

## HAZARDOUS SUBSTANCES AND RESTRICTED MATERIALS

### Contents

#### Para

- 1 Introduction
- 5 Definitions
- 7 MOD Policy
- 9 Implementation of MOD Policy
- 15 Responsibility of Users
- 25 International Legislation
- 30 EU Legislation
- 44 UK Legislation

#### Annex

- A Restricted Materials
- B Batteries
- C Persistent Organic Pollutants (POPs)
- D Volatile Organic Compounds (VOCs)
- E Perfluorooctane Sulphonate (PFOS) and Perfluorooctanoic Acid (PFOA)-types of Perfluorinated Chemicals (PFCs)
- F Assurance Questions

### INTRODUCTION

1 Hazardous Substances and Restricted Materials have a detrimental effect on the environment, and human health. Many are natural, but more recently the number of man made substances being manufactured has risen significantly. The scale of impact depends on the type and quantity of material being used and whether the impact is direct or indirect. Concentrations can ultimately reach levels where the damage is difficult to repair.

2 Many of the substances are persistent in the environment and will accumulate over a period of time, entering supply and food chains. They can enter an animal's body in a variety of ways (ingestion, inhalation or contact with skin) and become more concentrated after each transfer thus increasing the damage caused. Some of the noted effects include poisoning, burns, chronic health problems, organ failure, foetal damage and reduced fertility. They can also have carcinogenic or mutating effects. Several notable environmental issues have been connected to the release of certain substances - acid rain, global warming and general contamination are just some of them. Long term consequences are less likely to be accounted for compared with acute injury which becomes immediately evident.

3 Due to the variety and nature of the MOD's activities we are heavily influenced by policy and legislation in this area. In certain cases the MOD may be granted exemption for the use of some hazardous substances but retains responsibility for ensuring that maximum efforts are made to abide by the legislation where possible. Derogations or exemptions for military purposes should be used sparingly and be fully justifiable with measures being put in place to identify suitable alternatives.

4 This leaflet covers some of the key legislation but suppliers and manufacturers should be contacted directly for more specific information on their products.

## Definitions

5 The Health and Safety Executive (HSE)<sup>1</sup> defines a Hazardous Substance as:

- Any substance which is listed in Part 1 of the CHIP Approved Supply List as dangerous for supply because it is very toxic, toxic, harmful, corrosive or irritant;
- Any preparation (mixture) that is dangerous for supply, as above;
- Any substance which has a Workplace Exposure Limit (WEL);
- Any biological agents used at work;
- Any dust other than one with a WEL at a concentration in air above 10 mg/m<sup>3</sup> averaged over 8 hours, or any such respirable dust above 4 mg/m<sup>3</sup> over 8 hours;
- Any other substance that creates a risk to health because of its properties and the way it is used or is present in the workplace.

6 A Restricted Material is one that is controlled by legislation but is still permitted for specific uses. It includes materials that have been refused for approval or withdrawn by industry from the domestic market or from further consideration in the domestic approval process, and there is clear evidence that such action has been taken to protect human health or the environment. Further information on restricted materials is available at Annex A.

## POLICY OVERVIEW

### MOD POLICY

7 For all hazardous substances and restricted materials, it is MOD policy to comply with UK and EU policy and legislation. Where there is no UK or EU legislation in force and there are no suitable alternative materials available, MOD must implement measures to reduce the negative impacts. This can be done by:

- Planned phasing out
- Supporting research to identify alternative options
- Putting measures in place to reduce emissions or pollution, etc.

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<sup>1</sup> <http://www.hse.gov.uk/coshh/detail/substances.htm>

8 MOD policy requires that all new uses of hazardous substances and restricted materials should be avoided and in the case of urgent operational requirements uses must always be subject to an appropriate risk assessment. Additionally, the legacy use of these should be minimised and cease as soon as possible. This requirement applies even where derogations or exemptions for Military purposes have been established.

## IMPLEMENTATION OF MOD POLICY

9 MOD has taken a number of steps to implement policy and reduce the use of hazardous substances and restricted materials. The Restricted Materials Steering Group (RMSG) is a MOD implementation group, hosted by Defence Equipment and Support, which catalyses and monitors the removal of restricted materials from the defence inventory. It also acts as the scrutiny Board for REACH exemption applications (for information on the exemption application process please click on this [link](#) )

10 The RMSG has introduced the HAZMAT database to aid the management of restricted materials in the MOD. Details on the use of, and access to, the HAZMAT database can be obtained from [DESSESEP-RMRad1@mod.uk](mailto:DESSESEP-RMRad1@mod.uk) .

11 JSP 515, the Hazardous Stores Information System (HSIS) is a database containing all the safety data sheets for MOD procured items. It should be noted that despite being subject to regular review and update, HSIS may not always contain the most comprehensive and current information. Any specific issues or concerns should be addressed directly with the relevant supplier and/or manufacturer.

12 Legislation requires that the safety data sheets shall contain information under the following 16 headings:

- Identification of substance/preparation and manufacturer
- Hazard identification of product
- Composition of item
- First aid measures
- Fire fighting measures
- Accidental release measures
- Handling and storage
- Exposure controls and personal protection
- Physical and chemical properties
- Stability and reactivity
- Toxicological information
- Ecological considerations
- Disposal considerations
- Information regarding transportation
- Regulatory information
- Other general information

HSIS can be accessed via the link below:

<http://www.transportsafety.dii.r.mil.uk/homepageedit/homegeneral.asp?department=HSIS>

13 It is MOD Policy to “carry out sustainability appraisals and environmental assessments, as appropriate, for new or revised policies, programmes (including acquisition programmes) office relocations, new projects and training activities”. Therefore, to ensure compliance with MOD policy, the Sustainability and Environmental Appraisal Tool should be used; further information can be found on the DE website [http://defencestates.cis.r.mil.uk/Organisation/Directorates/Strategy\\_and\\_Policy/SusApp.asp](http://defencestates.cis.r.mil.uk/Organisation/Directorates/Strategy_and_Policy/SusApp.asp)

14 TLB CESOs or equivalents are responsible for providing assurance of compliance in line with the MOD process ownership model.

