives operations that might affect their services. They are also a possible source of information on previous EOD operations or UXO finds. Operators should seek the advice of authorised representatives of these organisations when planning disposal operations.

Civil Aviation Authority (CAA)

It is a CAA requirement that all air users should be advised of unusual air activities that might be hazardous. This includes the effects of EOD Operations. The process for notifying air users is called the "Notice to Airmen" or NOTAM.

NOTAMs are requested 28 days before the event by sending an email to ausops@caa.co.uk . The email follows a specific format which is exemplified here:

- A. School 250605
- B. Anytown. Grid Ref SX5678. 500m radius.
- C. 010213 1000 LOCAL
- D. 010214 1400 LOCAL
- E. Explosive Ordnance Disposal. Surface to 500 ft. POC Fred Smith 07123 123123

Decode of their automatic input format:

- Line A: Reference number, user defined and unique
- Line B: Location in text and 4-figure grid reference or lat-long
- Line C: DD MM YY hhmm for start. Add "LOCAL" otherwise they assume GMT.
- Line D: DD MM YY hhmm for finish
- Line E: Activity and requested airspace, Ask for what you really need and don't overstate it. Contact number should be someone onsite that pilots can talk to.

The email should be sent to ausops@caa.co.uk and titled "NOTAM Request". To talk to the cell for advice telephone 020 7453 6599

Although they ask for twenty eight days, the CAA realises that operationally it is not always possible. If there is something that requires short notice notification then the operator or his/her company should by all means contact AU. However in these cases it may not be possible to get a NOTAM out in time, as most pilots will have briefed in the morning for activities that day. In these cases it may be prudent to notify the nearest air traffic unit, and in addition the Low Flying Cell at R.A.F Wittering on tel no 01780 783838.

Maritime Coastguard Agency (MCA)

The MCA, under the Merchant Shipping Act 1995, have a duty to enforce merchant shipping legislation. Local coastguard personnel will often be a useful source of information on previous EOD operations, local history of explosives finds, sea-dumping or jettisoning of munitions in the area, use as ranges or wartime bombardment. MCA should also be able to assist with the enforcement of a maritime exclusion area if an EOD operation requires such.

Ministry of Defence (MOD)

Where there is a realistic expectation of encountering munitions during a commercial operation or private working and a threat to life or potential for unacceptable economic damage does not exist, the MOD would not expect to respond. In such circumstances a competent commercial EOD contractor should be employed as part of business continuity or police response.

The MOD:

- Maintains the Joint Service EOD Operations Centre (JSEODOC) which coordinates MOD EOD operations across the UK. The Joint Service Explosive Ordnance Disposal Operations Centre (JSEODOC) is responsible for tasking appropriate Ministry of Defence (MOD) assets to provide Explosive Ordnance Disposal (military EOD) support to the civil authorities where there is a perceived threat to life or critical national infrastructure.

Maintains EOD teams at readiness to provide:

CBRN specialist EOD capability.

IEDD capability.

CMD capability in support of the Civil Authorities and Civil Powers.

EOC capability in respect of remediation of former MOD properties, ranges and training areas.

Commercial EOD organisations

Where there is a realistic expectation of encountering munitions during a commercial operation or private working and a threat to life or critical national infrastructure does not exist, the MOD would not expect to respond. In all other circumstances a competent commercial EOD contractor should be employed as part of business continuity or police response.

The EOD companies have a responsibility, under Sections 2 and 3 of the Health and Safety at Work etc. Act 1974, to reduce the risks to their employees and persons not in their employment who could be affected by their activities to as low a level as is reasonably practicable. In fulfilling those responsibilities the operator will need to consider in particular:

1. their duties under the Management of Health and Safety at Work Regulations 1999, which implement the HSWA 74.
2. adopting safe systems of work.
3. providing appropriate training.

Commercial EOD organisations must:

- Have an understanding of the legal requirements and be able to demonstrate that understanding in their systems of work.
- Be open to independent audit against current legislation and national or international standards.

- Establish and maintain SOPs for EOD operations which comply with national standards or IMAS, and other relevant standards and regulations, and which reflect local conditions and circumstances. These SOPs shall incorporate:
 1. Risk Assessment.
 2. Planning and managing a safe system of work.
 3. Emergency procedures.
 4. QA & record keeping.
 5. Maintenance of tools, equipment and plant required to carry out the work?
- In preparing risk assessments and method statement, refer to published guidance on the disposal of explosives and decontamination of explosives plant/equipment. (management guidance for the safe decommissioning of explosives sites - CBI July 2003)
- Apply SOPs for EOD operations in a consistent, effective and safe manner.
- Ensure that the EOD operators are suitably trained, competent, and current and provide assurance to the Authorities by the implementation of an auditable Competence Management System.
- Ensure that the affected community is fully cognisant of all EOD activities in the area and the implications for the community, (particularly related to the depth of clearance).
- Provide guidance and advice on the safe and efficient conduct of EOD operations to contracting organisations.

EOD Company Duty Controller

The EOD Controller will:

- Be a suitably qualified and experienced person (SQEP) to a level able to take responsibility for EOD actions on behalf of the EOD Company.
- Be authorised to make decisions on behalf of the EOD Company.
- Provide immediate advice and authority to Company EOD personnel to undertake EOD operations

EOD Operators

The EOD Operator must:

- Assure the EOD Company of his/her competence and currency, through the maintenance of their EOD Log Book and validation when called for.
- Take all reasonable precautions to prevent death, injury or damage to property.
- Provide appropriate guidance and advice. Explosive ordnance disposal operators trained to IMAS Level 2 or above can provide advice and guidance to contracting organisations and EOD operators trained to a lower level on the identification of munitions and the subsequent actions that may be necessary.

Contracting Organisation

Contractors need to consider the potential risks, unmitigated consequences and safety measures of encounters at all their locations and take action to ensure that the risks to their employees and public, are reduced to the lowest level that is reasonably practicable⁴⁶. Against this background, the advice in this document provides practical guidance to contractors of the options available to minimise the occurrence and effect of munitions on their operations, and the steps needed to manage any encounters that may take place. The Construction industry has procedures in place in CIRIA Publication C681 - Unexploded ordnance (UXO) A guide for the construction industry.

The contracting organisation shall:

1. Not place commercial factors above the safety of the public or their workforce, including the EOD operator.
2. Provide to the EOD company all relevant, known, information about the site⁴⁷, its surroundings and the type of work to be undertaken.
3. Provide the EOD contractor with adequate funds and resources to carry out all reasonable enquiries or investigations that the contractor requires so that he has all the information he needs to produce a safe design.
4. If appropriate, refer to, and highlight, any deviations/constraints from the CIRIA guidance in the task description.

Owner/User of Explosive Substances and Articles

The owner/user is responsible for the routine disposal of unserviceable items found to be sub-standard, time-expired, damaged or misfired during their routine business. This is not an EOD issue and should be dealt with as routine disposal in accordance with HSE/CBI EIG Guidance⁴⁸.

In general terms, the owner/user of the explosive substance or article is ultimately responsible for remediation within the requirements of the Environmental Protection Act under the premise that the 'polluter pays'.

Liabilities

No system is perfect and in the conduct of EOD operations it is sometimes necessary to have an EOD Operator working on a heavily corroded object from the barest of information at a scene, albeit with the best information available on the explosives history of the site and technical information support. The EOD Company must therefore mitigate against all reasonable risk from the most likely hazards but all parties must be prepared for the unexpected, e.g. full detonation of an item of ordnance when the intent was deflagration.

The Risk Assessment must therefore address the known explosives history of the site and its surrounding area and significant factors such as the location of utilities and critical local or national infrastructure.

EOD Companies should ensure that they have an adequate level of liability insurance, professional indemnity and 3rd party cover.

⁴⁶ <http://www.hse.gov.uk/risk/theory/alarplance.htm> . The definition set out by the Court of Appeal (in its judgment in *Edwards v. National Coal Board*, [1949] 1 All ER 743) is: "'Reasonably practicable' is a narrower term than 'physically possible' ... a computation must be made by the owner in which the quantum of risk is placed on one scale and the sacrifice involved in the measures necessary for averting the risk (whether in money, time or trouble) is placed in the other, and that, if it be shown that there is a gross disproportion between them - the risk being insignificant in relation to the sacrifice - the defendants discharge the onus on them."

⁴⁷ If it is a construction site refer to CDM Regs 2007

⁴⁸ CBI Explosives Industry Group. Guidance for the Safe Management of the Disposal of Explosives. A guide to the safe disposal of explosives, the relevant legislation, the techniques used for disposal and associated risk control systems. January 2007

7.0 EOD OPERATIONS

Philosophy of EOD

EOD Operations are conducted within the following framework, in order of priority:

1. Preservation of Life
2. Preservation of Property
3. Preservation of Evidence and/or Technical Intelligence
4. Restore the situation to normal as soon as possible

The last two elements of this framework may be interchanged depending on the local situation.

General principles

The principles of EOD Operations set out in the International Mine Action Standards⁴⁹, while intended for demining operations in former conflict areas may nevertheless be adopted, with modifications to some terminology, to provide a sensible and proven safe structure for the conduct and management of non-military EOD operations.

EOD may be undertaken as a routine part of site clearance operations when the contractor's risk assessment for a site suggests that there may be a UXO hazard. EOD operations may also be undertaken to dispose of UXO discovered outside these known hazardous areas. These EOD operations will be referred to as 'Pre-emptive' and 'Reactive' respectively.

Such operations may involve a single item of UXO or a number of items at a specified location such as a mortar or artillery gun position.

