

# 9 Dangerous Substances and Explosive Atmospheres

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## Scope

9.1.1 This chapter sets out the MOD procedures and guidance on the identification, assessment and mitigation of dangerous substances and explosive atmospheres including the Defence overseas estate except where host nation regulations are more stringent.

9.1.2 The requirements of this chapter also apply to UK Defence Establishments occupied by the United States Visiting Forces (USVF).

9.1.3 The manufacture, handling, use, storage and transport of explosives are excluded from the scope of this chapter.

## Introduction

9.2.1 The Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) require the MOD to assess the risk of harm to personnel from fires or explosions involving dangerous substances in the workplace. These risks must be eliminated or reduced so far as is reasonably practicable. The aim is to both prevent harm to defence personnel, visitors and members of the public who may be put at risk, and to minimise collateral damage.

9.2.2 The Regulations complement the requirement to manage risks under the Management of Health and Safety at Work Regulations and transpose two European Directives (the Chemical Agents Directive (98/24/EC) and the Explosive Atmospheres Directive (99/92/EC)) into UK legislation. They also replace a number of older regulations dealing with flammable substances safety.

9.2.3 DSEAR deals with the immediate danger to life or health from fires or explosions resulting from the ignition of dangerous substances and should not be confused with COSHH which deals with the chronic and acute health effects of exposure to substances hazardous to health. Processes and the storage involving dangerous substances that require a DSEAR assessment will also require COSHH assessments.

## **Role and Responsibilities**

### **Procurement or Acquisition**

9.3.1 As 'suppliers' or 'importers', Design Authorities, Project Teams (persons responsible for procurement and delivery of Equipment and Services) Maintenance Management Organisations (MMO) and Defence Acquisition Teams have the responsibility to ensure that equipment and infrastructure procured, operated or maintained (in accordance with EN 60079-17:2007) is safe to use. Analysis of explosion protection and consideration of prevention or control measures must be carried out at an early stage by, or in conjunction with, the manufacturer/supplier who should have the required competences. The explosion protection analysis must include the identification and calculation of DSEAR zones and equipment category requirements, along with any necessary design alterations.

9.3.2 Organisations/persons responsible for the procurement or maintenance of plant, equipment and/or facilities which involve hazardous substances must ensure that relevant information is provided to the operating authority for inclusion in the Stage 2 DSEAR RA. This will include, but is not limited to, hazard analysis, hazardous area classification drawings, ratings of equipment etc, material safety data sheets (MSDS) and information on required/recommended control measures.

9.3.3 DSEAR RAs provided by manufacturers or suppliers may not relate to the specific circumstances (use and location) in which the equipment will be used by the MOD; therefore a DSEAR RA which takes into account the factors relating to MOD use must be completed.

### **Infrastructure Provider**

9.3.4 The responsibility to provide a legal and Defence DSEAR compliant infrastructure rests with the individual with the direct authority to commit adequate resources for maintaining the infrastructure and associated site plans, building/facility drawings, fixed signage, etc.. The infrastructure provider must provide the Commanding Officer / Head of Establishment (CO/HoE) with assurance that the correct category of fixed assets/electrical systems is maintained and is compliant with the hazardous area classification in accordance with the appropriate DSEAR RA.

### **Commanding Officers (COs)/Heads of Establishment (HoEs)**

9.3.5 The CO/HoE owns the risk and the responsibility to ensure that all areas where explosive atmospheres are likely to be present are identified, assessed and controlled in accordance with DSEAR. This includes ensuring that Stage 1 and 2 DSEAR RAs are conducted; establishing hazardous area zones etc; and providing information to the infrastructure provider to allow drawings to be updated; and signs to be moved/erected etc.

The CO/HoE should appoint a Hazardous Area Manager (where appropriate) to co-ordinate this function and monitor compliance.

9.3.6 Where the MOD shares the workplace with a lodger organisation, contractor or private individual/organisation, arrangements must be put in place to co-ordinate the implementation of the protective measures required by the DSEAR RA; noting that overall responsibility rests with the HoE. JSP 375 Part 2, Volume 1, Chapter 02 (Office and General Workplace Safety) and Chapter 34 (4C System: the management of visiting workers and contractors) refer.