## RESPONSIBILITIES OF USERS

15 MOD Project Teams (PTs) and Design Authorities must ensure as far as reasonably practicable that any new design or equipment brought into service meets both UK and EU legislative requirements and MOD policy.

16 Incorporation of hazardous substances and restricted materials into new designs and equipment should be avoided where possible. Consultation with Industry to identify safer alternatives should be undertaken at the earliest opportunity and where identified and proven to meet MOD specifications they should be substituted. Particular care should be taken when purchasing Commercial off the Shelf (COTS) equipment, especially where this is sourced from outside the EU as legislative and safety standards may not be as stringent. The PT should contact [DESSESEP-RMRad1@mod.uk](mailto:DESSESEP-RMRad1@mod.uk) or further advice and/or approval if necessary.

17 If no suitable alternatives are available and the incorporation of hazardous substances and restricted materials is unavoidable, then the risks posed to operators, maintainers and any other persons who may be affected must be considered, assessed and minimised through design to ensure that the equipment is safe both in use and during maintenance.

18 Where quality standards or legacy/‘call-off’ contract specifications require the use of hazardous substances and restricted materials, particular care should be taken. When such a material is specified, the PT should satisfy themselves of the continuing need to use it. Notwithstanding this, the MOD must still meet its own policy and legislative requirements and also ensure that the use of quality standards or existing contract specifications do not prevent it, or its suppliers, from doing so. If necessary, the contract specification should be amended or the use of the quality standard appropriately qualified.

19. PTs must ensure the use of hazardous substances and restricted materials in their projects is actively managed and investigations into alternatives must not cease once design work is completed and equipment brought into service. Continuous review of extant and upcoming legislation is also necessary to ensure that the MOD does not unwittingly act illegally. Evidence of active investigation must be shown along with current knowledge of relevant new technologies that could eventually meet the need. Developments in the relevant legislation can be followed from many of the commercially available tracking products and the websites of the Health and Safety Executive and Environment Agency, as well as SSD&C may also be useful.

20 Defence Industry Partners (DIPs) also have a responsibility to actively investigate alternatives for the hazardous substances and restricted materials they supply. However, where alternatives are identified, they must first satisfy the appropriate MOD safety and performance criteria and must not be incorporated until such time that these tests are successfully completed and written approval is obtained from the MOD. Once approved, the alternative must be used in all subsequent instances.

21 Where DIPs supply alternatives which do not contain restricted materials, it is the PTs responsibility to ensure that updated NATO Stock Numbers (NSNs) are obtained and used. This will enable the Department to effectively track the fitting of the replacement parts which is particularly important where Regulators require this. Legacy stocks containing the material should be removed from store and disposed of in accordance with MOD policy and any relevant legislation or recognised disposal route; for example, through the Disposal Services Agency (DSA).

22 Where legislation allows for derogations or exemptions applicable to defence, PTs and Defence Industry Partners who wish to enact it must ensure that they comply with any conditions detailed therein. Where an exemption requires the approval of the Secretary of State, PTs and Defence Industry Partners must not proceed until such time that they have received appropriate written authority to do so. The decision to enact the exemption and the approvals process undertaken, where applicable, must be well documented and robust enough to withstand scrutiny from an Enforcing Authority (such as the HSE).

23 PTs must be able to demonstrate that hazardous substances and restricted materials are being effectively managed either separately or together as part of a Safety or an Environmental Management System that the team have established. It Should also be managed as part of the CADMID cycle, developing the 'cradle to grave' concept and harnessing Smart Acquisition principles. For further information see the Acquisition Operating Framework (AOF) website at:

<http://www.aof.dii.r.mil.uk/>

24 PTs have a responsibility to ensure as part of their through life management plan that the correct disposal route and associated financial provision is identified for both the equipment and any hazardous substance it may contain. The disposal strategy should be subject to continuous review to ensure currency with legislation and to plan for the potential increasing costs associated with it.

## LEGISLATIVE OVERVIEW

### INTERNATIONAL LEGISLATION

#### **Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade**

25 PIC legislation entered into force on 24 February 2004. It was founded on the voluntary PIC procedure that Governments adhered to in the 1980s.

26 The Convention covers pesticides and industrial chemicals that have been banned or severely restricted for health or environmental reasons and its objective is to promote shared responsibility and cooperation among Parties in the international trade of certain hazardous chemicals. It aims to protect human health and the environment from potential harm and to contribute to their environmentally sound use. This Convention gives importing countries the tools and information they need to identify potential hazards and exclude chemicals they cannot manage safely. If a country agrees to import chemicals, the Convention promotes their safe use through labelling standards, technical assistance, and other forms of support. It also ensures that exporters comply with the requirements.

27 Annex III of the text of the Convention lists a total of 40 chemicals subject to the Prior Informed Consent (PIC) procedure. Among these chemicals: 25 are pesticides, 11 are industrial chemicals and 4 are severely hazardous pesticide formulations.

28 For more information, including links to Annex III see:

<http://www.pic.int/home.php?type=t&id=5&sid=16>

29 General information and guidance about legislation governing chemicals can be found at the following website: <http://www.chcs.org.uk/>

### EU LEGISLATION

#### **Directive on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (1907/2006/EC)**

30 REACH is a European Community Regulation on chemicals and their safe use which entered into force on 1 June 2007. Its aim is to improve the protection of human health and the environment through the better and earlier identification of the intrinsic properties of chemical substances.

31 REACH requires the compulsory registration of all substances (existing and new) that are sold, imported, manufactured or used in the EU in quantities equal to or exceeding one tonne per year. Data on the hazardous nature of the substances and their uses must be collected with the responsibility now falling on industrial manufacturers and users. The sharing of data is compulsory in order to minimise the number of tests required. Routes of exposure have to be identified, and recommended risk management measures have to be given to downstream users. If the substance is found to be one of high-concern, authorisation requirements and restrictions or bans may be imposed on its use.