The effective management of explosive hazard reduction programmes includes, where necessary, the establishment and maintenance of a capability to conduct EOD in a safe and effective manner. This involves a formal risk assessment of the UXO hazards and the development of a safe and effective EOD capability. Such a capability shall include the preparation of appropriate procedures for neutralisation and disarming, the use of well trained and qualified EOD operators, and the use of effective and safe equipment, stores and supplies.

The development of a safe and effective EOD capability may require the establishment of levels of expertise to cope with a range of operational requirements. As a general principle, operators should deal only with those items and situations for which they have been trained and authorised, i.e. are competent. All other cases should be referred to the next higher level of expertise.

General procedures

Whether Pre-emptive or Reactive, EOD Operations should pass through the following process, with different emphasis on specific elements depending on the scenario:

PREPARATION

Training

- Operations Room Staff
- EOR Staff
- EOD/CMD Staff
- Certification
- Refresher Training
- Equipment maintenance

⁴⁹ IMAS 09.30 Second Edition (01 October 2008)

Planning

Company SOPs

Liabilities. Commercial EOD Operations are not underwritten by the MOD or Home Office, therefore the EOD Company should have sufficient liability insurance, professional indemnity and 3rd party cover.

Knowledge of the task

Likely finds

Site survey

OPERATIONS

Tasking

Authority/agency/office(s)

Planning

Liaison with client, police, local authority, HSE, Statutory Services/utilities

Safety Case

Method Statement

Peer Review & Scrutiny

Document Control

Change Control

Liabilities

Conduct

Safety of the public, site personnel and EOD personnel

Identification

On-site evaluation

Dynamic Risk Assessment

Prevention & Mitigation

Exclusion zones

Rendering safe

 Detonation

 Deflagration/Low-order techniques

 Desensitisation

 Burning/Incineration

 Dismantling

Recovery

 PUCA (but see Classification, Storage and Transportation issues)

Final disposal

Remediation

 Decontamination of residues

 Maintenance of disposal area

Quality Assurance

POST-OPERATION

Reporting

Debrief those directly involved locally

Company reports

 Reporting to private or commercial client

 Reporting to police force/local authority as requested

 Reporting to HSE as requested

The EOD Operator has a number of disposal procedures available to him and the accepted priority order for incidents within the UK is:

- Destroy on-site in prepared destruction area
- Destroy in-situ
- Move to destruction area on nearby site for destruction immediately
- Move to temporary store for destruction at a different site at a later date

It follows that the risk assessment and method statement for an EOD task must include sufficient detail to enable the EOD Operator to undertake each of these options if his professional judgment so dictates. If the EOD organisation's Risk Assessment and Method Statement show that none of these options is viable, the organisation is to seek advice and assistance from HSE and/or MOD.

Competence of individuals

Regulation 4(1)(c) of CDM(2007) requires that "No person on whom these Regulations place a duty shall arrange for or instruct a worker to carry out or manage design or construction work unless the worker is competent, or under the supervision of a competent person. Regulation 4(2) goes on to say that "Any reference in this regulation to a person being competent shall extend only to his being competent to perform any requirement and avoid contravening any prohibition, imposed on him by or under any of the relevant statutory provisions.

This is an example of good practice that a commercial EOD organisation should encourage and expect from any client wishing to secure their services.

A competent person⁵⁰ may be defined as "a person who, by reason of theoretical and practical training or actual experience or both, is competent to perform the task or function or assume the responsibility in question and is authorised to perform such task or function". In the case of an EOD Operator, that authority will come from his/her company, which should have a formal system in place to ensure the competence of their EOD Operators at all times.

Competence of individuals has been described⁵¹ according to this model:

$$\text{Competence} = \text{Skills} + \text{Experience} + \text{Knowledge} + \text{Attitude}$$

In the field of EOD, competence at all levels within the organisation is the keystone to safe operations. The EOD Operator at the scene must be demonstrably competent in order to carry the responsibilities of public safety and commercial success as well as the confidence of the local populace and authorities. The company's Operations Managers must be able to make technical judgments and decisions when they are themselves remote from the scene, based on information provided by the EOD operator.

It follows that EOD Operators must be suitably qualified and experienced enough (SQEP) to conduct the operations being undertaken and that EOD Operations Managers must be qualified, experienced and current to a level higher than the field operator.

It is suggested that individuals and companies can demonstrate further commitment to quality and safety by membership of a professional body which has a published code of conduct such as the Institute of Explosives Engineers (IExpE) or Institute for Munitions Clearance and Search Engineers (IMCSE)

To paraphrase BS5607, before undertaking any EOD works, those involved should ensure that they have sufficient knowledge, experience and training (competency) in such operations.

Where there is a requirement for any EOD works, the procurer of the works should ascertain that any person or organization contracted to carry out the works has either the competence themselves, or has engaged the services of an individual or organization with these competences.

⁵⁰ BS5607:1998

⁵¹ Andrew Watson, Institute of Mining Engineers, IExpE Conference 2010

Qualifications

Training and maintenance of competence is essential to the business and safe conduct of EOD operations.

In order to operate in the UK, all EOD Operators should hold qualifications that are mapped against the National Occupational Standards for Explosive Substances and Articles (NOS for ESA), Key Role 12⁵² at the level appropriate to the task in hand.

It is expected that the senior EOD operator on site will be technically qualified and, in order to provide assurance to local authorities and clients of his capability to conduct dynamic risk assessments, must hold a recognised qualification in the management of an EOD or Munitions Clearance operation.

Assistant EOD Operators expected to represent the senior EOD Operator in his absence may also be required to hold a suitable command/leadership qualification.

EOD can be carried out at many levels - from the neutralisation of large bombs and missiles to the destruction of grenades and sub-munitions. EOD qualifications should be appropriate to the hazard and the munitions most likely to be found. As a guide the following levels are appropriate⁵³:

- EOD Level 1. Level One operators are competent to locate, identify and destroy under appropriate supervision, single items in-situ on which they have been specifically trained.
- EOD Level 2. Level Two operators are competent to locate, identify, move, transport and destroy multiple items on which they have been specifically trained.
- EOD Level 3⁵⁴. Level Three operators are competent to conduct render-safe procedures and final disposal of any type of explosive ordnance with the exception of specialisations listed under level four.
- EOD Level 4. Level Four operators are competent to carry out specialist tasks in the following categories provided that they have the relevant training⁵⁵:
 1. Disposal of specific Guided Weapons;
 2. Demilitarisation of Explosives Ordnance;
 3. Chemical, Biological, Radiological and Nuclear weapons;
 4. Improvised Explosive Device Disposal;
 5. Disposal of weapons with specific fuel hazards;
 6. Logistic disposal.

NB. These CWA levels equate directly to the IMAS EOD Competence levels.

NB. The EOD Level 4 qualification shall clearly indicate the specialist training received by each individual.

NB. EOD Operations on any CBRN weapon or munition remains the responsibility of the MOD.

NB. EOD Operations on any 'improvised' munition or firing system remains the responsibility of the MOD.

Some UXO fall within the guidelines for the above qualification levels but present a specific or additional hazard. Examples are items containing White Phosphorus (WP), missiles, or the requirement for bulk demolitions. Special consideration should be given to the need for additional training, or for specific exclusion from the category of competence.

Where particular items are frequently encountered, specific training in the disposal of these items may be given to enable the operator to deal with them rather than continually refer the problem to the next higher level of expertise. It should be noted that sub-munitions may be particularly hazardous to deal with and should only be dealt with by level 2 or above qualified personnel.

⁵² http://www.cogent-ssc.com/education_and_qualifications/NOS.php

⁵³ CWA 15464-1, Humanitarian Mine Action - EOD Competency Standards - Part 1: General requirements

⁵⁴ **CWA 15464-5**, Humanitarian Mine Action - EOD Competency Standards - Part 5: Competency for EOD level 3

⁵⁵ CWA 15464-4, Humanitarian Mine Action - EOD Competency Standards - Part 4: Competency for EOD level 4

EOD Assistant/No2

The EOD Operator usually requires an assistant, to act as his/her driver/co-driver to meet ADR requirements and to assist in the preparation of EOD equipment and site management. The EOD Assistant/No2 shall be competent equivalent to QCF Level 2.

EOD Instructor Qualifications

It is recommended that persons employed as EOD Instructors shall be competent and current EOD Operators at a minimum of IMAS Level 3 or QCF Level 3 or equivalent and that they shall have a minimum of three years field experience in EOD.

QCF Qualifications

At the time of writing, the following qualification units are available⁵⁶ to training providers, which would also provide the required levels of assurance when combined with proof of experience and currency.

L4 Planning and management of MC operations	12-001-04
L4 Planning and management of ST search operations	12-002-04
L3 Supervisory management of MC and/or ST search operations	12-003-03
L3 Search for and disposal of munitions	12-004-03
L3 Search for munitions and/or ST	12-005-03
L2 Contribute to the search and/or disposal function	12-006-02
L1 Provide support for search or munition clearance operations	12-007-01

NB. MC = Munitions Clearance; ST = Specified Targets

S/NVQ Qualifications

Those individuals who have been awarded S/NVQ qualification in EOD will continue to be recognised provided that they can demonstrate currency as an EOD Operator.

Military Qualifications

UK military EOD qualifications have long been recognised by commercial EOD companies and this will continue, provided that the individual can demonstrate acceptable experience and currency. Some UK military EOD qualifications also attract a nationally recognised vocational qualification, certification from which would enable a commercial EOD organisation to correlate the qualifications of all potential recruits to the organisation.

