Hazardous Chemical Management Procedure

Table of Contents

1 Purpose

This procedure provides information on the principles and methodology for managing risks associated with the use of hazardous chemicals in the workplace and applies to the following:

- substances, mixtures and articles used, handled, generated, stored or transported at the workplace which are defined as hazardous chemicals under the Work Health and Safety (WHS) Regulations[1]
- the generation of hazardous chemicals from work processes e.g. toxic fumes released during welding.

The intent of this document is to meet the requirements stipulated by the *National Self-Insurer OHS Audit Tool* (NAT), applicable *Group Management System* (GMS) Standards and relevant safety legislative requirements.

The processes defined within this procedure will promote a consistent and systematic approach to chemical management, with the view of ensuring compliance with obligations under our Self-Insurance and relevant regulatory requirements.

2 Scope

The requirements defined in this procedure are for the storage, handling and transport of hazardous chemicals only and exclude carriage of dangerous goods by air which is governed by the International Air Transport Association (IATA), International Civil Aviation Organisation (ICAO) and Civil Aviation Safety Authority (CASA) regulations.

This document has been written in-line with chemical hazard classification, labelling and safety data sheets (SDS) requirements based on the *Globally Harmonised System for Classification and Labelling of Chemicals* (GHS) and also applies to workplace hazardous substances and dangerous goods classified under the *NOHSC Approved Criteria* and *ADG Code*[2].

The processes defined in this procedure must be adhered to by Business Units sitting within the Qantas Group to enable and promote a consistent approach to chemical management.

3 Responsibilities

The *Manager Group Standards and Integration (Safety Services)* or nominated delegate is responsible for:

- consulting with and notifying relevant personnel of any review and amendments to this procedure.

The *Business Unit Manager* or nominated delegate is responsible for:

- ensuring that chemical management activities undertaken by their BU complies with the requirements and intent of this procedure
- obtaining the SDS from the manufacturer, importer or supplier of the chemical
- establishing and maintaining a register and manifest (where relevant) of hazardous chemicals and providing notification to the regulator of manifest quantities if required and
- ensuring that personnel involved in chemical management processes are provided with relevant information, training, training and supervision.

Supervisors are responsible for:

- ensuring all risks involving hazardous chemicals in their area of control are assessed for all identified hazards and then either eliminated or controlled using the hierarchy of control process and
- completing risk assessments with worker representatives, safety personnel and relevant management.

All personnel are responsible for:

- reporting all identified hazards immediately using nominated processes, tools and forms
- taking reasonable care for their own and others health and safety and
- cooperating and complying with any reasonable instructions or procedures relating to the use, handling, transport; and storage of hazardous chemicals in the workplace to ensure that they work safely.

4 Background

In relation to chemicals, a hazard is a set of inherent properties of the substance, mixture, article or process that may cause adverse effects to organisms or the environment. There are two broad types of hazards associated with hazardous chemicals which may present an immediate or long term injury or illness to people. These include:

- **Health hazards –** These can cause adverse health effects through potential exposure from inhalation, skin contact or ingestion. Adverse health effects can be acute (short term) or chronic (long term).

[1] WHS legislation has been enacted in ACT, NSW, NT, QLD, TAS and SA. Refer to other jurisdiction's websites for their legislative requirements.

[2] Most substances and mixtures that are dangerous goods under the ADG code are hazardous chemicals.

- **Physicochemical hazards** – The physical or chemical properties of the substance, mixture or article that pose risks to workers other than health risks, as they do not occur as a consequence of the biological interaction of the chemical with people. They can often result in injury to people and/or damage to property as a result of the intrinsic physical hazard. Examples of physicochemical hazards include flammable, corrosive, explosive, chemically reactive and oxidising chemicals.