32 A European Chemicals Agency (ECHA) based in Helsinki will be responsible for implementing and monitoring this new system. For more information, see:

[http://echa.europa.eu/reach\\_en.asp](http://echa.europa.eu/reach_en.asp)

Note: Annex XVII of the REACH Directive has replaced Directive 76/769/EEC as of 1 June 2009.

## **Defence Exemption**

33 REACH has provision for a defence exemption where this can be demonstrated to be 'in the interests of defence'. It is MOD policy, as stated in the Secretary of State (SofS) for Defence Policy Statement on Safety, Health, Environmental Protection and Sustainable Development that "where the Ministry of Defence has been granted specific exemptions, disapplications or derogations from legislation, international treaties or protocols, it will introduce standards and management arrangements that are, so far as reasonably practicable, at least as good as those required by legislation". To invoke the exemption, the MOD will use a management system to undertake the principal functions of the civilian regime which will be administered by Defence Equipment and Support DE&S will also act as the main focal point for all MOD related REACH issues. For further information please contact the Directorate of Safety & Environmental Protection in DE&S.

For more information, see:

<http://defenceintranet.diiweb.r.mil.uk/DefenceIntranet/Library/CivilianAndJointService/BrowseDocumentCategories/SafEnvFire/Safety/HazardousSubstancesSafety/RegistrationEvaluationAuthorisationAndRestrictionOfChemicalsreach.htm>

## **Regulation concerning Export and Import of Dangerous Chemical (2003/304/EC), with latest amendment Regulation 2006/777/EC**

34 The aim of this Regulation is to improve the information exchange about the characteristics of chemicals banned for use, or subject to severe restrictions within the Community. Its objectives are

(a) to implement the Rotterdam Convention (often going beyond its provisions), and  
(b) to impose the same packaging and labelling requirements for exports of all dangerous substances within the EU.

35 Annex I to this legislation consists of lists of chemicals which:

- Are subject to export notification procedure.
- Qualify for PIC notification.
- Are subject to the PIC procedure in accordance with the Rotterdam Convention.

36 For more information, including the original regulation, amended text and Annex 1; see: <http://edexim.jrc.it>

## **The Treaty of Lisbon 2009 (Article 346)**

(Replaces the Treaty of Amsterdam 1997)

37 Article 346 allows any Member State to take such measures as it considers necessary for the protection of the essential interests of its security which are connected with the production of or trade in arms, munitions and war material; such measures shall not adversely affect the conditions of competition in the internal market regarding products which are not intended for specifically military purposes. Based on this and UK MOD policy on compliance with legislation the following should still be complied with:

- No banned substance or material should be used on any new Defence Platform/equipment
- Where restrictions exist, substances/materials should not be used outside these restrictions
- Any substance benefiting from a defence exemption can only be used on Defence platforms/equipment where there is no suitable alternative.

38 Neither the MOD nor its Defence Industry Partners should use Article 346 to enable the use of banned or restricted substances in MOD equipment/platforms.

### **European Regulation on the Classification, Labelling and Packaging of Substances and Mixtures (Preparations) COM (2007)355 (known as the CLP Regs)**

39 The CLP Regs came into force in January 2009 and relate to the criteria and labelling rules for classifying substances based on the UN's GHS. It introduces new criteria, hazard symbols (pictograms) and labelling phrases for different substances while taking into account elements which are part of the current EU legislation.

40 The CLP Regs are being introduced via a transitional arrangement – it will apply to the classification of substances from 1 December 2010, and the classification of mixtures from 1 June 2015. They will replace the Dangerous Substances Directive (67/548/EEC), the Dangerous Preparations Directive (1999/45/EC) and The Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 (CHIP 4) in the UK. Additionally, the CLP Regs will take over the notification of classifications, the establishment of a list of harmonised classifications and the creation of a classification and labelling inventory provisions currently part of the REACH Regulation.

41 For more information see:

[http://ec.europa.eu/enterprise/reach/docs/ghs/ghs\\_prop\\_vol\\_i\\_en.pdf](http://ec.europa.eu/enterprise/reach/docs/ghs/ghs_prop_vol_i_en.pdf)

### **Directive on the Restriction of the use Hazardous Substances in certain Electrical and Electronic Equipment (2002/95/EC) (RoHS)**

42 For information on RoHS please refer to Annex A.

### **Waste Electrical and Electronic Equipment (WEEE)**

43 For information on WEEE please refer to the Controlled Waste leaflet (Leaflet 3).

## **NATIONAL LEGISLATION**

44 The majority of environmental legislation for the UK comes directly from the EU. The UK currently has a Red List of the most dangerous chemicals which have been selected for priority control. These chemicals are toxic, do not or are very slow to degrade in water and bio-accumulate in living organisms. More information can also be found in Annex C to this leaflet - Persistent Organic Pollutants (POPs).

### **The Chemicals (Hazard Information and Packaging for Supply) Regulations 2009**

**(CHIP 4)**

45 CHIP, currently in its fourth iteration, was introduced to protect people and the environment from the effects of chemicals by requiring suppliers to provide certain information about them and to package them safely. The European [Regulation on Classification, Labeling and Packaging of Substances and Mixtures](#) will replace CHIP4 on completion of the transitional arrangements in 2015.

46 CHIP requires the supplier of a dangerous chemical to:

- identify the hazards (dangers) of the chemical. This is known as 'classification';
- give information about the hazards to their customers. Suppliers usually provide this information on the package itself (e.g. a label);
- package the chemical safely.

Note: CHIP no longer covers provision of Safety data sheets (SDS) which is now enforced under the [REACH Regulation](#)

More detailed information can be found on the HSE website at:  
<http://www.hse.gov.uk/chip/>

**ANNEX A**

**RESTRICTED MATERIALS**

**MOD POLICY**

The uses of materials mentioned in this annex are restricted, and should be avoided if alternatives are available. Where there is current usage, alternatives should be researched and used at the earliest available opportunity.