9.3.7 Known and suspected DSEAR activities/processes must be Stage 1 DSEAR Risk Assessed (MOD Form 5014) by competent persons as detailed in 9.3.5 to identify whether the process/activity produces an explosive atmosphere and if a Stage 2 DSEAR RA is required. Where the need for a Stage 2 DSEAR RA has been identified, the CO/HoE must ensure that competent persons as detailed in 9.3.6 are formally appointed to undertake a comprehensive DSEAR RA and determine the correct classification and boundaries of DSEAR hazardous area Zones. Additional SME advice may be required; this may be provided by the TLB CESO/S&EP organisation or the process operator etc.

9.3.8 Before any facility/workplace that has been classified as a hazardous area under DSEAR is used for the first time, the CO/HoE must seek assurance from a suitably qualified person that the requirements of para 9.3.4 have been met.

9.3.9 All DSEAR RAs and control measures relating to process fire precautions are to be brought to the attention of the fire safety risk assessor(s) to allow the impact on the wider general fire precautions for the unit/establishment to be evaluated and to ensure compliance with fire safety legislation.

## **Managers**

9.3.10 The manager of any DSEAR activity/process/area is to ensure that: a current DSEAR RA is available; the activity/process/area and procedures are maintained to ensure compliance; and that all personnel are trained and competent.

9.3.11 Managers are to ensure that safe systems of work are in place to prevent the accidental release of a substance and prevent the presence of potential ignition sources within zoned areas. All defence personnel and visitors proposing to enter an identified hazardous area must be provided with relevant information, instructions and training in accordance with the requirements of JSP 375 Part 2, Volume 1, Chapter 34; which shall include:

- the dangerous substances present in the workplace and the risks they present including access to any relevant safety data sheets and information on any other legislation that applies to the dangerous substance;
- the findings of the RA and the control measures implemented as a result (including their purpose and how to follow and use them);
- emergency procedures; and
- the control of contraband items (smoking materials, mobile phones, radios, MP3 players etc.).

9.3.12 Appropriate work clothing and tools minimising the risk of electrostatic discharges that could ignite an explosive atmosphere are to be provided. The manager

must put in place checks to ensure these are maintained and used when working in hazard zones. Routine checks on the effective control of contraband and other control measures identified by the Stage 2 DSEAR RA must be conducted by managers.

9.3.13 Managers responsible for maintenance operations are to ensure that an appropriate task risk assessment has been undertaken, including any additional measures necessary to ensure the safety of personnel; and that only competent personnel who are aware of the additional hazards and control measures undertake such work in the DSEAR zoned area. Maintenance activities will normally be conducted under a “permit to work” system (in accordance with JSP 375 Part 2, Volume 1, Chapter 30, or JSP 375 Part 2, Volume 3)

## **All Personnel**

9.3.14 Personnel are to comply with the requirements of the DSEAR RA, safe systems of work, and the correct use of control measures. All personnel must undertake such training as is required to enable them to understand and comply with all instructions provided.

## **Dangerous Substances**

9.4.1 Dangerous substances in the context of DSEAR are substances or mixtures of substances (referred to as “preparations” in DSEAR) that could create risks to people’s safety from fires and explosions or similar events, such as ‘thermal runaway’ from chemical reactions (exothermic reactions). Liquids, gases, vapours and dusts that may be found in a workplace can all be dangerous substances; these include:

- substances or mixtures of substances classified as explosive, oxidising, extremely flammable, highly flammable, or flammable under the Classification, Labelling and Packaging of Substances and Mixtures Regulation (CLP);
- dust, gases or vapours that when airborne may form a potentially explosive cloud (solvents, paints, varnishes, flammable gases - such as liquid petroleum gas (LPG), metal and wood dusts from machining and sanding operations and dusts from foodstuffs etc.);
- any other substances, or mixtures of substances which, because of their physical properties and the way in which they are present in the workplace, create a risk to safety from fires and explosions, but which may not be covered by CLP; and
- materials which would not normally be regarded as hazardous but may become so when pumped or stored/used under pressure and which could generate a flammable mist on release.