5 Chemical Management

5.1 Chemical Information

The following table provides information on the GHS Pictogram and Dangerous Good Classes:

GHS Pictogram Summary

	Explosives (divisions 1.1 – 1.4); Self-reactive substances; Organic peroxides.
	Flammable substances; Pyrophoric substances; Self-heating substances; Substances that emit flammable gases in contact with water.
	Oxidizing substances.
	Compressed, liquefied, and dissolved gases.
	Corrosive to metals; Skin corrosion; Serious eye damage.
	Acute toxicity (oral, dermal, inhalation).
	Eye or skin irritation; Skin sensitization; Respiratory tract irritation; Narcotic effects.
	Aspiration hazard; Respiratory sensitization; Carcinogenicity; Germ cell mutagenicity; Reproductive toxicity; Specific target organ toxicity.
	Acute or chronic hazards to the aquatic environment.

Dangerous Goods Guide

Class 1: Explosives

Divisions 1.1, 1.2, 1.3, 1.4, 1.5, 1.6 Explosives 

Class 2: Gases

Division 2.1 Flammable gases 

Division 2.2 Non-flammable / Non-toxic gases 

Division 2.3 Toxic gases 

Class 3: Flammable Liquids

Flammable liquids 

Class 4: Flammable Solids

Division 4.1 Flammable solids 

Division 4.2 Spontaneously combustible 

Division 4.3 Flammable when wet 

Class 5: Oxidizing

Division 5.1 Oxidising substances 

Division 5.2 Organic peroxides 

Class 6: Toxic / Infectious

Division 6.1 – Toxic **Division 6.2** – Infectious 

Class 7: Radioactive

Radioactive materials 

Class 8: Corrosive

Corrosive substances 

Class 9: Miscellaneous

Miscellaneous dangerous substances 

Packing Groups

PG I	GREAT DANGER
PG II	MEDIUM DANGER
PG III	MINOR DANGER

Information on Dangerous Goods classification and the associated safety requirements is provided in the Dangerous Goods Classification and Safety Tool.

5.1.1 Introduction of Chemicals

Introduction of chemicals into the Qantas Group needs to be undertaken in accordance with the processes defined within the flowchart, which is accessible from the New Chemical Introduction Flowchart link.

The flowchart describes the identified required steps to be followed when either introducing a new chemical (including Non-Hazardous / Hazardous / Dangerous Substances) into the Qantas Group or undertaking the regular review of the materials use as initiated by either a new Safety Data Sheet or process change.

5.1.2 Australian Inventory of Chemical Substances (AICS) Compliance

If a chemical substance is manufactured or imported[3] into Australia there is an obligation to ensure the substance, if pure, or each of the substances comprising a mixture, are listed by the of the *Australian Inventory of Chemical Substances* (AICS). Specifically, the purchase of chemicals places a number of obligations on Qantas, once of which is ensuring that if materials are imported directly into Australia, without going through a domestic third partner, there must be an assurance that the chemical,

[3] While Qantas and its' subsidiaries purchase (including importation) of hazardous chemicals, they do not get involved with manufacturing them.

or each of the constituents of a chemical mixture, are listed on the AICS, or otherwise formally exempted under very specific criteria and import volume restrictions.

This obligation does not apply to Qantas if we purchase the chemical substance(s) through a domestic third party. It is the domestic third party that actually imports the material into Australia upon whom the AICS compliance obligation falls.

The obligation and responsibility for checking for the compliance of hazardous chemical materials rests with the Qantas business importing the chemical. The check of the chemical, or if a mixture, all of its constituent chemicals, for AICS compliance must occur prior to the material being imported into Australia, regardless of the amount purchased.

The constituent chemicals can usually be found listed in the SDS with their corresponding *Chemical Abstract Service* (CAS) numbers which are unique identifiers for individual chemical substances. The AICS records chemicals both by names and by CAS numbers. CAS numbers makes the checking process easier by giving an alternative option to the sometimes complex names of chemical substances.

In the first instance the AICS check will require checking that all of the CAS numbers, for all of the components of the product, are listed on the Public Section of the AICS. If not, the next step is to apply to the *National Industrial Classification Notification and Assessment Scheme* (NICNAS) to check the Confidential Section of the AICS. This requires a written application to be submitted and processed.