**Asbestos**

Detailed information about asbestos can be found in JSP 375, volume 2, leaflet 54

**Radioactive Materials**

Please refer to JSP 392 for further information.

<b>Metal</b>	<b>Description</b>	<b>Uses</b>	<b>Hazardous Properties</b>
Cadmium	<ul style="list-style-type: none"> <li>• Naturally occurring element</li> <li>• Most commonly found as a compound combined with oxygen, chlorine or sulphur</li> <li>• Pure cadmium is a silver-white metal</li> <li>• Cadmium and its compounds are generally stable</li> <li>• It has high melting points and low volatility</li> <li>• Produces toxic fumes when burnt</li> <li>• Tarnishes in air, soluble in acids but not alkalis</li> </ul>	<ul style="list-style-type: none"> <li>• Most extensively used in electroplating</li> <li>• Solders</li> <li>• Standard E.M.F. cells</li> <li>• Nickel-cadmium batteries</li> <li>• Rods to control atomic fission</li> <li>• Component to alloys with low melting points, low friction and high resistance to fatigue</li> <li>• MOD's main use for cadmium is in aircrafts</li> </ul>	<ul style="list-style-type: none"> <li>• Probable human carcinogen</li> <li>• Evidence to show increased rates of certain cancers in animals</li> <li>• Probable teratogen in humans</li> <li>• Adverse effects on the reproductive system</li> <li>• Linked to other health effects including reduced respiratory capacity of lungs, permanent kidney damage and anaemia</li> <li>• Known toxin to plants and animals</li> </ul>
Chromium	<ul style="list-style-type: none"> <li>• Odourless hard metal in crystal or powder form</li> <li>• Forms include chromium (0), chromium (III) and chromium (VI) compounds</li> <li>• Chromium (III) occurs naturally</li> <li>• Chromium (0) and (VI) are produced in</li> </ul>	<ul style="list-style-type: none"> <li>• Protective coatings for automotive equipment to prevent corrosion</li> <li>• Nuclear and high temperature research</li> <li>• Electroplating cleaning agents in metal finishing</li> <li>• Mordants in textiles</li> <li>• Catalytic manufacture</li> </ul>	<ul style="list-style-type: none"> <li>• Known to be carcinogenic and toxic</li> <li>• There is inadequate evidence for carcinogenicity of chromium oxide, and chromium acetate</li> <li>• There is sufficient evidence for carcinogenicity of barium chromate, calcium chromate, chromium trioxide, lead chromate, sodium</li> </ul>

Metal	Description	Uses	Hazardous Properties
	<p>industrial processes</p>	<ul style="list-style-type: none"> <li>• Fungicides and wood preservatives</li> <li>• Specialty chemicals</li> <li>• Dyes and pigments</li> <li>• Medicinal antiseptics</li> </ul>	<p>dichromate, and strontium chromate</p> <ul style="list-style-type: none"> <li>• Chromium carbonate, chromium phosphate, cobalt chromium alloy, lead chromate oxide, potassium chromate, potassium dichromate, sodium chromate, and zinc chromate have not been evaluated for their carcinogenicity</li> <li>• Chromium (III) is less toxic and chromium (IV) compounds are corrosive</li> <li>• Causes ulceration of the skin</li> <li>• Exposure can be through air, water, soils and food.</li> </ul>
<p>Lead</p>	<p>Detailed information about lead can be found in JSP 375, volume 2, leaflet 5, Annex B</p>		
<p>Mercury</p>	<ul style="list-style-type: none"> <li>• Naturally occurring element</li> <li>• Silver white, liquid at room temperature</li> <li>• Can be found in compounds with other chemicals e.g. chlorine</li> <li>• When found in organic form it will eventually decompose to inorganic mercury</li> <li>• Not flammable and odourless</li> <li>• Stable with air and water, only reacts with nitric acid</li> <li>• Poor conductor of heat, good conductor of electricity compared with other metals</li> <li>• Some compounds of mercury are soluble with water</li> </ul>	<ul style="list-style-type: none"> <li>• Used pure in thermometers, barometers</li> <li>• Batteries containing mercury are used in guided missiles to portable radios</li> <li>• Electric or mercury lamps are used for outdoor lighting</li> <li>• Diuretics, antiseptics and skin preparations</li> <li>• Pigments, refining, lubrication oils, dental amalgams</li> <li>• Used as a catalyst in the production of vinyl chloride monomer, urethane foam and anthraquinone.</li> </ul>	<ul style="list-style-type: none"> <li>• Naturally can be concentrated in the flesh of certain fish</li> <li>• Low levels of contamination in oceans and lakes can led to the death of these fish</li> <li>• Severe effects on the nervous systems</li> <li>• Poisoning and cardiovascular collapse</li> <li>• Renal failure</li> <li>• Gastrointestinal damage</li> <li>• Damage to the brain, kidneys, or developing fetuses</li> <li>• Can also be exposed via food and drink</li> </ul>

**INTERNATIONAL PROTOCOL**

## **UNECE Convention on Long-Range Transboundary Air Pollution (CLRTAP) on Heavy Metals**

The Protocol aims to cut emissions from industrial sources, combustion processes and waste incineration. It sets limits for emissions from stationary sources and suggests use of Best Available Technique (BAT), such as special filters, scrubbers, or mercury-free processes, to achieve these limits. The Protocol introduces measures to lower emissions of mercury from products such as batteries.

For full Protocol text, please see:

<http://www.unece.org/env/lrtap/full%20text/1998.Heavy.Metals.e.pdf>

## **EU LEGISLATION**

### **Directive on Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons (PAHs) in Ambient Air (2004/107/EC)**

Strict limits on the total allowable levels of the so-called heavy metals have now been set for arsenic, cadmium, nickel, and PAHs. Mercury emissions will be monitored and a European Commission on acceptable levels for mercury is to be followed.