Quality and audit of the qualifications

EOD Companies need to ensure operators are competent for the tasks they undertake. EOD Companies and organizations should develop performance criteria, appropriate assessment tools and procedures in order to assess the level and quality of competence of EOD operators. This could include written tests, practical exercises, demonstrating a task, or procedures for assessment of performance during EOD operations.

CWA 15464:2005 - Humanitarian Mine Action - EOD Competency Standards (5 parts) provides guidance on the competencies needed for EOD levels 1, 2 and 3 and is designed to enhance the process of planning and evaluating EOD operators' development and capacity building. Its use can also help improve the assessment of training and competency of operators involved in EOD work.

Currency of qualifications. An EOD Operator shall be deemed to be current if either:

- his qualification was achieved within the previous 2 years
- his work record, validated by the employer, shows that he has maintained the necessary skill level through operations within the last 2 years
- he can show documentary evidence of revalidation at training within the last 1 year.

⁵⁶ <http://www.homelandsecurityqualifications.co.uk/>

Validation of qualifications

It is recommended that a commercial EOD organisation should revalidate the qualifications of its EOD operators on a regular, formal basis. As an example, Humanitarian Mine Action organisations operating in other countries will typically validate their operators on a 6-monthly basis.

Company Standing Operating Procedures (SOPs)

The EOD Company shall write and maintain a comprehensive set of SOPs that provide all levels of management and operators with the detail of how the company conducts its operations and meets its legal and operational requirements in all foreseeable scenarios.

Tasking

Commercial EOD organisations may be tasked by almost any legal entity, including but not restricted to:

- a contracting organisation fulfilling its obligations to ensure the safety of a worksite
- Local authorities
- Police
- MCA Coastguard
- Government Departments
- Private landowners/farmers
- Port and Harbour Owners
- Civil Aviation Authority

These bodies may task EOD companies through direct contract action .

Commercial EOD Companies are likely to be tasked when:

1. There is no immediate risk to life or potential for unacceptable economic damage.
2. It is assessed by the first responder that the object to be cleared is NOT:
 - An IED
 - A biological, chemical, radiological or nuclear weapon
 - NB. A quick-look guide for first-responders to assist in making a sensible judgment on these criteria is at Annex B.

Each operation should be given a unique task number, referred to throughout all related documentation, reporting and queries.

The EOD company shall inform the local authority, client and police when a task has been accepted and the team is despatched.

Planning

A site survey is an essential pre-requisite of any commercial EOD operation, and should reveal much valuable information. If the site was formerly used as a firing range or ammunition store for example, the possibility of finds is quite high. If there is no history of such, then the risk will be much lower. There needs to be an assessment of what might be found, but bearing in mind that unexpected finds will always turn up. Small arms ammunition, artillery shell, WWII bombs, along with a whole range of other explosives that previous generations might have tried to hide could be found.

The Method Statement shall include a detailed risk assessment & specific laydown of the ground.

Sources of information that could be tapped before any work starts include:

- Construction companies should have undertaken a historical survey of the site, know where services are etc.
- Construction companies should have conducted a detailed UXO risk assessment in accordance with the guidelines in CIRIA Report C681 – UXO: A Guide for the Construction Industry

- Construction companies are required⁵⁷ to provide any contractor appointed by the client with pre-construction information, including:
 - any information about or affecting the site or the construction work
 - any information concerning the proposed use of the structure as a workplace;
 - the minimum amount of time before the construction phase which will be allowed to the contractors appointed by the client for planning and preparation for construction work
 - any information in any existing health and safety file
- MoD records for area, including:
 - Defence Infrastructure Organisation records.
 - Unit war diaries
 - Battle Area Clearance records
 - previous "FFE" certification
- Local Authorities' archives.
- Local historical records.
- Local Newspaper archives
- Local "personalities" who may have witnessed wartime bombardment or military activity in the area.
- HSE for previously licensed sites.

Where information is considered inadequate or insufficient, the EOD Company should consider the use of geophysical survey to assist in planning the Operation: equipment and techniques available include, but are not limited to, magnetometry, resistivity, ground penetrating radar. The EOD Company should consult a specialist in the field of geophysics (geophysicist), recognising that the skills required to understand and interpret geophysical data and also, more crucially, understanding that the limits of detection for UXO are very specialised as are the skills required to undertake EOD.

Method statement⁵⁸

Preparation

The following points should be considered in preparing the method statement:

- scope of the operation
- risk assessment factors which influence the proposed method of work;

The risk assessment for EOD Operations must dovetail with the site risk assessment done by the prime contractor and must adhere to the principles of HSG65⁵⁹. There are five steps to risk assessment⁶⁰:

- Identify the hazards
- Decide who might be harmed and how
- Evaluate the risks and decide on precaution
- Record your findings and implement them
- Review your assessment and update if necessary

⁵⁷ The Construction (Design and Management) Regulations 2007, Regulation 10

⁵⁸ BS5607:1998

⁵⁹ <http://www.hse.gov.uk/pubns/books/hsg65.htm>

⁶⁰ <http://www.hse.gov.uk/risk/fivesteps.htm>

These are most easily recorded in tabular form:

What are the hazards?	<i>Slips and trips</i>
Who might be harmed and how?	<i>Staff and visitors may be injured if they trip over objects or slip on spillages</i>
What are you already doing?	<i>We carry out general good housekeeping. All areas are well lit including stairs. There are no trailing leads or cables. Staff keep work areas clear, eg no boxes left in walkways, deliveries stored immediately, offices cleaned each evening</i>
Do you need to do anything else to manage this risk?	<i>Better housekeeping is needed in staff kitchen, eg on spills</i>
Action by whom?	<i>All staff, supervisor to monitor</i>
Action by when?	<i>01/10/2010</i>
Done	<i>01/10/2010</i>

An Example Risk Assessment is at Annex H.

The Method Statement should include at least the following information:

- names, qualifications, experience and training of key personnel, including engineers, shotfirers, explosives storemen, persons authorized to handle explosives and siren operators;
- an organization chart showing the relationship between the key personnel;
- plant to be employed;
- determination of services, buildings and structures which may be at risk from blasting operations;
- factors to be considered in the determination of the potential exclusion zone and arrangements to ensure the protection of site personnel and the public, and the placing of sentries for each blast;
- system of audible and visible signals agreed with site management and methods of communication to all site personnel and the public giving clear warning of impending blast, actual blast event and all clear;
- the arrangements to be made for the acquisition, storage (if required), transportation and if necessary, disposal of explosives to comply with current legislation and regulations;
- the arrangements and timing of suitable trial blasts to confirm the way in which the target will respond to the blasting regime being considered;
- provision to be made for the preparation of a blast plan for each blast to be carried out, made up of a firing plan and (where applicable) a mitigation plan;
- that a number of typical blast plans may be required to indicate to what extent different situations will affect the blast design and execution;

- type and position of any mitigation measures to prevent fly and fragmentation and to reduce vibration and overpressure effects.;
- the positioning and recording of environmental impact measurements, for example, ground vibration and air overpressure;
- the method of recording the above information and the list of records needed for legal and management purposes;
- where applicable, a programme of blasting operations;
- procedures in the event of and procedures to rectify misfires;
- contingency planning in the event of an emergency or an unforeseen occurrence arising during the operation, including the names and telephone numbers of the emergency services or others that may have to be contacted, e.g. RIDDOR reporting.

Application

The EOD Operator should have possession of all the documents making up the method statement and in particular should be in possession of and understand any firing plan required.

Changes by the EOD Technician to the method statement should be completed before any explosives are emplaced.

Where the EOD Operator is unable to comply with the method statement or when the exclusion zone appears to be different from that shown in the method statement, operations should be suspended until the method statement has been suitably modified by the Company Duty Controller, unless the EOD Operator has been empowered to make variations of such nature and extent as have been authorised by the Company in the method statement.

Any variations in the method statement made during EOD Operations should be recorded in detail. It is assumed that on each occasion when a blast is planned at a construction site all other procedures and practices as outlined in this code will have been given due consideration

Detonators should not normally be inserted into explosives until the charges are about to be finally placed.

The EOD Company operations cell shall have a reachback capability from field operators to senior personnel who will apply adequate scrutiny and have authority to make amendments to the safety case.

Safety of public and workers

Evacuation. Evacuation of personnel is likely to be necessary during EOD operations for the protection of the public and workers. The Risk Assessment and Method Statement shall include criteria for requesting evacuation and cordon, with recommended safety distances for the most likely types of UXO expected at the site. Through liaison with local authorities it may be possible to adopt a process similar to the demolition sector, which will set a cordon only when needed, i.e. when the blast is about to take place and will almost always involve the police.

Explosive hazards. The EOD company shall advise the site management and workers on likely explosive hazards, their recognition, their risk and unmitigated consequences, mitigation, controls and emergency procedures.

Other hazards, e.g. Noise, vibration, environmental contamination, shall be considered in the risk assessment and accounted for in the Method Statement. IMAS 10.70⁶¹ provides guidelines as to the minimum environmental protection measures in demining operations which may be adapted to conventional EOD operations if no local standards are available.

⁶¹ http://www.mineactionstandards.org/fileadmin/user_upload/MAS/documents/imas-international-standards/english/series-10/IMAS-10-70-Ed1-Am1.pdf

The intent of this standard is reproduced here:

Scope of environmental impact

In accordance with the principles of ISO 14000 Environmental Management, environmental impact concerns:

- a) Pollution of air (noise and smoke etc), water and soil;
- b) Reduction and disposal of waste, especially toxics and hazardous waste;
- c) Reduction of energy consumption;
- d) Reduction of CO₂ emissions;
- e) Use of land;
- f) Risk to heritage.