If the material or some of its components are NOT listed on either the Public or Confidential Sections of the AICS, an application can be made to import up to 100 kgs per annum of the unlisted substance under a very specific exemption, called a *Non-Cosmetic Exemption*. This exemption will allow up to 100kgs of the material to be imported per annum but it also places an annual reporting obligation for every exemption. Where required, assistance to complete the exemption can be sought from Qantas Group Safety Services.

The Public AICS and information related to the confidential section and associated searches can be found on the internet by clicking www.nicnas.gov.au/chemical-inventory-AICS/public-AICS link and a flow chart outlining the process of AICS compliance can be viewed through this hyperlink.

For any challenges with ensuring compliance, assistance and advice should be sought from your local WHS support person or by contacting QGSS.

5.1.3 Register of Hazardous Chemicals

All workplace chemicals used, stored, handled and transported at a Qantas workplace must be identified and listed on the *ChemAlert Stock Holding* list for that work location.

A register identifying all hazardous chemicals that are used, handled, stored and transported at the workplace must be readily available to any Qantas worker or relevant external party e.g. emergency personnel. The register must include a list of hazardous chemicals used and stored at the workplace and a SDS for each hazardous chemical listed. The SDS must be dated within the last five (5) years to be current.

5.1.4 Placard and Manifest Quantities

A manifest is different from a register as it provides a written summary of specific typed of hazardous chemicals with physicochemical hazards and acute toxicity that are used, handled or stored at a workplace. A manifest is only required where the quantities of those hazardous substances exceed prescribed threshold amounts and it contains more detailed information than a register of hazardous chemicals as its primary purpose is to provide emergency services organisations with information on the quantity, classification and location of hazardous chemicals at the workplace. It also contains information such as site plans and emergency contact details.

The manifest must comply with the requirements of *Schedule 12* of the *WHS Regulations* and it must be updated as soon as practicable after any change to the amount or types of chemicals being used, stored, handled or generated at the workplace. *Clause 348* of the *WHS Regulations* requires the regulator be given written notice of hazardous chemicals that exceed the manifest quantities.

Information on manifest and placard quantities of hazardous chemicals is shown in the Placard and Manifest Guidance Tool.

5.1.5 Prohibited and restricted hazardous chemicals

The WHS Regulations prohibit or restrict the use, storage or handling of certain hazardous chemicals in certain situations e.g. substances containing arsenic must not be used in spray painting or abrasive blasting. Information on hazardous chemicals that are restricted or prohibited for use is listed in **Appendix C** of the Safe Work Australia Managing Risks of Hazardous Chemicals

Code of Practice. Qantas is committed to ensuring that these hazardous chemicals are not introduced into workplaces under their control.

5.1.6 Exposure standards

Exposure standards [*8-hour time-weighted average, peak limitation and short term exposure limit (STEL)*] represent the airborne concentration of a particular substance or mixture that must not be exceeded.

Chemicals with workplace exposure standards are listed in the Workplace Exposure Standards for Airborne Contaminants. Although exposure standards may also be listed in Section 8 of the SDS, you should always check these exposure standards.

5.1.7 Separation and Segregation

Separation: Dangerous Goods shall be kept separate from protected works (people and property) at or beyond the boundaries of the premises, either by distance or a barrier. Barriers need to be impervious to the Dangerous Goods.

Separation distances for protected works vary based on the Class, Packing Group and quantities of Dangerous Goods Stored. Reference to the specific Australian Standard shall be made to determine the correct separation distances.

Any TWO cabinets shall be separated by not less than 3m. (Reference to additional distances required by Australian Standards of a specific Class of Dangerous Good shall be made).

Note – It is advised that Emergency Services or building engineers are consulted before the construction of any site is initiated.

Segregation: Incompatible dangerous goods must be segregated from with which they may react dangerously. They shall be protected against rising flames and heat radiation from any fire in the store. Dangerous goods cannot be allowed to interact with food, food packaging or personal products. Stability specific substances must be kept at their specified requirements.