For consolidated text of the directive please see:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004L0107:EN:NOT>

### **Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (2002/95/EC)**

This directive is implemented in the UK through the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2008 (the "RoHS Regulations"). which bans the placing on the EU market of new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants. RoHS is a partner directive to the WEEE Directive (Waste in Electrical and Electronic Equipment) that controls the disposal and recycling of EEE in the UK

There are a number of exemptions for the use of the hazardous substances for specific technical uses where alternatives do not presently exist. There are also permissible maximum concentration values which allow for any trace presence. The full list of these exemptions can be found at:

<http://www.rohs.gov.uk/content.aspx?id=15>

For further information on the RoHS regulations please go to:

<http://www.rohs.gov.uk/Docs/Links/RoHS%20Regulations%202008.pdf>

## **ANNEX B**

### **BATTERIES**

#### **INTRODUCTION**

Batteries are an essential energy source used in a wide variety of products and appliances. They are usually divided into two groups:

- Portable batteries (normally weighing less than 1kg)
- Industrial and automotive batteries (usually weighing more than 1kg).

Although each type is very different in its composition, they all pose a serious and significant risk to both environment and human health. As nearly all contain lead, cadmium and mercury, they are considered to be hazardous waste when spent, and should be disposed of appropriately.

Legislation is already in place to deal with certain types of batteries. However the Government is currently reviewing new proposals for a directive that should cover all types of batteries.

#### **PORTABLE BATTERIES**

These are batteries used in household applications or other applications by either consumers or professional users. This sector consists of three main types:

- General purpose non-rechargeable batteries. There are usually composed of zinc carbon or alkaline manganese chemistries. They are commonly used in items such as clocks, portable stereos, torches and cameras.
- Non-rechargeable button cells containing zinc air, silver oxide, manganese oxide or lithium. These items are used in products such as hearing aids, watches and calculators.
- Rechargeable batteries (also referred to as accumulators). These include compounds such as nickel-cadmium, nickel-metal-hydride, and lithium-ion or sealed lead-acid. They are commonly used in mobile phones, power tools, emergency lighting, laptops and household appliances.

#### **AUTOMOTIVE BATTERIES**

These are mainly lead-acid batteries used for starting, lighting and ignition power for vehicles.

#### **INDUSTRIAL BATTERIES**

These usually consist of lead-acid or nickel-cadmium compositions. They are used for functions such as standby or traction power in telecommunications and rail applications.

#### **EU LEGISLATION**

## **Batteries and Accumulator Containing Certain Dangerous Substances (Council Directive 91/157/EEC)**

This states that batteries containing mercury, cadmium or lead should possess identifying labels and be collected separately when spent. Permissible heavy metal limits are set.

See below link for further information

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31991L0157:EN:HTML>

### **NOTE**

This was amended by Commission Directive 93/86/EEC and Commission Directive 98/101/EC.

Commission Directive 93/86/EEC is concerned with the labelling of batteries using appropriate symbols (including chemical ones). For further information please see:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:61996J0236:EN:HTML>

Commission Directive 98/101/EC has changed the permissible levels of mercury allowed within batteries: For further information please see:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31998L0101:EN:HTML>

### **UK LEGISLATION**

#### **The Batteries and Accumulators (Containing Dangerous Substances) Regulations (S.I. 1994 No. 232)**

The sale of alkaline batteries containing 0.025% mercury is prohibited, with further specifications on chemical symbols for batteries. Full text can be seen at:

[http://www.legislation.hmso.gov.uk/si/si1994/Uksi\\_19940232\\_en\\_1.htm](http://www.legislation.hmso.gov.uk/si/si1994/Uksi_19940232_en_1.htm)

### **NOTE**

Part of this has been amended by S.I. 2001 No. 255, which also goes further to transpose Commission Directive 98/101/EC into UK law.

#### **The Batteries and Accumulators (Containing Dangerous Substances) (Amendment) Regulations (S.I. 2000 No. 3097)**

It provides stricter regulations on permissible levels of heavy metals allowed within batteries. See:

<http://www.hmso.gov.uk/si/si2000/20003097.htm>

#### **Directive on Batteries and Accumulators and Waste Batteries and Accumulators (2006/66/EC)**

The Waste Batteries and Accumulators Regulations came into force on 5 May 2009 establishing a new Producer Responsibility system for the collection, treatment and recycling of waste portable, industrial and automotive batteries. This follows a Europe-

wide Batteries Directive laid in 2006, which aims to increase battery recycling rates across all European member states. Batteries when used in equipment connected with the protection of the essential security interests of EEA states, such as arms, munitions and war material, and intended for specifically military purposes are exempt For further information please go to:

<http://www.defra.gov.uk/environment/waste/producer/batteries/index.htm>

### MOD Policy for Directive

Even with the exemption in place, efforts should be made to abide by this legislation, and plans to collect and recycle batteries should be implemented. Where technologically feasible, batteries containing fewer heavy metals should be used. Research into alternatives should be carried out where exemptions are enforced.

## ANNEX C

### PERSISTENT ORGANIC POLLUTANTS (POPS)

#### INTRODUCTION

POPs are toxic, resistant to normal breakdown processes, bioaccumulative, and can travel great distances on wind and water currents. They are found mainly in pesticides, industrial chemicals and by-products of industrial processes. The list of POPs is endless, however, at present, some of those under considerable scrutiny (mentioned below) include:

- Aldrin
- Chlordane
- Chlordecone
- Dichlorodiphenyltrichloroethane (DDT)
- Dieldrin
- Dioxins and furans
- Endrin
- Heptachlor
- Hexabromobiphenyl
- Hexachlorobenzene
- Hexachlorocyclohexane (HCH)
- Hexachloroethane
- Methyl Bromide
- Mirex
- Nonyl Phenols (NPs) and Nonyl Phenol Ethoxylates (NPEs)
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Polybrominated Biphenyls (PBBs)
- Polybrominated Diphenyl Ethers (PBDEs)
- Polychlorinated Biphenyls (PCBs)
- Toxaphene
- Trichlorobenzene

#### MOD POLICY

It is MOD policy to minimise the use of POPs where technically feasible and use substances which are less harmful.