General requirements

EOD operations should be carried out in a manner that minimises the impact on the environment and is safe for men, women and children in the local communities and demining staff.

Planning for EOD operations shall take into account the effects of those operations and any supporting activities, on the environment, and any possible damage to property or infrastructure, or harm to personnel.

EOD organisations should ensure that land, over which EOD operations have taken place, is left in a state whereby it is suitable for its intended use once EOD operations cease.

Particular attention should be given to property, infrastructure or land required for subsistence or economic purposes to ensure that these activities can continue after EOD operations have been completed.

Vibration

Generation of excess vibration should be avoided. Human beings are very sensitive to vibration and can perceive vibration levels of a very low order. This can readily lead to complaints during production blasting operations, therefore effective consultation and communication with owners and occupiers should take place, and vibration levels should be controlled by proper blast design.

Many excavation operations in construction have to be carried out in the proximity of existing buildings or existing and new structures such as bridges, retaining walls and underground services. Additionally, where the public are involved, their sensitivity to ground-borne vibration from blasting and their concerns in respect of potential damage to their property dictates that a great deal of attention should be paid to this aspect of the blasting operation.

Although no statute exists, a contractual limit may be specified or the relevant British Standards which address damage levels from vibration and human exposure levels to vibration should be consulted (BS 7385-1, BS 7385-2 and BS 6472 respectively). In situations where ground or airborne vibrations may constitute either a nuisance or a potential damage risk, structural surveys pre- and post-blasting, together with consultations with owners or occupiers of the buildings/structures concerned, should be undertaken.

An assessment should be made of the potential detrimental effects of vibrations transmitted through structural elements caused by, for example, plant operation, impact with the ground of felled structures or the use of explosives. The potential detrimental effects include:

- a) cosmetic and structural damage of adjacent premises;
- b) disturbance of sensitive equipment such as hospital equipment and computers;
- c) buried services including gas pipes;
- d) public perception of risk.

Expert advice should be obtained where necessary to estimate the anticipated values of vibration including, where appropriate, the effects of short duration ground vibration due to impact or detonation of explosive charges which can impose very high peak particle velocity (ppv) levels.

Vibration should be monitored in sensitive locations, e.g. where neighbours and other facilities are likely to be affected both before (to establish existing vibration, e.g. from railways and roads) and during the EOD Operation.

Initial trial blasting may be carried out with small isolated charges to allow the transmission properties of the ground in that particular location to be characterized; vibration effects from production blasting operations can then be calculated with a degree of confidence.

A suggested approach to the limiting of blast and vibration effects is to:

- Set up mitigation
- Set out blast/vibration monitors
- trial shot <0.5kg
- adjust mitigation
- trial shot
- actual shots

A community liaison function that ensures local people know what is occurring should be a routine activity incorporated with EOD operations.

Identification of UXO

Proper identification of the UXO is essential to formulating the safest method of disposal. Knowledge and the timely provision of information are critical to the safe conduct of EOD operations, particularly when the EOD operator is faced with a corroded object of unknown origin. The EOD Company shall maintain reference material and appropriate liaison with holders of EOD information to enable the identification of UXO in the field or by referral from the site to the company operations team. This reference material shall, as far as is possible, be open-source and available to all UK CMD operators. The Swedish EOD Centre (SWEDEC) maintains an internationally available EOD reference system EOD-IS⁶² which would meet the requirement and UK MOD is already a member of the EOD-IS User Group.

Selection of Disposal Site

For demolition purposes, the ideal ground has deep soil and is free from rock, undergrowth, bushes or trees. The presence of rock provides hazards from flying debris, whilst undergrowth, bushes and trees present a fire risk. Whenever possible, sandy ground is to be avoided because of the problems and dangers associated with trenches which have undercuts. Ground containing peat is not to be used. In choosing a permanent site, it is advisable to select high ground in order to minimize the blast effect.

The ideal site for the burning of propellants and explosives is sandy, barren soil with water readily available, e.g. a beach where burning can be achieved below the high-water mark. Beaches located under steep cliffs are to be avoided because of the possibility of burning debris being carried by convection currents to the top of the cliff, where fires might start. Where a beach is not available, the area selected for the burning ground is to be free from trees, undergrowth or any other combustible material, and is to be large enough for propellant and other explosive material to be laid on a different piece of ground for a succession of burns on one day. Depressions where propellant burn by-products may stagnate are to be avoided. Ground containing peat is not to be used.

All areas selected as demolition or burning grounds are to avoid proximity to:

- Buildings, especially those which are inhabited.
- Overhead or underground cables and wires.
- Land drainage schemes and underground pipelines.
- Railways, roads and canals.
- Airfields.
- Radio or radar transmitters (induced electromagnetic (EM) energy could cause the premature firing of electric detonators and igniters).
- Agricultural land.

⁶² <http://www.eodis.org/>

EXPLOSIVES LIMITS

Explosives Limits for demolition and burning grounds are to be decided by the EOD Company's explosives safety manager in agreement with the competent local emergency services and civil authorities.

MARKING OF THE AREA

Demolition and burning grounds used only for that purpose are to be clearly marked with notice boards, which are to be sited so that they are clearly visible to personnel approaching the area from all directions. Permanent demolition and burning grounds within ammunition depots should be fenced off as an additional precaution.

SENTRY POSTS

Sentry Posts are to be sited at all strategic positions so that the sentries can prevent persons or livestock from entering the danger area. The posts are to afford adequate protection for the sentries whilst allowing a clear view of their area of responsibility and any visual signals made from the firing point. When it is not possible to site sentry posts close to the demolition ground, eg on open ranges, sentries are to be located outside the danger area.

SPLINTER-PROOF SHELTER

A firing point Splinter-Proof Shelter (SPS) is to be constructed on all permanent demolition grounds to provide protection against splinters and ricochets. The prime factor when planning the location of the SPS is the safety of the disposal party. Due account must be taken of the probable angle of descent and size of fragments. In the event of a misfire, it is an advantage if the EOD Operator can hear and see at what stage in the initiating sequence a misfire or partial detonation has occurred, and this should be borne in mind.

COMMUNICATIONS

In addition to reliable communications to the sentry posts, the demolition ground is to be connected by telephone to the parent company operations centre. Company Operating Procedures are to include actions to be taken in case of an accident, injury or fire.

Mitigation

Wherever possible, finds should be disposed of in situ or at a safe location on the same site. Disposal often makes use of other explosives to bring about the destruction, but this is not always the case.

The EOD Operator shall be trained in and be able to implement a variety of mitigation methods in order to protect people and property. There may be pressure on the operator to do it quickly; the operator should resist pressure that would lead to unsafe practice.

The on-site destruction area shall be sited such that its location provides the first requirement of a safe and suitable place, meaning somewhere with adequate separation from people and buildings, and suitable protection/mitigation measures against blast, vibration and debris throw. Calculation of separation distance for open-detonation will, by necessity, be based on worst-case vs most-likely case and the geography of the actual site. Thereafter, other mitigation techniques will need to be deployed. Examples of appropriate mitigation methods are:

- Total Containment Vessel (TCV). TCVs are available from commercial sources and are designed to contain the blast and fragmentation from the destruction of an item of ordnance. Many TCVs also incorporate valves and scrubbers to allow the high-pressure gases to be vented safely to atmosphere following the destruction of the UXO.
- Blast box. Suitably constructed container that will permit repeated disposal of UXO by detonation, containing fragmentation. Vibration and overpressure to a known limit.
- Air Trenching. Digging a suitably deep trench between the disposal area and the exposed site will disrupt vibration in that direction.
- Water wall.

- Sandbag wall.
- Undercut and tamping
- Blast mats
- Tyres
- Any combination of these

The EOD planner and EOD technicians will need to be Liaison with police, Fire and Rescue Service, site owner, main contractor, utility companies, local residents and businesses. The nature of the site will play a big part - whether it is large or small, the nature of surrounding buildings, whether it is a rural, residential or industrial location. The decision on the siting of the destruction area should ideally be made in the planning stage, based on expected finds, but always bearing in mind that plans may have to change because of the unexpected.

Design of blast and blast protection

The blast design and the design for blast protection should be assessed with the design for the exclusion zone boundary to ensure that any ejecta are contained within the predicted debris area.

Any limitation of the containment ability of blast protection, e.g. for low-order techniques being used on large aircraft bombs (dependent on risk assessments), should be taken into account in the exclusion zone design to ensure that the exclusion zone boundary extends far enough to contain any ejecta.

The design of the detonation sequence and delay periods should ensure that, for example:

- a) mechanical disruption of undetonated charges does not occur;
- b) the structure is not weakened in the vicinity of undetonated charges, and
- c) the robustness of the blast protection is not compromised, especially in places where charges are still to be detonated.

The use of delayed detonation sequences to initiate the charges should be considered as part of the measures to reduce potential high levels of air over-pressure.

Materials which can absorb energy give better results than hard materials such as steel sheets and sleepers, which may in themselves become missiles.

Protection may be either placed directly over the blast to give protection at source, or may be of the stand-off variety, or a combination of both. When close protection is used it is essential that it is designed to allow for any break-up and expansion of the mitigation material or survive until the gas expansion phase of the blast is over. When stand-off protection is used, such as blocking windows in high rise flats, it is essential that it is constructed so that it can resist not only material being projected at it but also air blast which may be several seconds in front of the main blast.

Exclusion zone

On all demolition work an exclusion zone will normally be established. Because conditions can vary so widely in the type of UXO to be destroyed, the charge weights to be employed, any delay sequences to be used and the type and efficiency of blast protection and mitigation which may or may not be used, it is inappropriate to give an indication of safety distances in this guidance.