Where the substances being kept are incompatible the following general rules apply:
- they shall be kept in separate compounds; or
- be segregated by a distance of not less than 3m.

Where the substances being kept may react dangerously:
- they shall be segregated by a distance of not less than 5 m; and
- they shall not be kept within the same compound, or in compounds that share a common drainage system.

Information on segregation of workplace chemicals can be sourced through the Storage Incompatibilities Segregation Guide.

5.1.8 Waste Disposal

All waste disposal facilities must be compliant with the requirements cited in this manual. Risk assessments are not required to be completed again for each workplace chemical to be disposed of, however it is imperative that the waste disposal area is risk assessed to ensure it is adequate to store the chemicals to be disposed of.

All waste shall be placed in a sealed bag and shall have its SDS attached to the bag and placed at the local drop point where the waste disposal authority will remove the waste. Empty containers shall be made safe before being disposed of. Except where the containers are to be refilled with the same substance, labels shall be removed or fully destroyed.

Consultation with the local waste disposal authority shall be made about the acceptability of the method of disposal. The company supplying the product, environmental service companies, or waste disposal companies may also be able to advise on disposal information. Reference shall be made to the SDS for further information.

Substances of doubtful quality or having illegible labels along with any contaminated substance, including that which is fire-affected shall be disposed. All substances collected as leaks or spills shall be disposed and all residues of corrosive substances shall be disposed of. These details can be entered into the Waste Removal Register.

5.2 Identifying Hazards

5.2.1 How to identify chemicals that are hazardous

The identity of chemicals in the workplace can be determined by looking at the label and the SDS, and reading what ingredients are in each chemical or product. In some cases, a chemical may not have a label or an SDS e.g. generation of fumes from an activity such as welding. The process for how to access SDS through ChemAlert is described in the Accessing SDS document.

The label (in conjunction with the SDS) should always be read to ensure all chemical hazards are identified. In other cases, product specification sheets may provide information of the types of hazardous chemicals generated during a process or by researching other sources such as codes of practice or guidance documents on the process.

Hazardous chemicals contained in plant and equipment forming a manufacturing process e.g. a piping system, must also be identified. This is to ensure controls can be implemented in the event of an accidental rupture or spill or when maintenance or cleaning is required.

Additional information regarding hazards and risks associated with the use, handling, generation and storage of hazardous chemicals can be obtained from the following sources:

- incident records;
- previous risk assessments;
- Australian Code for the Transport of Dangerous Goods by Road and Rail;
- European Chemical Substances Information System (ESIS);
- The Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP);
- National Industrial Chemical Notification and Assessment Scheme (NICNAS);
- regulatory authorities;
- trade unions and employer associations;
- work health and safety consultants; and
- internet searches of authoritative websites, such as those of international work health and safety agencies like the US Occupational Safety and Health Administration, or the European Chemicals Bureau.

5.2.2 Safety Data Sheets (SDS)

SDS contains information on the identity of the product and any hazardous ingredients, potential health effects, toxicological properties, physical hazards, safe use, handling and storage, emergency procedures, and disposal requirements specific to the chemical. Further information on content requirements for SDS is defined in *Schedule 7* of the *WHS Regulations 2011.*

If the SDS for a hazardous chemical is not supplied, the manufacturer, importer or supplier must be contacted prior to the chemical being used at the workplace.

The following table provides a summary on the important hazard information to note from the SDS (*adopted from the Managing Risks of Hazardous Chemicals in the Workplace: Code of Practice)*:

Hazard classification	This information will be present in the form of hazard statements e.g. *may cause cancer* or *flammable liquid*.
The route of entry	This information is important as it lets you assess the health risks to your workers. Routes of entry can include inhalation (breathing it in), skin contact, ingestion (swallowing it), eye contact and injection through high pressure equipment. Depending on the substance, the severity of harm could range from minor to major e.g. from minor skin irritation to chronic respiratory disease. Some chemicals may not be hazardous by all routes of entry. For example, silica is hazardous only by inhalation so the risk assessment needs to consider how inhalation could occur in the workplace.
Advice or warnings for at-risk workers	The SDS may also include summaries of toxicological data, or advice or warnings for people that might be at risk, such as • people who are sensitised to particular chemicals • warnings for pregnant women • people with existing medical conditions such as asthma.
Instructions on storage	This may include advice on not to store with certain incompatible materials, or advice on potential hazardous degradation products Examples include – storage of acids and bases, or storage instructions to avoid formation of explosive peroxides in ether during extended storage
Physicochemical properties	Physicochemical properties can have a significant effect on the hazard. Some key properties to note include: ○ physical state: is it solid, liquid or gas? - if solid – what is the potential for dust explosion? - if liquid – is it mobile/viscous/volatile/miscible? - if gas (and vapours) – is it lighter/heavier than air? ○ flashpoint, fire point and explosive limits ○ viscosity ○ density ○ particle size ○ vapour pressure ○ solubility and pH

	○ reactivity ○ boiling and/or freezing point or range ○ electrical and/or heat conductivity ○ the nature and concentration of combustion products.
Use situations that may generate hazardous chemicals	Examples may include: • use of welding rods which may liberate hazardous fumes and vapours • directions for use of chlorine bleach, warning that harmful levels of chlorine gas may be generated if the substance is mixed with incompatible chemicals • warnings that some metals, including alkali metals, in contact with water or acids, liberate flammable gas • information on by-products or breakdown products like formation of explosive peroxides in ether
Environmental hazards	The SDS should contain information on environmental hazards and risks. An awareness of this information will assist you to meet any environmental laws in your state or territory.

5.2.3 Providing access to SDS in the workplace

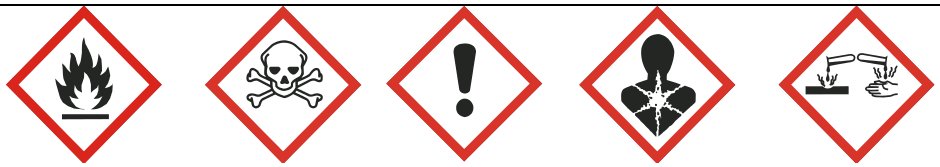
The SDS should be kept in a location near the work area where the substance is used and there needs to be assurance that all workers likely to be exposed to the hazardous chemical know how to find the SDS.

Access to SDS can be provided via an electronic database provided the database is readily available to workers, they know how to use it, and a backup means of providing the SDS is provided e.g. as hard copies in a filing system.

5.3 Labels

The SDS should be referred to when reading a label to ensure that all chemical hazards are identified. This is particularly important as some product labels do not contain all hazard information e.g. some consumer product labels, when hazardous chemicals that are dangerous goods are labelled to meet transport requirements, etc.

The table below shows examples of elements on a label that indicate the type and severity of the hazard:

Label element	Examples
Signal words – these provide an immediate warning to the reader	Danger or Warning
Hazard statements – these describe the nature and severity of the chemical hazard based on a chemical's classification	May cause cancer Fatal if inhaled Flammable liquid and vapour Causes severe skin burns and eye damage May cause respiratory irritation
Pictograms – these provide a pictorial representation of the type of hazard that can be easily recognised at a glance	 Flammable Acute toxicity Warning Human health Corrosive

Schedule 9 Part 3 of the *WHS Regulations 2011* provides detailed information on the minimum legislative requirements for labelling.

5.3.1 Incorrectly labelled or unlabelled containers

Where a container does not have a label or is incorrectly labelled, action must be taken to correctly label the container. This includes containers that have had chemicals transferred into them (decanted) in the workplace, and containers of chemical wastes.

Any container with unknown contents must have the following markings on the container, *Caution – do not use: unknown substance*. Such a container must be stored in isolation until its contents can be identified and, if it is found to be hazardous, the container is appropriately labelled. If the contents cannot be identified, they should be disposed off in accordance with relevant local waste management requirements.