Chemical	Description	Uses	Hazardous Properties and Handling
<b>Aldrin</b>	<ul style="list-style-type: none"> <li>• Colourless crystal</li> <li>• Not combustible, however liquids containing it may be flammable</li> <li>• Decomposes on heating</li> </ul> <p>Corrosive due to the gradual evolution of hydrogen chloride</p>	<ul style="list-style-type: none"> <li>• Pesticide</li> </ul>	<ul style="list-style-type: none"> <li>• Decomposes on heating producing toxic corrosive fumes</li> <li>• Bio accumulates and enters food chains</li> <li>• Becomes more concentrated and causes damage to the environment and human health</li> <li>• For maintenance sweep spilled substances into containers and dispose of carefully</li> </ul> <p>Do not allow into watercourses or sewers</p>
<b>Chlordane</b>	<ul style="list-style-type: none"> <li>• Odourless, thick, clear/amber liquid</li> <li>• Chlorine like odour</li> <li>• Insoluble in water</li> <li>• Aliphatic in aromatic hydrocarbon solvents</li> <li>• Decomposes at high temperatures</li> </ul> <p><b>Corrosive and non combustible but may ignite in a mixture</b></p>	<ul style="list-style-type: none"> <li>• Pesticide</li> </ul>	<ul style="list-style-type: none"> <li>• Gives off toxic gases on decomposition</li> <li>• Carcinogen and mutagen in animals and humans</li> <li>• Damage to animals organs (no links to human cancer as of yet)</li> <li>• Prolonged contact is linked with organ failure and damage as well as damage to the central nervous system</li> </ul> <p><b>Water spray and alcohol resistant foams are best to control fires containing the substance</b></p>
<b>Chlordecone</b>	<ul style="list-style-type: none"> <li>• Tan to white coloured solid</li> <li>• In the anhydrous form is soluble in organic solvents</li> <li>• Readily soluble in acetone</li> <li>• Stable and does not</li> </ul>	<ul style="list-style-type: none"> <li>• Insecticide</li> </ul>	<ul style="list-style-type: none"> <li>• Affects humans and animals</li> <li>• Causes neurological and liver damage</li> <li>• Causes reproductive failure and fetotoxicity</li> <li>• Stable and persistent, and has a bio</li> </ul>

	degrade		accumulative <b>Should be managed in the same way as Chlordane</b>
<b>DDT</b>	<ul style="list-style-type: none"> <li>• Colourless to white crystalline powder</li> <li>• Forms hydrogen chloride on combustion</li> <li>• Soluble in organic solvents</li> <li>• Reacts with organic and inorganic bases including iron and aluminium</li> <li>• Ignites only when mixed with flammable substances</li> </ul>	<ul style="list-style-type: none"> <li>• Insecticide</li> <li>• Malarial control</li> </ul>	<ul style="list-style-type: none"> <li>• On combustion lets off toxic and corrosive fumes</li> <li>• Toxic to aquatic organisms</li> <li>• Hazardous to the environment</li> <li>• Toxic to humans causing liver damage and damage to the nervous and reproductive systems</li> <li>• Evidence suggests that it is not as damaging as certain other insecticides</li> <li>• Should be managed in the same way as chlordane</li> </ul>
<b>Dieldrin</b>	<ul style="list-style-type: none"> <li>• Behaves similarly to aldrin, sharing many of its characteristics</li> <li>• Aldrin breaks down in humans and animals to become dieldrin</li> </ul>	<ul style="list-style-type: none"> <li>• Insecticide</li> <li>• Timber preservation</li> </ul>	<ul style="list-style-type: none"> <li>• Similar to aldrin</li> </ul>
<b>Dioxins and Furans</b>	<ul style="list-style-type: none"> <li>• Chloro organic compounds</li> <li>• No specific use: by products of industrial processes</li> <li>• Can travel long distances</li> <li>• Increase in concentration in fatty tissue as they move high up the food chain</li> </ul>	<ul style="list-style-type: none"> <li>• Industrial by product</li> </ul>	<ul style="list-style-type: none"> <li>• Toxicity varies greatly</li> </ul>
<b>Endrin</b>	<ul style="list-style-type: none"> <li>• Closely related to aldrin and dieldrin</li> </ul>	<ul style="list-style-type: none"> <li>• Insecticide</li> <li>• Rodenticide</li> </ul>	<ul style="list-style-type: none"> <li>• More toxic than the other two, has a much larger impact on the aquatic environment</li> </ul>
<b>Heptachlor</b>	<ul style="list-style-type: none"> <li>• White crystalline solid</li> <li>• Soluble in acetone and benzene</li> <li>• Partial solubility in</li> </ul>	<ul style="list-style-type: none"> <li>• Insecticide</li> </ul>	<ul style="list-style-type: none"> <li>• Toxic to human and animals</li> <li>• Little known about health hazards but has been linked with liver</li> </ul>