In urban situations, the design of the exclusion zone may require special additional considerations, for example, the nature of buildings and services in the vicinity and the safety of the general public. It may be worthwhile also considering the inclusion of a buffer area, designed to collect unpredicted primary or secondary fly.

Annex F to the CBI/HSE Guidance for the Safe Management of the Disposal of Explosives provides guidance on the calculation of minimum separation distances for a disposal site assuming that relevant

good practice is being followed and that relevant controls to prevent or mitigate explosive events have been implemented. It is recommended that this guidance is followed whenever possible to site a permanent or semi-permanent disposal area.

In a reactive EOD Operation, however, it may not be possible to follow the CBI/HSE Guidance to the letter and the EOD Operator should then follow the principles of EOD and his/her training and experience to conduct a dynamic risk assessment and advise the authorities and clients of the hazards, likelihood and impact of an event, mitigation available and apply a generic exclusion zone based on the experience and teachings of UK MOD.

If this dynamic risk assessment concludes that there is an immediate and grave risk to life or unacceptable economic damage, the task is to be referred to the MOD.

It should be recognised that some demolition events involve a high level of public interest and under such circumstances crowd management and control will be required prior to, during and after the event.

Escape and rescue facilities at the disposal area

The operator shall ensure that-

- adequate means of escape and rescue are provided and maintained so as to permit persons in the disposal area to leave the disposal area promptly and safely in the event of danger;
- adequate means of communication and warning are provided to enable assistance, escape and rescue operations to be launched at once if required;
- written instructions concerning the use of emergency equipment and the action to be taken in the event of an emergency at or near the disposal area are prepared;
- persons at work at the disposal area are trained in appropriate action to be taken in the event of an emergency; and
- rescue equipment is provided at readily accessible, appropriately sited and clearly sign-posted places and kept ready for use.

Danger areas

The operator shall ensure that:

- any danger areas in the disposal area are clearly marked;
- equipment or barriers designed to prevent inadvertent entry by any unauthorised person are installed at any danger area in the quarry in which, because of the nature of the work being carried out there or for any other reason there is-
 - risk of a person falling a distance likely to cause personal injury,
 - risk of a person being struck by a falling object likely to cause personal injury, or
 - a significant risk to the health and safety of persons; and
- where any person at work is authorised to enter a danger area, appropriate measures are taken to protect his health and safety.

Lighting

The operator shall ensure that every part of a permanent disposal area in which a person is likely to be exposed to risks in the event of the failure of artificial lighting is provided with emergency lighting of adequate intensity and where that is impractical persons at work in that place shall be provided with a personal lamp.

Neutralisation and disarming procedures

Individual UXO should be destroyed or neutralised in situ when it is not safe to move them to the on-site disposal site. The decision whether to move a UXO, or a particular type, or not, should be based on an assessment by an appropriately trained, qualified and authorised EOD operator. If the fuze system is such that it is safe to move for nearby disposal, it may be moved. If the fuze system makes it simple to render the munition safe by neutralisation and/or disarming, it should be rendered safe prior to moving it to a suitable location for disposal.

Commercial EOD organisations will need to prepare Standard Operating Procedures (SOPs) for neutralisation and disarming procedures which are appropriate for the UXO hazards likely to be encountered and which are consistent with accepted international EOD practice. In the event that an operator discovers an item of UXO that cannot be identified, either specifically or generically in accordance with the levels of experience and training of the operators at the site, work is to cease, the EOD company Duty Controller informed and a specific EOD Operation planned and executed in conjunction with all interested agencies.

Destruction procedures

EOD organisations shall prepare SOPs for the effective and safe destruction of relevant UXO. These should include the destruction of UXO in-situ, or UXO recovered and destroyed individually. Destruction on-site in a pre-planned disposal area must always be the preferred option. This will, among other things, help to reduce the contamination of the area with metal fragments from an in-situ detonation. Destruction of multiple UXO should only be advised and conducted by suitably trained EOD operators. Special attention shall be given to ensuring the containment of blast and fragmentation effects resulting from the destruction of UXO. Sites chosen for bulk destruction shall be located sufficiently far away from populated areas so as to represent no risk.

Natures of EOD arisings that the EOD organisation should have SOPs in place for include:

- High Explosive
- Propellants
- Small Arms Ammunition
- Pyrotechnics and fireworks
- Anti-riot and Chemical Training Items
- White Phosphorus
- Inert
- Explosive substances

Charges used for the destruction of UXO may be ready-made or prepared on-site; SOPs must include the preparation of charges. Ready made charges must be classified for carriage.

Supervision and responsibility

When explosives are used, the demolition method is to be supervised to ensure that the designed method and overall procedures are strictly adhered to.

When blasting operations are to take place or are taking place on a construction site, it is essential that they should be under the control of a competent person. These competent persons should be responsible for the acquisition, storage, handling, transport and use of all explosives, detonators and accessories, and should be given a clear statement in writing of their duties and jurisdiction. Other persons who are to assist them in the performance of their duties in connection with the use of explosives should also be authorized in writing.

No person other than those designated should be in possession of explosives on site.

Disposal of unserviceable ESA

Common sense and users' duty of care dictate that they are responsible for all eventualities in the routine movement, storage, preparation for use and use of ESA. The owner/user is therefore responsible for the routine disposal of unserviceable items found to be sub-standard, time-expired, damaged or misfired during their routine business. Users should be trained and competent to dispose of unserviceable ESA. Manufacturers, maintainers and storage organisations should have processes and facilities in place for the disposal of unserviceable ESA. It may be that the organisation has in-house facilities or contracts out their disposal requirements to a commercial EOD company; use of MOD EOD assets is not usually appropriate in these instances.

UNDP/SEESAC' RMDS/G 05.55 - "EOD clearance of ammunition storage area explosions" provides guidance for EOD organisations and operators called to clear the site of an unplanned explosion in an explosives depot or factory, which is likely to result in UXO having been subjected to significant physical insults and projected over a large area within and outside the boundaries of the facility. Such an incident is likely to be the subject of a HSE investigation and significant resources are likely to be required. Unless there is a continued grave and immediate threat to life or significant economic damage, it is possible that this would fall outside the remit of the MOD.

Neutralisation and disarming procedures should not be necessary for bulk or individual items of unserviceable ESA as they will not, by definition, have been primed or have failed to explode.

Remediation

After all EOD Operations have ceased the EOD company shall advise the contracting organisation on any remediation that may be necessary as a result of their operations. The Risk Assessment and Method Statement should include the possibility of a requirement for remediation and the EOD company should liaise with local authority environmental officers throughout the planning and conduct of operations. Only through such liaison and planning can the most appropriate remediation be specified in the Method Statement, e.g. whether a specialist contractor or local authority service will suffice.

FFE of items before going to scrap. The EOD Company shall have written standards and procedures for certifying the remnants of EOD activities 'free from explosives' (FFE) and will authorise named persons as competent to certify items as FFE. Records of FFE certification are to be maintained to satisfy the requirements of POMSTER and only FFE items may be transferred as scrap material.

REPORTING

Reporting and liaison are vital to ensuring safe and efficient dealings between the EOD Company, local authority and clients.

An example report is at Annex C

Long-term tasks will require regular progress reporting to the client.

Statistics are to be collated by the EOD Company to inform future tasks and to be provided to the authorities if requested.

Quality Assurance (QA)

The EOD company should have a robust QA system in place, to provide internal and external assurance of the quality of the planning, implementation, monitoring and reporting processes it has in place. Whilst not mandated, there is a much to be said for a company that is registered with the internationally recognised standards ISO9001/14001, which are applied throughout the task from planning to reporting.

8.0 STORAGE, PREPARATION FOR USE AND TRANSPORTATION OF EXPLOSIVES FOR EOD

REGULATIONS

The EOD Company shall ensure that the necessary licences to acquire, store and use explosives are in place for the duration of the EOD task and that the licences are in the name of the appropriate legal entity. This will depend on the licence and who is in control. MSER storage licences are normally in the name of the person or company in control of the explosives in storage. COER certificates will normally be in the company name.

Separate licences to acquire, store and use explosives are required for the work site and any off-site disposal area.

STORAGE

Explosives shall be stored in accordance with MSER.

Unless it can be guaranteed that all finds will be destroyed on the day they are found, then a store will be required. Where finds are disposed of on the day they are found, no storage licence is required, however the potential for unforeseen delays should be considered. Delays could be due to finding a large quantity of UXO that cannot be disposed of quickly enough or due to weather conditions or availability of explosives or perhaps other factors external to the site. It is therefore sensible to have a safe and suitable store, licensed by LA, Police, FRS or HSE as appropriate, on the site where UXO may be temporarily kept until they can be disposed of.

An explosives store will be required for holding serviceable explosives for use by the EOD operator on sites where the task is expected to run over an extended period, where it is assessed that the likelihood of large quantities of UXO requires regular disposal blasts and the risk from frequent movement of explosives to the site outweighs the safety and security requirements of storage on-site.

The challenge for the contractor is to identify a suitable location on the site for an explosives store and contact the appropriate authority to have it licensed or registered and agree the security arrangements. Registration will only be appropriate where the quantity kept is less than 30 kg of Hazard Type 1. By way of example, this quantity in a metal built unrounded store, without a detonator annex has a separation distance to occupied buildings of 39 m. Larger quantities will require a store licence.

MSER requires that Serviceable explosives should be stored separately from UXO, however, space, time and risk factors may dictate that only a single store is practicable. Detailed planning and liaison with the licensing authority is necessary to ensure the safest configuration.