9.4.2 Substances (such as Diesel) with a high flashpoint shall not normally require zoning (except inside bulk storage tanks) unless the substance is under pressure with the potential of forming a mist or spray capable of creating an explosive atmosphere (this may be due to failure of the high pressure systems in which they are handled). Zoning is required where the temperature is close to the flashpoint of the substance, typically where the temperature is within approximately 10°C of the flashpoint although the exact figure will depend on the circumstances and process.

## Hazard Zones

9.5.1 The identification of facilities (pipes, tanks etc.), activities, areas (refuelling points, pits, trenches etc.) and buildings within the workplace where explosive atmospheres may occur must be recorded in the Site RA (JSP 375 Part 2, Volume 1, Chapter 08) and the 4C Area Hazard Register (JSP 375 Part 2, Volume 1, Chapter 34), and be classified as hazardous (a place in which an explosive atmosphere may occur in such quantities as to require special precautions to protect the health and safety of the workers).

9.5.2 Hazardous places are classified in terms of zones on the basis of the frequency and duration of the occurrence of an explosive atmosphere. Hazardous places must be marked with signs (fig. 1) at entry points (and where appropriate, boundaries) along with any other hazard signs/information identified in the Stage 2 DSEAR RA. The classification of Zones is as follows:

- For gas, vapour or mist:
  - Zone 0 - A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is present continuously or for long periods or frequently.
  - Zone 1 - A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally.
  - Zone 2 - A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only.
- For combustible dust:
  - Zone 20 - A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously, or for long periods or frequently.
  - Zone 21 - A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur in normal operation occasionally.
  - Zone 22 - A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

### Notes:

- i. Layers, deposits and heaps of combustible dust must be considered as sources which can form an explosive atmosphere if dispersed.
- ii. Piles of dust may be subject to self-heating and layers of dusts may cause overheating of equipment; and become an ignition source.
- iii. "Normal operation" means the situation when installations are maintained or used within their design parameters.



Figure 1.

9.5.3 The identification and classification of zones must be completed by a competent person as identified in 9.3.6. Factors which affect the calculations for the parameters of zones include (but are not limited to):

- the release rate, size and density of the particles that form the vapour, mist, fumes or cloud;
- building design;
- ventilation;
- the presence of oxidizing substances<sup>1</sup>;
- the topography of the area if any release would not be constrained by natural or artificial barriers;
- the presence of any pits, trenches or ditches that may trap and contain any release;
- where tanks are being vented and vapours are being released;
- the linking of adjacent hazardous Zones for uniformity and clear demarcation purposes between hazardous and safe areas;
- weather conditions including breezes, which may extend the hazard area, or hot weather that may increase the production of vapour; and
- Ambient temperature/humidity in buildings/facilities

9.5.4 The zones surrounding some vehicles and installations may have already been calculated for temperate climates (up to 30°C) to allow a direct example approach to be applied. However, the process/activity being assessed must not differ from the examples in layout, equipment design, climate, or degree of ventilation. If there are any changes to these parameters, zones will need to re-calculate using appropriate industry based codes of practice as guidance by a competent person. Once identified, all hazard zones must be clearly marked on site plans denoting the classification of each zone. Guidance on DSEAR RAs for Bulk Fuel Installations can be found in JSP 317 Part 2 Chapter 1 (Storage and Handling of Fuels and Lubricants). Pipes, containers, valves, joints, take offs etc that transport or store dangerous or flammable substances may need to be zoned and identifiable; and included in hazardous area drawings.

9.5.5 Area classification and DSEAR risk assessment for installations in non-temperate regions must take account of the foreseeable range of ambient temperatures and the

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<sup>1</sup> The presence of oxidising substances does not affect the extent of the zone, however, the presence of such materials may materially affect the risk of ignition and will promote combustion.

flashpoint of the dangerous material. If the flashpoint of the material is within 10°C of the maximum foreseeable ambient temperature, then the material must be considered as being flammable and hazardous area classification will be necessary. Heating from exposure to direct sunlight must also be taken into consideration as high levels of solar radiation can result in metal temperatures greater than 100°C.