5.4 Risk Assessment

Risk assessments are the best way in many circumstances[4] to determine the measures that should be implemented to control risks, as they will help to:

- identify which workers are at risk of exposure;
- determine the sources and processes causing the risk;
- identify if and what kind of control measures should be implemented;
- check the effectiveness of existing control measures; and
- determine whether health surveillance processes are required.

The risk assessment needs to consider foreseeable failures of plant and equipment, as well as any control measures e.g. a power failure may impact on the operation of a mechanical ventilation system at the workplace. ChemAlert is the endorsed chemical management system and provides the functionality for chemical risk assessments.

It may not be necessary to undertake a risk assessment where hazards and associated risks are well-known and have well established and acceptable control measures e.g. where there are a small number of chemicals in a workplace and the hazards and risks are well understood. In these instances, a notation should be made in the chemical register to reflect this.

5.4.1 Who should conduct the risk assessment

The following competencies are required for personnel conducting chemical risk assessments:

- training in the endorsed Chemical Management database used within Qantas (or equivalent);[5]
- practical understanding of WHS legislation, relevant Codes of Practice and guidance material;
- an understanding of the work processes involved at the workplace;
- sufficient resources and authority to gather information, consult with appropriate people, review existing records and examine the workplace; and
- ability to interpret information on the label and SDS of the hazardous chemical.

External professional assistance in conducting risk assessments may be required to design an air monitoring strategy; collect and analyse samples; interpret results; and in the design, installation and maintenance of control measures.

5.4.2 Deciding on what type of risk assessment is appropriate

The type of risk assessment will depend on the nature of the work being performed and can be categorised as the following three (3) types:

Basic Assessment: consists of reviewing the label and SDS of the hazardous chemical and deciding whether the hazardous chemicals in the workplace are already controlled with existing control measures recommended in the SDS or other reliable sources.

Generic Assessment: involves an assessment of a particular workplace, area, job or task and the assessment is applied to *similar* work activities that involve the use of the chemical being assessed e.g. a business or industry association might do a generic assessment for a number of workplaces that use, handle, generate or store identical chemicals. ***When conducting a generic assessment, it is important that the workplace, tasks and hazardous chemicals being assessed are identical in characteristics, properties, potential hazards and risks. Generic assessments are not appropriate for very high risk chemicals such as carcinogens.***

Detailed Assessment: may be required when there is a significant risk to health and for very high risk chemicals such as carcinogens, mutagens, reproductive toxicants or sensitisation agents in the case of health hazards. Information on the label and SDS will allow determination of whether the chemicals have these hazards. ***A detailed assessment may also be required when there is uncertainty as to the risk of exposure or health.***

5.5 Controlling Risks

5.5.1 The Hierarchy of Control

It is always the aim to eliminate a hazard and associated risk first. Where this is not reasonably practicable, the risk must be minimised by using one or more of the following approaches:

- Substitution

[4] Whilst documented risk assessments are not mandatory for hazardous chemicals under the WHS Regulations (unless specified), Self-Insurance requirements require risk assessments to be documented.

[5] Competence for chemical risk assessments can also be demonstrated through evidence of training completion in courses relating to Chemical Management that are either recognised by industry or achieved at a tertiary level.

- Isolation
- Implementing engineering controls.

If the risk still remains following the above-mentioned approaches, it must be minimised by implementing administrative controls, so far as is reasonably practicable. Any remaining risk must be minimised with suitable personal protective equipment (PPE). *Note: administrative control measures and PPE rely on human behaviour and supervision and when used on their own, tend to be the least effective ways of minimising risks.*

Eliminating the hazard: This must always be considered before other control measures, as it is the most effective. It involves removing the hazard or hazardous work practice from the workplace e.g. not using a hazardous chemical or eliminating exposure can be achieved by using nails instead of using chemical based adhesives

Substitution: Involves replacement of a hazardous chemical with a chemical that is less hazardous and presents lower risks e.g. substituting a highly flammable liquid with one that is less flammable or combustible

Isolation: This can be achieved through isolating workers from chemicals (which involves separating people from the chemicals or hazards by distance or barriers to prevent or minimise exposure) or isolating chemicals from other chemicals (hazardous chemicals should be physically separated from any chemicals or other things that may be incompatible and this can be achieved by distance, barriers, or a combination of both barriers and distance).