	various alcohols		damage
<b>Hexabromo-biphenyl</b>	<ul style="list-style-type: none"> <li>• Family to polybrominated biphenyls</li> <li>• Persistent</li> </ul>	<ul style="list-style-type: none"> <li>• Flame retardant</li> </ul>	<ul style="list-style-type: none"> <li>• Enters and remains in food chains</li> <li>• Little toxicological data available</li> <li>• Suggests endocrine disrupting activity and links to carcinogenicity</li> </ul>
<b>Hexachloro-benzene</b>	<ul style="list-style-type: none"> <li>• White crystalline solid</li> <li>• Chlorinated hydrocarbon industrial chemical (waste product)</li> <li>• Previously used as a fungicide</li> <li>• Insoluble in water, soluble in benzene, carbon disulphide, chloroform and ether</li> <li>• Chemically stable and resistant to biodegradation</li> </ul>	<ul style="list-style-type: none"> <li>• Fungicide</li> <li>• Contaminant in pesticides</li> </ul>	<ul style="list-style-type: none"> <li>• Very persistent environmental chemical</li> <li>• Carcinogenic to animals and anticipated for humans also, however there is inadequate evidence.</li> </ul>
<b>HCH</b>	<ul style="list-style-type: none"> <li>• Organic compounds</li> <li>• White solid with musty odour, evaporates easily</li> </ul> <p>Most common form is gamma-HCH known as lindane</p>	<ul style="list-style-type: none"> <li>• Timber insecticide</li> <li>• Domestic and agricultural insecticide</li> </ul>	<ul style="list-style-type: none"> <li>• Release to water damages insects and fish</li> <li>• Persists and accumulates in environment and can travel long distances</li> </ul> <p>Adverse health effects include blood disorders, dizziness, headaches, and damage to the liver and kidneys</p>
<b>Hexachloro-ethane</b>	<ul style="list-style-type: none"> <li>• Colourless solid</li> <li>• Gradually evaporates in air</li> </ul> <p>By product in production of some other chemicals</p>	<ul style="list-style-type: none"> <li>• Fungicides, insecticides, insecticides</li> <li>• Lubricants and plastics</li> <li>• Military smoke producing devices</li> </ul>	<ul style="list-style-type: none"> <li>• Mild irritant with organ damage at excessive levels only</li> <li>• Evidence of tumour growth in animals</li> </ul> <p>Insufficient evidence to suggest carcinogenic effects on humans</p>
<b>Methyl Bromide</b>	Please refer to Annex C		
<b>Mirex</b>	Similar properties to chlordecone	<ul style="list-style-type: none"> <li>• Insecticide</li> </ul>	See above
<b>NPs and</b>	<ul style="list-style-type: none"> <li>• NPEs are liquids or</li> </ul>	<ul style="list-style-type: none"> <li>• Detergent and</li> </ul>	<ul style="list-style-type: none"> <li>• Toxic to wildlife</li> </ul>

<p><b>NPEs</b></p>	<p>waxy solids</p> <ul style="list-style-type: none"> <li>• Colourless to light amber</li> <li>• Varying degree of water solubility</li> <li>• Primary degradation product is NPs</li> </ul> <p>NPs belong to a class of chemicals called alkylphenols</p>	<p>cleaning agent</p> <ul style="list-style-type: none"> <li>• Degreasing products</li> <li>• Stabilisers</li> <li>• Pharmaceuticals and pesticides</li> <li>• Plastics, synthetic rubber</li> <li>• Textiles paints and varnishes</li> <li>• Oil additives</li> </ul>	<p>especially aquatic</p> <ul style="list-style-type: none"> <li>• Controls fertility and sexual development</li> <li>• Links with abnormal sexual development in fish and other aquatic animals</li> <li>• No human effects identified yet</li> </ul> <p>Please visit the <a href="#">link</a> for Defra's Risk Reduction Strategy concerning Nonylphenols</p>
<p><b>PAHs</b></p>	<ul style="list-style-type: none"> <li>• Hydrocarbon compounds with multiple benzene rings</li> <li>• Best known PAH is benzo[a]pyrene, B[a]P</li> </ul> <p>Natural or man made</p>	<ul style="list-style-type: none"> <li>• Typical components of asphalt, fuels, oils and greases</li> </ul>	<ul style="list-style-type: none"> <li>• Causes cancer, birth defects and mutations in wildlife</li> <li>• Cancer and genetic damage to humans</li> </ul> <p>Carried over long distances and impact much further away than expected</p>
<p><b>PBBs</b></p>	<ul style="list-style-type: none"> <li>• Consists of 209 possible isomers</li> </ul> <p>Chemical and physical properties depend on the compound</p>	<ul style="list-style-type: none"> <li>• Not many uses</li> <li>• Flame retardant</li> </ul>	<ul style="list-style-type: none"> <li>• Persistent bio accumulators</li> </ul> <p>Evidence to suggest carcinogenetic and toxicity particularly in aquatic animals</p>
<p><b>PBDEs</b></p>	<ul style="list-style-type: none"> <li>• Have replaced PCBs and PBBs as fire retardants</li> <li>• Physical and chemical properties depend on the isomer present</li> <li>• Three most common are penta, octo and decaBDEs</li> </ul> <p>DecBDEs are the most commonly used worldwide</p>	<ul style="list-style-type: none"> <li>• Flame retardant used in electronics, furniture, textiles, cables.</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental presence is increasing exponentially (over the last 2-5 years)</li> <li>• PentaDBEs are the most bio accumulative and can be absorbed and built up in organisms</li> <li>• PBDEs are linked with damaged health including neurological and behavioural in both humans and animals</li> <li>• Significant risk to fetuses</li> <li>• Please use links to view Defra's Risk Reduction Strategy for PentaBDE<sup>2</sup> and</li> </ul>

<sup>2</sup> [http://www.defra.gov.uk/environment/chemicals/pdf/penta\\_bdpe\\_rrs.pdf](http://www.defra.gov.uk/environment/chemicals/pdf/penta_bdpe_rrs.pdf)