9.5.6 Where a temporary process or activity is to be implemented which may generate an explosive atmosphere, this must be risk assessed by a competent person as identified in 3.6 and if applicable, an appropriate temporary zone is to be established, suitable controls implemented and the CO/HoE notified.

## Assessing the Risk

9.6.1 All DSEAR risk assessments and mitigation measures for qualifying processes and activities on the Defence Estate and for qualifying processes and activities undertaken elsewhere by the MOD must be compliant with the HSE guidance contained in ACOP L138.

9.6.2 A Stage 1 DSEAR Risk Assessment (RA) must be undertaken (to ascertain if a full DSEAR Assessment is required) for any process or activity that is suspected to have the potential to create an explosive atmosphere in normal operation, handling, storage or maintenance; and recorded on MOD Form 5014.

9.6.3 If the Stage 1 DSEAR RA identifies a possibility of dangerous substances or processes that may result in an explosive atmosphere, then a Stage 2 DSEAR RA must be carried out following the template at Annex A, by a competent person(s) and in accordance with JSP 375 Part 2, volume 1, Chapter 8. The Stage 2 DSEAR RA assesses the fire and explosion risks that may result from the ignition of the dangerous substances. A summary of the residual hazards and risks should be recorded on MOD Form 5014 (DSEAR Risk Assessment) and reference the relevant supporting evidence/documents.

9.6.4 Where required by the Stage 2 DSEAR RA, Hazardous Area Classification Drawings (held by the Maintenance Management Organisation (MMO) / Estate Management Team) must be produced and conform to Annex B.

9.6.5 Two signatories are required who are directly involved in conducting the Stage 1 DSEAR Risk Assessment and will be:

- The manager responsible for the process; **AND**
- An assessor qualified to at least NEBOSH General Certificate in Occupational Health and Safety (or a national or MOD recognised equivalent), and undertaken suitable DSEAR awareness training.

The two signatories **must not** be the same person.

9.6.6 To conduct a Stage 2 DSEAR Risk Assessment for the MOD, the assessment team must meet the same competence requirement as for conducting a Stage 1 Risk Assessment (with additional input from appropriate stakeholders (e.g. MMO, DFRMO) where required). Where bespoke hazardous area classification drawings and zone calculations are required (i.e. not using industry standard or IP15 drawings), the person signing them off must hold a current Certification of Personnel Competency for IECEx Unit Ex 002 (or equivalent nationally recognised certified scheme) or provide evidence by other



means of equivalent qualification, knowledge, experience, and quality assurance systems (see IECEx 05 and IEC 60079 series documents).

9.6.7 An Explosion Protection Document is to be produced which, where practicable, will incorporate:

- area classification reports & zonal drawings;
- risk assessments;
- restrictions on the type of protection method employed;
- calculations (ventilation rates, Intrinsically Safe circuits etc);
- material safety data sheets;
- equipment design data (Gas Group, Temperature Class, Zone suitability);
- equipment certificates (EX rating);
- a register of all EX equipment in hazardous zones including maintenance frequency;
- equipment maintenance schedules;
- inspection schedules;
- maintenance records;
- training records;
- competence records;
- any other relevant data.

Where specific original information is not available, e.g. original design calculations or certificates, then an assessment should be made of the fitness for purpose of the equipment.

9.6.8 If a potential explosive atmosphere has been identified in the Stage 1 DSEAR RA, then a Stage 2 DSEAR RA must be carried out to assess the risk of fire and explosion that may result from the ignition of dangerous substances. These RAs must be completed in accordance with JSP 375 Part 2, Volume 1, Chapter 08 and cover normal operation, maintenance and other work on or with plant, equipment and facilities and will include associated refuelling and decanting operations. The RAs must include the identification, consideration and careful examination of:

- the hazardous properties of the substance;
- information on safety provided by the supplier, including information contained in any relevant safety data sheet;
- the circumstances of the work including –
  - the amount of the substance involved;
  - the work processes, procedures and substances used and their possible interactions;
  - where the work will involve more than one dangerous substance, the risk presented by such substances in combination; and
  - the arrangements for the safe handling, storage, transport and disposal of dangerous substances and of waste containing dangerous substances.
- activities, such as maintenance, where there is the potential for a high level of risk;
- the effect of measures which have been or will be taken;
- the likelihood that an explosive atmosphere will occur and its persistence;
- the likelihood that ignition sources, including electrostatic discharges, will be present and become active and effective;
- the scale of the anticipated effects of a fire or explosion;



- any places which are or can be connected via openings to places in which explosive atmospheres may occur; and
- any such additional safety information.