During the conduct of an EOD Operation placing explosives and detonators, a log must be kept of the quantity of materials used, which should be balanced against the quantities of materials remaining. This log should be the responsibility of the senior EOD Technician who should complete and sign it on a daily basis. The log should be available at all times for scrutiny. Any discrepancy should be investigated immediately and resolved. The Company Duty Controller should be informed without delay of the incident and then of the outcome of the investigation.

Security needs to be effective when explosives are on site, including when they are in position on the disposal area, so provision should be made for:

- an adequate number of security guards to be on duty (see also the Control of Explosives Regulations 1991 [62] and HSE Circular to Chief Officers 1/2005)
- a system of communications to provide contact with the police or security control centre;
- floodlights to light the areas, as appropriate.

PREPARATION OF EOD WEAPONS AND EXPLOSIVE CHARGES

The EOD Company shall comply with current law for the licensing of a working area for the preparation of explosive charges and EOD weapons e.g. hand-stemmed point-focal charges. Company SOPs and EOD Weapon user instructions shall state the safe working practices to be used in the preparation of explosive tools to be employed.

Arrangements must be made to ensure that explosives cannot be prematurely detonated, including any unintentional initiation, e.g. when positioning equipment or using mobile telephones and radios. Where conventional electrical detonating systems are being used they should be split and shunted to prevent unintentional initiation. Contact with moisture should be avoided.

USE OF EOD WEAPONS AND EXPLOSIVE CHARGES

Company SOPs shall describe the use of explosive tools and charges by company personnel. The SOP for a particular tool or charge shall include a current risk assessment.

TRANSPORTATION OF EOD WEAPONS AND EXPLOSIVE CHARGES

Vehicle Standards

Vehicles used for the carriage of EOD equipment and explosives for reactive or pre-emptive tasks shall comply with ADR/CDG/appropriate to the NEQ and HD being carried.

MOVEMENT AND STORAGE OF EOD ARISING

EOD Operations usually require the destruction of an item or items of UXO by open burning (OB) or open detonation (OD) as the safest way of removing the explosive hazard from a site. Environmental factors such as proximity to sensitive buildings or utilities, noise, vibration or air overpressure damage from the detonation of a large amount of explosives may preclude the disposal by OB or OD at the site and therefore the UXO will have to be moved to a more suitable disposal site.

By their very nature, EOD arising are not the same as the new, packaged munition that was provided to the user before it became a UXO. Having been unpacked, prepared for firing and fired, or simply gone astray and been subject to unintended climatic and other environmental stresses, an item of UXO cannot automatically be deemed to be the same Hazard Division or Compatibility Group into which the original was classified.

Within the compass of this GN, the following may also be considered as EOD arising:

- Life expired or surplus items, in their authorised packaging, which are subject to formal demilitarisation and disposal.
- Retail or wholesale stock holdings that become unserviceable and in their authorised packaging, that cannot be returned to the manufacturer for disposal.

Legislation covering the classification, labelling, packaging, storage and transport of explosives is drawn up to cover new or serviceable explosives in their authorised packaging. It was never designed to cover EOD operations or EOD arising.

The EOD Company Duty Controller has two options available to him/her when the EOD operator on-site declares that a UXO cannot be destroyed on-site. They can apply for classification of the UXO or they can package and move the item as "EOD Arising" Classification will require immediate notification to the HSE and subsequent implementation of a formal classification procedure, which will require temporary "storage" of the UXO for an indeterminate period. Movement as EOD Arising may also be sanctioned for the company through the HSE. The implications of both these options are explored here, with the approval process for both.

EOD Operators are trained to identify UXO to a level where they can determine if the UXO is safe to move to another location for final disposal; this is known as PUCA (pick up and carry away). Alternatively, EOD Operators at EOD Level 3 are also trained to neutralise identified UXO to make them safe to PUCA.

Classification of EOD Arisings

Classification of explosives is a formal process and contractors cannot classify the UXO themselves, and HSE cannot and will not classify UXO without evidence that they are safe to transport.

Before authorising such carriage, HSE needs to be convinced that the carriage is safe, i.e. that there is no risk of initiation during the transport operation. For undamaged explosives that are similar to explosives that have already been classified, this can be relatively straightforward, but for unexploded ordnance of unknown condition and unknown provenance it could be very difficult. It is anticipated that authorisations could be granted on a case by case basis i.e. specific to the items that have been found. Provided HSE is satisfied that the carriage can be authorised, an authorisation can be granted relatively quickly, but HSE only issues them during normal working hours. HSE requires sufficient time to assess and make a judgement on the adequacy or otherwise of any proposal. The proposal shall be in writing and fully developed in its content. The process may take a number of days or weeks and the submission must take this factor into account. Provided HSE is satisfied that the carriage can be authorised, an authorisation can be granted relatively quickly, but HSE only issues them during normal working hours.

Information that will be required includes:

- Justification why explosives need to be moved
- Evidence the explosives are safe to transport (taking into account impact, friction, heat)
- Details of proposed packaging
- Journey details and proposed dates
- Proposed hazard division for the purpose of carriage.

The Test Scheme used by HSE is that detailed in Part 1 of the UN Manual of Tests and Criteria. The normal process for classification of an explosive substance or article is outlined in the flow chart at Figure 1. Within the MOD, the Explosives Storage and Transport Committee (ESTC) classifies military explosive substances and articles for movement and storage⁶³. Classifications awarded by the HSE and the ESTC are normally, but not necessarily, acceptable to each other.

The ESTC process of classification of military explosives as packaged (when stowed and transported in such a condition) consists of the allocation of the appropriate:

- HD, as a result of tests **or by analogy**.
- CG.
- UN Number and UN Proper Shipping Name selected from the Dangerous Goods List, ('The Orange Book').

Unless the item of UXO is in its original packaging, it can only be classified by analogy, requiring the professional, technical judgement of the Competent Authority, i.e. the HSE.

NATO, as exemplified in AASTP 3 - Manual of NATO Principles for the Hazard Classification of Military Explosives, and the ESTC attach great importance to actual tests. The Secretary of the ESTC is the custodian of test reports on both ESTC classification and other related tests of foreign explosives of interest to ESTC.

However it may be helpful to predict the effect of an explosion by reference to similar items, but undue reliance on such an expedient can be misleading. Minor differences in the item construction or packaging can have a significant effect on an explosion of the item, thus necessitating a change to the hazard assessment and HCC.

Where the classification of an item is made by analogy to a similar item, evidence of original trials may be required by HSE.

⁶³ JSP 482 Edition 3 Change1, Chapter 4

Until HSE authorisation is received the UXO must be held in an on-site licensed store.

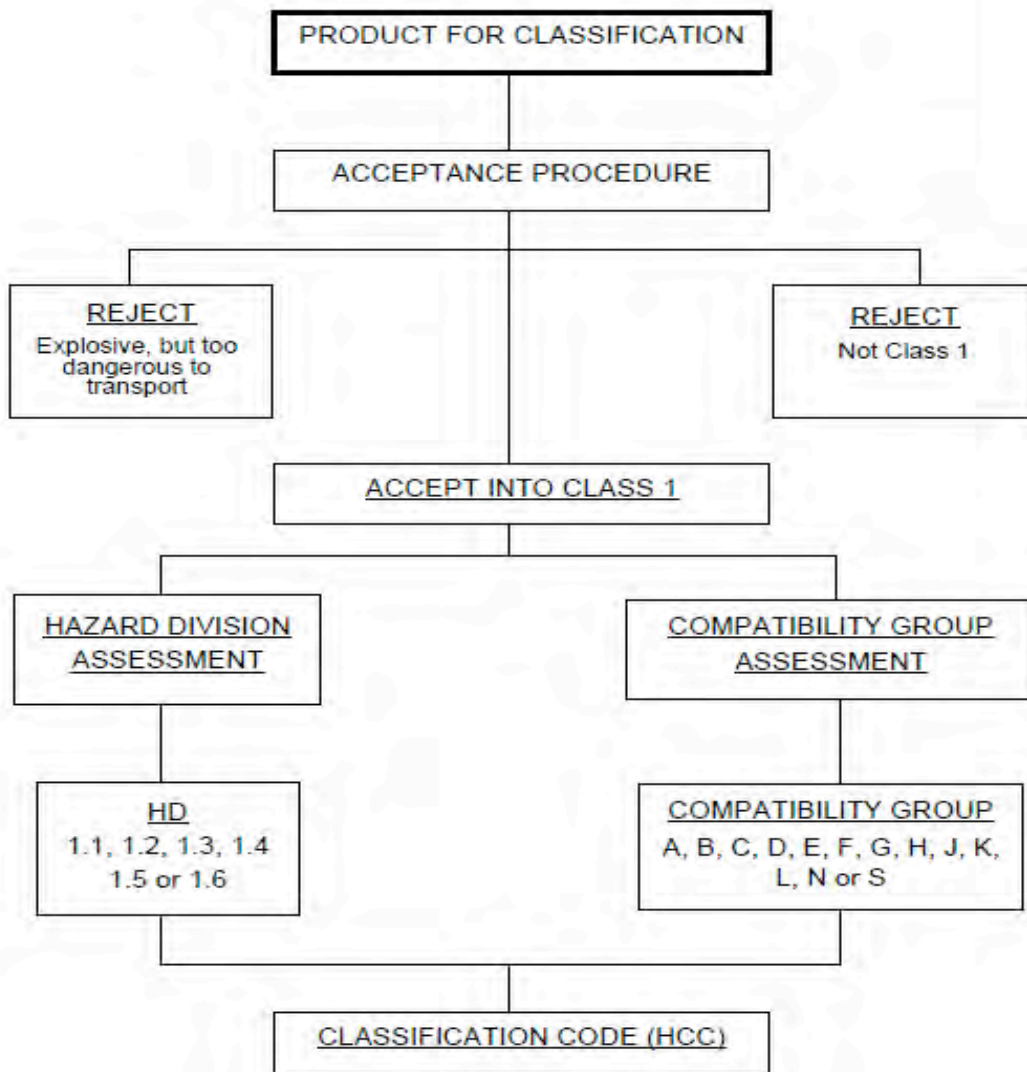


Figure 1. Overall Scheme of Procedure for Classifying Substances or Articles in UN Class 1

Movement of EOD Arisings

Classification in these operational circumstances may not be appropriate. However HSE has the power to authorise carriage of explosives that is contrary to the prohibitions or requirements of the Carriage Regulations. Such authorisations must be time limited, specify the purpose for which they are issued, and set out the conditions of carriage.