			OctaBDE <sup>3</sup> <b>See below for legislation information</b>
<b>PCBs</b>	<ul style="list-style-type: none"> <li>• Man made organochlorine chemicals</li> <li>• Chemically stable, fire resistant, do not generate vapours easily</li> <li>• Insoluble in water, soluble in fatty acids and oils</li> <li>• 209 possible isomers</li> </ul> <p>Oily liquids or solids, colourless to light yellow, sometimes exists as vapour</p>	<ul style="list-style-type: none"> <li>• Can be found in older products</li> <li>• Used in transformers, capacitors and electrics as coolants and lubricants</li> </ul>	<ul style="list-style-type: none"> <li>• Persistent and bio accumulative</li> <li>• Concentration increases up the food chain (especially in aquatic creatures)</li> <li>• Heavily bind with soils and organic particles</li> </ul> <p>Manufacture of PCB containing equipment is forbidden but it is a by product of other industrial processes</p>
<b>Toxaphene</b>	<ul style="list-style-type: none"> <li>• Also known as camphechlor</li> <li>• Yellow or amber waxy solid</li> <li>• Soluble in acetone, benzene and organic solvents</li> <li>• Broken down by sunlight, high temperatures and biodegradation</li> </ul> <p>Penetrates soil and binds, remaining stagnant</p>	<ul style="list-style-type: none"> <li>• Insecticide</li> </ul>	<ul style="list-style-type: none"> <li>• Toxicity varies</li> <li>• Widespread contaminant of aquatic ecosystems</li> </ul> <p>Poisonous to humans when ingested</p>

<sup>3</sup> [http://www.defra.gov.uk/environment/chemicals/pdf/octa\\_bdpe\\_rrs.pdf](http://www.defra.gov.uk/environment/chemicals/pdf/octa_bdpe_rrs.pdf)

## ANNEX D

### VOLATILE ORGANIC COMPOUNDS (VOCs)

#### INTRODUCTION

VOC sources can be found both indoors and outdoors. They are known to have an adverse affect on both health and the environment. Some examples of products that emit VOCs include household products (including paints, paint strippers, and other solvents), wood preservatives, aerosols, cleansers, disinfectants, air fresheners, stored fuels, vehicle emissions and dry-cleaned clothing.

Some major emissions include benzene; a range of phenols, ethers, alcohols and their derivatives; PAHs and 1, 3-butadiene. The list is endless but some major contributors can be found at the following website.

<http://www.epa.gov/wtc/voc/>

VOCs are a major contributor to low level ozone, which unlike stratospheric ozone, is a known common air pollutant that has been proved to be a public health hazard. Ozone is created in the atmosphere via a photochemical process when VOCs react with oxides of nitrogen in the presence of sunlight. Low level ozone is a highly reactive gas that restricts the functionality of lungs, making it harder for humans to breathe.

It is impossible to avoid the complete use of VOC emitting objects. However, it is possible to reduce their emissions. Alternatives for some of the high-emitting products are available with further research currently being done to bring emissions in line with legislation. Many of the alternatives contain low-emission VOCs.

Information about their effects and further information on sources can be found at the following website:

<http://www.epa.gov/air/toxicair/newtoxics.html>

Please refer to Leaflet 2 on Pollution Prevention in JSP 418 for more information, including relevant legislation.

#### MOD POLICY

Where possible, minimise use of VOCs and use less harmful substances, e.g. water-based paints instead of paints containing high-levels of VOCs for decorating.

## ANNEX E

### PERFLUOROOCTANE SULPHONATE (PFOS) AND PERFLUOROOCTANOIC ACID (PFOA) - TYPES OF PERFLUORINATED CHEMICALS (PFCs)

#### INTRODUCTION

PFCs are used in a variety of chemical applications. PFOS is specifically used mainly in:

- Fire fighting foams
- Hydraulic fluid additives
- Surface treatments
- Metal plating
- Paper/textile protection
- Photographic industry and
- In semiconductors

PFOS and PFOA are two of the most persistent chemicals present within our atmosphere. Currently there is relatively little knowledge and understanding of the consequences of this. However, their bio accumulative and toxic nature makes them a cause for concern.

The use of PFOS by 3M, the world's largest producer of PFOS, was phased out voluntarily due to concerns over its carcinogenic and toxic properties. After this, several Organisations for Economic Co-operation and Development (OECD) countries agreed to work together. The purpose was to gather information on the effects of PFOS to human health and the environment. Simultaneously, Defra has commissioned a consultation on risk reduction strategy for PFOS related substances.

Detailed information regarding PFOS/PFOA can respectively be found at:

<http://www.fluorideaction.org/pesticides/pfos.final.report.nov.2002.pdf>

<http://www.fluorideaction.org/pesticides/pfos.epa.dev.tox.apr.2003.pdf>

#### MOD POLICY

It is MOD policy to avoid the use of PFCs where technically feasible. Where they are currently used, research alternatives and make use of them at the earliest available opportunity.

## ANNEX F

### ASSURANCE QUESTIONS

The purpose of these question sets is not for delivery bodies to provide answers to each question. However, they should be useful for the delivery body in stating their assurance level. If full assurance cannot be given, a short explanation of the problem area/s and the actions which are being taken to improve the assurance level is required.

#### Questions

1. How are legislative requirements met and updated?
2. How many project teams during the last annual reporting audit period received either no assurance or limited assurance? How is this being remediated?
3. How is the TLB/TFA monitoring and managing the usage of HSRMs?
4. How are the responsible authorities ensuring:
  - to minimise the use of HSRM;
  - that environmentally acceptable alternatives to HSRM are used where technically and economically feasible;
  - that new designs and installations do not incorporate or use HSRM as far as reasonable practical?
5. How will the disposal of any HSRM be managed? Is the disposal included in through life costing?
6. On the basis of your responses to the questions, and the guidance that is provided in JSP 418, what level of assurance do you believe applies for your compliance with this policy area?

#### DIA Assurance Classifications

- **Full assurance** - The frameworks of governance, risk management and control should ensure effective, efficient and economic achievement of the business objective. Risks that threaten the achievement of that objective are adequately managed.
- **Substantial Assurance** - Weaknesses identified in governance, risk management or control frameworks. Achievement of the business objective is threatened by inadequate management of medium or low category risks.
- **Limited Assurance** - Weaknesses identified in governance, risk management or control frameworks. Achievement of the business objective is threatened by inadequate management of high category risks.
- **No Assurance** - The frameworks of governance, risk management and control do not support effective, efficient and economic achievement of the business objective