Examples of existing processes/records that may be required to assist/support a DSEAR RA is contained in Annex C.

## Mitigation and Control Measures

9.7.1 The control measures identified in the RA must be put in place to eliminate risks from dangerous substances; or to reduce the probability of the risk occurring as far as is reasonably practicable; and to mitigate the effects of any fire or explosion. The best solution is to eliminate the risk completely by replacing the dangerous substance with another substance, or employing a different work process. Where the risk cannot be eliminated, DSEAR requires control measures to be applied in the following priority order:

- if possible substitute with a non hazardous substance;
- reduce the quantity of dangerous substances to a minimum;
- avoid or minimise releases of dangerous substances;
- control releases of dangerous substances at source;
- prevent the formation of a dangerous atmosphere;
- collect, contain and remove any releases to a safe place (for example, through ventilation);
- avoiding ignition sources in zoned areas, in particular those from electrical and mechanical equipment (including lightning protection);
- avoid adverse conditions (for example, exceeding the limits of temperature or control settings) that could lead to danger;
- keep incompatible substances apart; and
- less hazardous alternatives or relocation of processes to a safer location (eg avoiding potential ignition sources).

9.7.2 In addition to the above controls, mitigation measures must be put in place to minimise casualties and collateral damage in the event of the risk being realised. These measures must be consistent with the RA and appropriate to the nature of the activity or operation; and include:

- reducing the number of employees exposed to the risk;
- equipment and plant with the correct EPS categorisation;
- providing explosion suppression or explosion relief equipment;
- taking measures to control or minimise the spread of fires or explosions; and
- providing suitable personal protective equipment (anti-static).

9.7.3 Site emergency procedures (JSP 375 Part 2, Volume 1, Chapter 01) must be developed to cover any potential emergencies identified in the RA process. These should cover regular safety drills; first aid; and suitable communication and warning systems proportionate to the risks. If an emergency occurs, workers tasked with carrying out repairs or other necessary work must be provided with the appropriate equipment to allow them to carry out this work safely. The information contained in the emergency plans and procedures; site plans; and DSEAR RA, must be made available in advance and on entry to the site, to the Emergency Services.

9.7.4 All plant, equipment, fixtures, fittings and tools etc. (including lighting, computers etc. in office spaces) used within a hazard zone must be rated as suitable for use in that

zone classification or to a higher standard. The hazardous area zone classification and corresponding equipment categories are:

- Zone 0 or Zone 20 - Category 1 equipment.
- Zone 1 or Zone 21 - Category 2 equipment.
- Zone 2 or Zone 22 - Category 3 equipment.

The category will be suffixed with a letter denoting suitability for gas (G) or dust (D) zones. Equipment suitable for both gas and dust zones will be marked GD e.g. equipment suitable for Zone 1 or 21 will be marked as Category 2GD. However pre-ATEX equipment may not have these markings.

9.7.5 The primary concern when maintaining plant and equipment is that it remains in a “fit for purpose” condition for the life of the installation. Consequently the replacement of any components must be carried out by competent persons only using parts certified to be safe for use in an atmosphere compliant with or to a higher standard than that of the zone classification in which it is installed.

9.7.6 ATEX and pre-ATEX hazardous area equipment may not be modified as any modification may breach the protection of the device. If repairs are required then these must be made using like-for-like spares.

## **Retention of Records**

9.8.1 All accident/incident records must be kept for at least 3 years from the date of its entry and in accordance with JSP 375 Part 2, Volume 1, Chapter 39.

## **Related Documents**

9.9.1 The following documents should be consulted in conjunction with this chapter.

### **JSP 375 Part 2, Volume 1**

- Chapter 06 - Safety Signs.
- Chapter 08 - Risk Assessment.
- Chapter 11 - Management of Hazardous Substances.
- Chapter 15 - Personal Protective and Respiratory Protective Equipment.
- Chapter 34 - 4C System: The Management of Visiting Workers and Contractors.