HSE agree *in principle* with providing a commercial EOD organisation with an annual authority to package UXO and move to an off-site disposal location.

The criteria for making an application for this annual authority require the EOD organisation to provide assurance:

- of the competence of its personnel at all levels of control of the explosive substances and articles involved in this process.
- That the company's policies will follow the accepted priorities for disposal of UXO described in this GN.
- That only formally nominated and authorised competent persons in a managerial positing (the Company Duty Controller) will authorise movement of UXO in these circumstances.

The on-site process for movement of EOD arisings is:

- The UXO must be positively identified, either specifically or generically, and assessed as safe to move by a suitably qualified and experienced EOD Operator before packaging. If the UXO cannot be positively identified, its packaging, movement and subsequent disposal shall be the subject of a separate EOD Operation with its own formal risk assessment, temporary classification of the UXO by HSE and subsequent actions and control measures.
- Package the UXO in a suitable wood or cardboard container that meets the requirements of ADR Package Group II⁶⁴. The package must bear a UN package certification mark and be less than 3 years old. Further advice on packaging may be found in the HSE CDG Manual⁶⁵
- Packages are to be correctly marked as:
 - UN Ser 0465
 - Proper Shipping Name: Explosive articles N.O.S
 - Hazard Classification Code: 1.1F.
 - All up weight (AUW)
 - Estimated NEQ

NB1. This classification is consistent with MOD practice. UXO of unknown provenance or condition will be assumed to be an Explosive Article containing a secondary detonating explosive substance with its own means of initiation, with a propelling charge (other than one containing a flammable or hypergolic liquid) or without a propelling charge and to present a worst case mass explosion hazard; as such it will be treated as belonging in UN Hazard Classification 1.1F (UN Serial 0465 Articles Explosive NOS).

NB2. Within GB, the HSE requires that the UXO is transported separately from all other explosives substances and articles. More than one item of UXO, of different types, may be found and need to be moved at the same time - the ALARP principle suggests that a single vehicle for all UXO and a separate vehicle for serviceable explosives is the most practicable. IT is possible that mixed packaging may be required; further guidance may be found in the EIG Industry Code of Practice on the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment (Amendment) Regulations 2011.

For pre-planned EOD operations, the off-site disposal area must be identified and included in the risk assessment and operating instructions for that particular operation.

In the case of a need to move EOD arisings as part of a reactive EOD operation, EOD Company Duty Controllers must be capable of initiating the necessary liaison with prime contractor's agents, clients and specialist agencies that should be involved in the planning and execution of the follow-on operation.

Accounting. All EOD arisings must be accounted for and registers of movements kept. These are auditable documents and should show the item history from recovery to disposal. Once packed, the package should be marked with a unique identifier relating to the contents registered in the accounting system.

Retention of Documentation. For records purposes, closed unit records are to be maintained for a minimum of 5 years. UXO Disposals Classification Forms are to be kept for a period of 5 years.

An example of an application for authorisation to move EOD arisings is at Annex E.

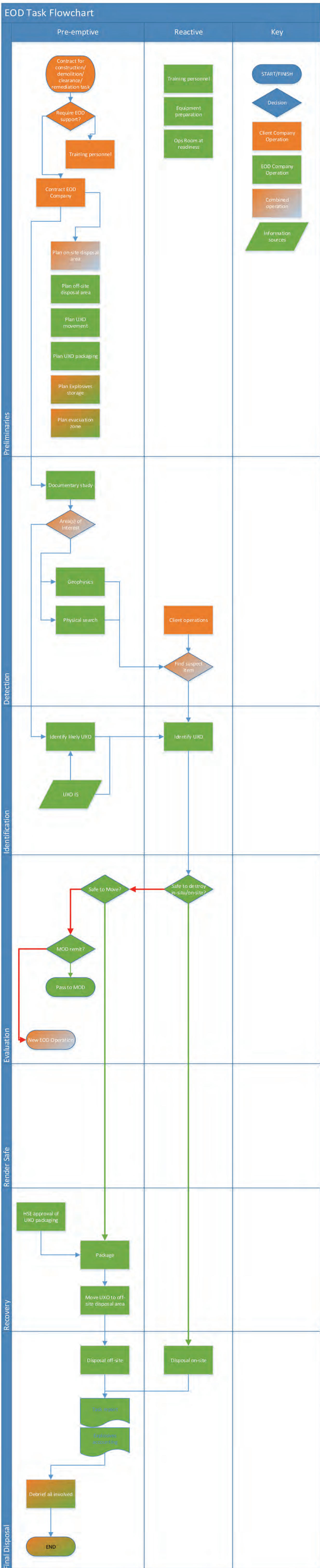
An algorithm for on-site certification of arisings is at Annex F.

A list of commonly found UXO with options for packaging for transport as EOD arisings is at Annex G.

Competence. An EOD Operator holding a current EOD Level 2 or higher, or equivalent qualification from an accredited training organisation is deemed trained and assessed in certifying an item of UXO safe to "Pick Up and Carry Away (PUCA)" as an appropriate disposal procedure.

⁶⁴ ADR 2011, Chapter 4.1, paragraph 4.1.1.17 states that unless specific provision to the contrary is made in ADR, the packagings, including IBCs and large packagings, used for goods of Class 1, self-reacting substances of Class 4.1 and organic peroxides of Class 5.2, shall comply with the provisions for the medium danger group (packing group II).

⁶⁵ <http://www.hse.gov.uk/cdg/manual/index.htm>



ANNEX B

QUICK-LOOK GUIDE FOR 1st RESPONDER

- Discover item.
- Stop work.
- Sketch or photograph in-situ.
- Mark location with obvious marker , eg: stick, stones, road marking paint.
- If on a site with EOD company presence: call site manager to request EOD company support.
- If on a location without pre- planned EOD cover, call the Police.
- Evacuate area as per the advice of EOD or Police.

1st RESPONDER

- Confirm the location of the item and its description.
- Clear the area in accordance with company or Police Force policy.
- Cordon the area in accordance with company or Police advice.
- Control the cordoned area to prevent ingress of people not involved in the disposal operation, until relieved by company or Police personnel.

ANNEX C

A		EOD TASKING REPORT		
		Priority Code:		
Client ID/Company:		Task Number:		
Date and Time Ordnance Discovered:		Date and Time Report Received:		
Person Receiving Report:		Name/Client Title of Person Reporting:		
		Tel:		
		Mobile:		
		Email:		
Reported Ordnance Description and Location:				
B1 First Aid Advice		B2 Additional Information		
Evacuation				
Cordon/Distance				
Do's				
Don'ts				
Secondary Hazards Considered				
D.T.G.		B3 Cat C Items in STMC A from Previous Tasks		
			Maroon	Bouyant Lifesmoke
			Mini Flare Packs	Handheld
			Rocket/Para Flares	MOB
			Signal Pistol Carts	Smoke Generator
			Speed Line/Thrower	Total NEQ
C Deployment				
Rendezvous/ETA/Location:		Personnel Deployed:		
Time Arrived On Task:		Time Task Complete:		
Revised Evacuation Distance:		Location of Controlled Explosion:		
Protective Works:		Emergency Services: Contact Details:		
		Police/MCA Incident Number :		
DTG of Controlled Explosion/Open Burn:		Explosive Used:		
Documents Attached (If Applicable) <small>Please tick relevant box(es)</small>	Form 1 Permit to Work	Form 2 Collection NEQ's	Form 3 TEP Consumables Delivery Form	Form 4 TEP Equipment Maintenance Check List

D	Positive ID & Quantity of Ordnance
---	------------------------------------

Description	Total
1. Blind	
2. Live	
3. Inert	

Remarks
1
2
3

E TEP Collections (See Attached Sheet)					(Only complete for TEP tasks)		
CAT	PROJECTION		NON PROJECTION		TOTAL		MPAS Database Updated by Control Room Supervisor
	No of Items	NEQ	No of Items	NEQ	No of Items	NEQ	
A							Signature:
B							Date:
C							PLEASE CIRCLE FOR CAT C ITEMS: Open Burn/Left in Seg. Unit

F No of Cat C items remaining in STMC A on Task Completion				(Only complete for TEP tasks)		
	Maroon		Signal Pistol Cart		Handheld Flare	Total NEQ
	Mini Flare Pack		Speed Line/Thrower		Man Overboard	
	Rocket/Para Flare		Bouyant Lifesmoke		Smoke Generator	

Comments:

G		
Explosives Officer	Explosive Account Admin	Senior Explosives Officer

Completed forms will be typed, then distributed by Control Room Supervisor

ANNEX D

APPROVAL PROCESS FOR PACKAGING AND MOVEMENT OF EOD ARISING

AIM

The aim of this annex is to give EOD organisations the process for applying for either an annual permit to package and move EOD arisings from the site of discovery of an item of UXO to an off-site disposal area in a pre-planned EOD task, or for a one-off move of UXO in a reactive EOD scenario.