Engineering controls: these controls are physical in nature, including mechanical devices or processes that eliminate or minimise the generation of chemicals, suppress or contain chemicals, or limit the area of contamination in the event of spills and leaks, and they often involve partial closure, use of exhaust ventilation or automation of processes.

Administrative controls: these control options should only be considered when other higher order control measures are not practicable, or to supplement other control measures. For carcinogens, administrative controls should only be used to provide additional protection.

Administrative controls are also relevant for emergencies when other control measures fail, such as for managing spills and leaks and are particularly important for those workers who are required to clean up spills, or who carry out regular cleaning and maintenance work.

Training and supervision should always be provided to ensure administrative controls are effectively implemented.

***Personal protective equipment (PPE)*:** In most circumstances, PPE should not be relied on to control risk and it should be used only as a last resort when all other reasonably practicable control measures have been used and the risk has not been eliminated, or as interim protection until higher level controls are implemented. There may also be situations when the use of other controls is not practicable.

5.5.2 Specific Control Measures

Fire and explosion risks: Key control measures for managing these risks include:

- designing buildings and plant to relieve and redirect pressure and flame in the event that an explosion occurs;
- installing systems to detect leaks of flammable gases or vapours;
- using intrinsically safe equipment;
- ventilation to avoid creation of hazardous atmosphere;
- substituting flammable materials for ones that are less flammable or combustible;
- ensuring incompatible materials are separated or segregated;
- reducing quantities of flammable and combustible materials, including items that contribute to the fire load but that are not hazardous chemicals themselves (example: wooden pallets);
- eliminating ignition sources from hazardous areas. This may include establishing a hot work permit system (see below);
- good housekeeping to minimise accumulation of combustible dusts; and ensuring equipment used in handling hazardous chemicals is maintained in accordance with manufacturer's instructions.

Undertaking hot work in areas where flammable or combustible chemicals or other materials are present creates a significant risk of fire or explosion. The authorised Qantas *Authority to Work* procedures must be used prior to commencing hot work activities as it is designed to eliminate or minimise risks from these activities by controlling when and how hot work is undertaken in these areas.

Further information on hot work permit systems is available in the following Australian Standards:

- AS1940 *The storage and handling of flammable and combustible liquids*
- AS/NZS 2865 *Safe working in a confined space*
- AS 1674.1 *Safety in welding and allied processes – Fire precautions* in relation to welding.

The following table provides information on control measures for *eliminating ignition sources* and *reducing vapour emissions:*

Ignition sources	Control Measures
Eliminating ignition sources	• Use intrinsically safe electrical equipment. Consider whether the hazardous chemicals can generate flammable or explosive atmospheres, and ensure that any equipment being used, like stirrers, is intrinsically safe. • Ensuring electrical equipment is effectively maintained. Poorly maintained electrical equipment can present a significant risk for example through worn brushes. • Ensuring electrical equipment is properly earthed. • Implementing administrative controls such as permit systems preventing hot work in these areas.
Reducing vapour emissions	• The use of enclosed transfer systems and vapour recovery connections • Keeping lids open only for the minimum period required for transfer • Minimising exposed surface areas • Avoidance of splash filling • Minimising the temperature of liquids being transferred • Providing extraction ventilation for all sources of vapour

Keeping hazardous chemicals stable: control options for managing these risks include:

- follow manufacturer's instructions or instructions on the SDS;
- maintain specified proportions of ingredients, goods and other components that constitute the hazardous chemicals e.g. phlegmatizers, diluents, solvents, wetting agents, desensitisers, inhibitors and/or other adulterants;
- include a stabilising ingredient where appropriate;
- keep the hazardous chemicals within any control temperature range where necessary; and
- keep the hazardous chemical and the packaging dry, unless the packages themselves are impervious to moisture.