### **JSP 375 Part 2, Volume 3**

- Chapter 02 – Common Requirements
- Chapter 03 – Electricity
- Chapter 04 – Boilers & Pressure Systems
- Chapter 05 – Petroleum Installations
- Chapter 06 – Confined Spaces

### **Other MOD documentation**

- ESTC Standard N<sup>o</sup>. 6;
- JSP 317 Storage and Handling of Fuels and Lubricants;

- JSP 319 Storage, Handling and Use of Gases;
- JSP 482 - MOD Explosives Regulations.

## Legislation and Guidance

- [Legislation.Gov.uk - Health and Safety at Work etc. Act 1974.](#)
- [Legislation.Gov.uk - Dangerous Substances And Explosive Atmospheres Regulations.](#)
- [Legislation.Gov.uk - Control of Substances Hazardous to Health Regulation.](#)
- [EC.Europa.eu - Classification, Labelling and Packaging of Substances and Mixtures \(CLP Regulation\).](#)
- [Legislation.Gov.uk - Management of Health and Safety at Work Regulations.](#)
- [Legislation.Gov.uk -The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations.](#)
- [Legislation-Gov.uk - The Regulatory Reform \(Fire Safety\) Order.](#)
- [HSE - ACoP L133 – Unloading petrol from road tankers.](#)
- [HSE - ACoP L138 - Dangerous substances and explosive atmospheres.](#)
- [International Electrotechnical Commission - IECEx 05 – Certificate of Personal Competence](#)
- [Energy Institute – Model Code of Safe Practice Part 15: Area Classification Code for Installations Handling Flammable Fluids.](#)

British Standards can be accessed via the Dstan site<sup>2</sup>.

- BS EN 60079 series - Electrical apparatus for explosive atmospheres
- BS EN 61241/3 - Electrical apparatus for use in the presence of combustible dust.
- BS EN 1127-1:2007 Explosive Atmospheres – explosion prevention and protection

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<sup>2</sup>- Access to British Standards is via the Dstan site: <http://dstan.uwh.diif.r.mil.uk/sol/index.htm>

## DSEAR Risk Assessment Report Format

DSEAR risk assessments carried out for hazardous processes on the MOD estate shall follow the requirements and report format detailed below:

### Front Page

- Include site details: date of assessment; Hazardous Area Classification signatory, assessor and report reviewers names and qualifications (proof of competency); and company.

### Introduction and background

- Must be concise and specific to the site and hazardous processes assessed.

### Executive Summary

- Must be concise limited to half a page of A4.

### Report Contents

- Reference main and sub-headings and page numbers.

### Inventory

- A list of facilities/installations, personnel consulted, process method statements and RAs covered by the DSEAR assessment.

### Hazard identification

- List of all hazardous processes requiring risk assessment detailed in tabular format;
- The clients completed MOD 5014 parts 1 & 2 is to be included.

### Prioritised Action Plan

- Actions are to be prioritised by significance of risk with recommend completion dates. To be in tabulated format.

*If the RA is completed by an external consultant, then it may be difficult to tie down completion dates, especially if the RA is done under contract to the RPC. The best that could be achieved would be a recommendation.*

### DSEAR Risk Assessments

- Undertake Risk Assessments to conform to DSEAR 2002 with particular reference to Regulations 5 and 6;
- Photographs can be used to identify the installations/facilities and/or equipment where they will add value but must be kept to a minimum;
- Each risk assessment shall detail site, facility/installation and date of inspection,
- Include the expected climatic conditions including the average annual maximum and minimum temperatures reached (where these are outside of normal UK maxima and minima);
- Include a concise description of the hazardous situation, process and products;
- Hazardous properties of the substances involved are to be presented in tabular format;

- There shall be reference to existing control methods; there is no requirement to reproduce word for word the existing methods unless that control method is considered to be inadequate;
- A statement whether existing control methods are adequate;
- A list of all sources of product and grade of release must be considered and listed in tabular format;
- Identified risks that are not addressed by existing control methods are to be detailed in a table prioritised by significance of risk;
- Risk of any potential system failure (flange failure, pipe breakage, etc) are to be identified;
- detailed with clear recommendations to enable the client to achieved sufficient control methods;
- A summary of the zoned areas is to be included in table format and supported by calculations where relevant; and
- A list of reference documentation utilised to complete the risk assessments shall be included.