CONSTRAINTS

The movement of any explosives comes with its own risks and therefore HSE Explosives Inspectorate (HSE XI) expects UXO to be destroyed in-situ whenever possible and when safe to do so; occasions when UXO are moved from the site of discovery should only be considered where the risks of on-site disposal cannot be mitigated to an acceptable level.

The overriding constraint is that the UXO has been assessed and is considered safe to transport, this will be largely dictated by the condition the UXO is found. Any requirement to store an item of UXO at the off-site disposal area will be subject to a separate application by the EOD organisation with the HSE XI.

PACKAGING

Outer packaging must be of wooden or other non-metallic construction and must display a UN Packaging Code that shows the package can be accepted for transport. Where this is not practicable a justification as to the suitability of the proposed packaging will need to be made.

Outer packaging must carry appropriate markings:

- UN Ser 0354, Articles Explosive N.O.S.
- Hazard Classification Symbol – 1.1L
- Gross Weight
- NEQ (Estimate)
- Quantity
- Name – “Unexploded Ordnance for Disposal by Open Detonation”
- Date packaged

Given the non-standard nature of the UXO, inner packaging must be safe and suitable, i.e. it must prevent the UXO from movement within the outer package and must not add to the effects of an unexpected explosion, nor the initiation of such an event e.g. by increasing the risk of electrostatic discharge. Suitable materials include, but are not limited to: anti-static bubble-wrap, corrugated card, polystyrene chips no smaller than combined outer dimensions of 5cm.

MOVEMENT

Normal ADR/CDG regulations apply with regard to approved vehicle type, placarding, training of drivers and escorts etc.

UXO are not to be carried in the same vehicle as the serviceable explosives required for their destruction, hence the use of the hazard classification code 1.1L. It is recognised that this requirement adds to the logistic burden on the EOD organisation but it is imperative that the hazard of the unclassified, packaged UXO is isolated from other explosive hazards that could add to the overall hazard in the event of an unplanned explosion or fire.

ANNEX D

APPLICATION

Time Limited Classifications for projects where repeated consignments of known UXO types are to be transported off-site e.g. area clearance or decommissioning.

An EOD organisation wishing a time limited classification to package and move UXO should apply in writing to HSE XI explaining their organisational process for:

- identification of UXO
- confirmation that it cannot be destroyed in-situ or on-site
- reach-back to the company duty EOD manager for authority to use a pre-planned off-site disposal area
- Description of the EOD organisation's UXO packaging methods
- Description of the EOD organisation's movement methodology

Individual Authorisations for the one-off consignment

An EOD organisation wishing an Authorisation to package and move UXO is to apply by fastest possible means, followed up in writing to HSE XI explaining their organisational process for:

- identification of UXO
- confirmation that it cannot be destroyed in-situ or on-site but is safe to move to an off-site disposal area – HSE will ask for evidence to support the assessment that the UXO is safe to transport
- Identification of a suitable off-site disposal area in conjunction with local authorities and/or HSE XI
- reach-back to the company duty EOD manager for authority to use this off-site disposal area
- Provide HSE XI with details of the UXO and packaging method
- Describe the proposed movement methodology
- Details of journey. Authorisations may include additional conditions to be complied with during the transport operation.

RECORDS

Any packaging and movement of UXO under the terms of the HSE Authorisation must be recorded on the EOD Task Report and made available to a Regulator when requested.

ANNEX E

Risk Assessment No:	
Job No:	

RISK ASSESSMENT PROCEDURE

Client:		Site:	
		Tasks covered by this Assessment:	

The following matrix is to be used to assess the risk to health and safety due to site working conditions. The tasks covered by this assessment are those shown above. A separate risk assessment should be made for additional tasks or if the nature of the task changes significantly during the job execution.

Severity, Likelihood and Risk Rating Tables

TABLE 1 – Severity Table and Definitions

Description	Code	Definition
Fatality	A	Multiple or Single fatality per event
Severe Injury	B	Major (Multiple or Single) severe/disabling injury or occupational illness per event. e.g. broken limbs
Major Injury	C	RIDDOR injury per event-injury resulting in more than 3 days absence from work including broken toes or fingers
Minor Injury	D	Injury requiring medical attention and leading to absence from work not exceeding 3 days

TABLE 2 – Likelihood Table and Definitions

Description	Code	Definition
Frequent	A	Occurs at least every month
Likely	B	Occurs at least once a year
Possible	C	Occurs every few years
Unlikely	D	Expected to occur within 20-150 years
Remote	E	Unlikely to occur within 20-150 years
Improbable	F	Extremely unlikely

TABLE 3 – Risk Rating Matrix

	Likelihood of Exposure to Harm						
	Frequent A	Likely B	Possible C	Unlikely D	Remote E	Improbably F	
Fatality A	High						
Severe Injury B							
Major Injury C							Med
Minor Injury D							

TABLE 4 – Risk Definitions

High	Immediate requirement to review and investigate the case removing/reducing the risk or improving the controls
Medium	Risks 'broadly acceptable' consider ongoing monitoring to identify reasonably practicable improvements
Low	Acceptable risk within system of work and method statement process

ANNEX F

Job Number:

**Method Statement and
Procedure Document**

Prepared for

DIRECTOR APPROVAL

Disclaimer

Version Control

Version Date	Version	Author/Date	Reviewer/Date	Approval/Date	Comment
	1.0				

Client Review

Name	Position	Signature	Date

Document Approval

	Sales	Commercial	SEO
Date			
Signature			
Job Title			

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11.	Storage of Explosive Items	5
12.	Statutory Records and Welfare Arrangements	6
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Method Statement and Procedure Document Briefing Log

I/We* the undersigned have been given and fully understood the briefing of the contents of this method statement and procedure document (***please delete appropriately*).

Name	Signature	Position	Company	Date

Briefing given by:

Name:	Title:	Date:
Signature:		

1. **Introduction**
2. **References**
3. **Purpose**
4. **Location of Work**
5. **Equipment and Plant to be Used**

Equipment and plant to be used on the site:

Equipment and Plant to be used	When	Additional Information

6. **Materials to be Used**

7. **Personnel**

On site personnel and responsibilities:

Name	Contact Number	Position/Role	Location

8. **Programme/Work Schedule**

Item	Task	Action	Initial (Complete)

9. **Disposal Area**

10. **Site Access and Storage**

11. **Storage of Explosive Items**

12. Statutory Records and Welfare Arrangements

Record/Equipment	Location	Notes
First Aid Kit		
Fire Fighting Equipment		
Communication Facilities		

13. Notices and Signage

14. Considerations for Third Parties/Members of the Public

15. Traffic Management

16. COSHH

17. Emergency Services Local Contact Numbers

18. Containment

19. Secondary Services/Hazards

20. Personal Protective Equipment

Personal Protective Equipment	When	Additional Information

21. Amplifying Comments

22. Environmental

23. Risk Assessments

ANNEX G

Permit To Work

Task Number/Job Number: _____

1. Planning the work to be carried out

Name of Person in charge of the work: (Name) _____ Position: _____

Nature of Work

HOT WORK	CONFINED SPACE	WORKING AT HEIGHT
COLD WORK	HIGH PRESSURE	
MECHANICAL WORK	ELECTRICAL WORK	

Location: _____

Brief Description of Work: _____

Permit Valid FROM: _____ (dd/mm/yy) TO: _____ (dd/mm/yy)

2 Potential hazards to be identified (or added) below that could be associated with this permit:

Slipping/tripping	Electrical hazard	Explosive gas/vapours	Stored energy
Falling	Temp extremes	Poisonous gas/vapours	Respiratory
Visibility	Heavy lifting	Low oxygen level	High noise level
Falling objects/tools	Trapped pressure	Chemical/corrosives	Simultaneous operations
EOD	Flying Fragments	Exertion	

3 Control measures to put in place for hazards identified above:

Fire extinguisher	Isolation of machinery	Face/eye protection	Respirator/facemask
Space vented	Portable gas detector	Fall protection	Ear protection
Portable radio	Oxygen percent	Work vest	Safety barriers
Access/escape route	Additional lighting	Gloves	Hard Hat

4 Circle one (to be completed by the Person in Charge of the Work)

YES/NO Do all personnel involved understand the nature of the work?
 YES/NO Has everyone who may be affected by this work been properly informed?
 YES/NO Is it safe to proceed?

5 Control of work: Signatures and Authorisation

ADDITIONAL PERMITS REQUIRED (Attached to this permit)

CONFINED SPACE ENTRY CERT _____ ISOLATION CERT _____

I am satisfied that the work has been adequately planned according to the Code of Safe Working Practices and that all relevant personnel and supervisors are informed. I approve the work to be carried out as detailed in this Permit to Work.

R.D.O. _____ (name) _____ (signature)

Responsible person: _____ (name) _____ (signature)

6 Completion of Work

Work is **completed/not completed** and is in a safe condition. Tools/materials/equipment have been removed and the area is clean and orderly. Normal operations **may/may not** be resumed. Safety systems have been restored. Additional permits are **cancelled/still active**

R.D.O.: _____ (name) _____ (signature)

Responsible Person: _____ (name) _____ (signature)

Time: _____ Date: _____

ANNEX H

Point Explosive Expenditure Form

(Serial No)

Date of Expenditure		
Explosives Drawn		
Explosives Used		
Location		
Event		
Explosives Returned		
Explosives Officer	Explosive Account Admin	Senior Explosives Officer