**Distribution List**

- Include all names/departments/sections for report distribution.

## Hazardous Area Drawings

Hazardous areas shall be defined through drawings that shall meet the following requirement and form part of the site record:

- Be compatible with the existing site drawings and be in CAD format (as a single layer) where CAD drawings already exist.
- Key dimensions of plant and zones shall be shown on the diagram in order to allow for clear identification of the zones on the installation.
- Be of suitable quality to enable black and white reproduction.
- Zoning shall be in accordance with the marking convention in IEC 60079-10.
- Site plan view shall be provided showing zoned areas.
- Plan and elevation for each facility or activity which shall include normal operations;
- Temperature Class and Gas Group for equipment in the zoned areas shall be marked on the diagram.

## Supporting Records/Documents

Sources of existing information that may be required to assist/support a DSEAR risk assessment are listed below (list not exhaustive):

<b>Issue</b>	<b>Existing Records/Documentation</b>	<b>Reference</b>
Materials used	COSHH Forms	JSP 375 Pt 2, Vol 1 Chpt 11
	Material / Hazardous Safety Data Sheets	JSP 515
PPE / RPE	Health Surveillance Reports	JSP 375 Pt 2, Vol 1 Chpt 14 JSP 375 Pt 2, Vol 1 Chpt 15
	Health & Safety RA	JSP 375 Pt 2, Vol 1 Chpt 08
Operating procedures for the process/activity in normal, start-up, shutdown or abnormal operations	SOPs Operator before use / after use inspections / maintenance	Operating Manuals (APs, AESPs, BRs and Manufacturers Operating Manuals). JSP 375 Pt 2, Vol 3
Details of operator training	Personnel Training Records	JSP 375 Pt 2, Vol 1 Chpt 39 Trade / service specific documents (e.g. JSP 317, JSP 319)
Details of fire plans including escape routes	Fire Safety Management Plan	JSP 375 Pt 2, Vol 1 Chpt 01 JSP 426
Details of high risk emergency actions as applicable	MACR	JSP 498 JSP 375 Part 2, Vol 3
Environment and spillage plans as applicable	Unit Spill Response Plans EMS / EMSAS	JSP 317 Part 2, Part 5 JSP 418
Details of hazardous area classification drawings and marking of hazardous area zones		
Existing controls	Hazardous area register / Site Safety procedures	JSP 375 Pt 2, Vol 1 Chpt 11
Signage		JSP 375 Pt 2, Vol 1 Chpt 06
Periodic Equipment Inspection regimes	DIO PG 01/09 Equipment Audits	
Preventative Maintenance Programme	RPC maintenance records. Equipment / Platform maintenance regimes	DIO DMGs APs AESPs BRs JSP 375 Part 2 Vol 3
Regular Audits and reviews	Audit regime as required	JSP 375 Pt 2, Vol 2 JSP 317



## Potential DSEAR Related Plant/Equipment and Processes/Activities

This list is not exhaustive:

- Acetylene cylinder storage
- Aluminium welding and fabrication areas
- Battery charging (lead/acid)
- Bulk fuel installations
- Calor Gas field cooking bottles
- Cylinder storage (flammable)
- Flam. Store (COSHH) lockers
- Handling of propellant or explosive (out of the container)
- Hazardous waste areas, including drum stores
- Jerry can filling
- Jerry can storage
- Missile de-fuelling & re-fuelling
- Oil/water separators
- Oxygen cylinder stores
- Packaged goods stores
- Packaged oil & lubricant store
- Paint spray booth
- Paint store & areas
- POL Point
- LPG tanks
- Unburnt propellant
- Vehicle hangars
- Vehicle workshops
- Woodwork shop & dust filters
- Pump rooms
- Sewage treatment plant