Some hazardous chemicals may provide an expiry date on the label and SDS. Where a chemical has passed its expiry date it should not be used, but disposed of in accordance with manufacturer's instructions and applicable legislation.

Impact protection – containers, structures and plant: Structures or plant used for the storage or handling of hazardous chemicals need to be appropriately located and fixed to stable foundations in order to prevent damage from the movement of the structure or plant including any attached pipe work or equipment. Impact protection measures may be necessary for:

- structures containing large quantities of hazardous chemicals;
- plant and equipment including storage and process vessels, associated pipe work, pumps and controls;
- storage areas (including transit storage) for packages, IBCs and associated shelves and racks; and
- exposed parts of the fire protection systems.

The most effective ways to protect containers, pipework, pumps and attachments from impact is to locate the containers away from trafficable areas or prevent vehicle access. Installation of crash protection measures, such as bollards and guardrails is an alternative means of impact protection. These should be designed to absorb the energy of any reasonably foreseeable impact and minimise the likelihood of injury to anyone involved in the incident.

Containing spills: The spill containment system must describe how to contain, cleanup and dispose of the spill or leak and any resulting effluent. The system must not create a hazard by bringing together different hazardous chemicals that are not compatible or that would react together to cause a fire, explosion, harmful reaction or evolution of flammable, toxic or corrosive vapour.

Factors considered in Qantas spill containment systems include:

- the nature and quantity of the hazardous chemicals (whether liquid or solid);
- the size of the largest container or reasonably foreseeable largest spill;
- the potential impact if the hazardous chemicals escape to the environment;
- whether it is necessary to provide for the management of firewater at an incident;
- separate spill containment provision for incompatible goods;
- materials used to construct the containment system and used for absorption are compatible with the hazardous chemicals;
- other materials in the vicinity that will prevent contamination of groundwater or soil; and
- the system's integrity will be maintained in any reasonably foreseeable incident.

For large quantities of hazardous chemicals, bunding may be required. Bunding should be designed and constructed in accordance with the relevant Australian Standard specific to the type of hazardous chemical e.g. AS 1940*: The storage and handling of flammable and combustible liquids*, and in consultation with the emergency services authority.

Further information on containing spills is provided in the Workplace Chemical Spill Containment Guidance Tool.

Transfer of hazardous chemicals: Where deemed applicable, the following methods will be used to eliminate or reduce risks during transfer operations:

- avoiding spillage or overflow, including overflow protection on equipment and receiving vessels;
- providing emergency shut-offs to limit the amount of hazardous chemicals released during a loss of containment;
- providing a spill containment system;
- reducing static electricity and vapour generation. This is particularly important for fire risk hazardous chemicals such as flammable liquids;
- ensuring transfer fittings are compatible;
- avoiding sources of ignition;
- installing flow and pressure regulators on pipe work or pumps;
- installing interlocking of valves and switches; and
- implementing systems for detecting losses from pipe work and fittings, such as static pressure loss detectors, measurement to determine losses in transfer or external sensors.

Plumbed eye wash stations and safety showers will be installed in areas where workers may be exposed in the event of a spill during transfer operations.

Controlling risks from compressed gases: Gas cylinders (full or empty) will be stored and handled in accordance with *AS 4332 – The storage and handling of gases in cylinders*. Key considerations for safe storage and handling of gas cylinders include:

- maintaining and regularly checking cylinders, regulators, hoses and pipes cylinders to ensure that there are no leaks or dents
- storing cylinders in an upright position to ensure the safety device functions correctly
- securing cylinders to prevent dislodgement
- transport cylinders with appropriate equipment such as trolleys or gas cages
- keep the cylinder valve closed when the cylinder is not being used
- keep all sources of heat and ignition away from gas cylinders, even if the cylinders do not contain flammable material
- store cylinders outdoors or in very well ventilated areas.

Where a leak is detected, the cylinder valve should be closed if it is safe to do so and appropriate PPE worn before attempting to locate the leak point. For toxic gases, self contained breathing apparatus may be required for emergency use. The area should be well ventilated and air conditioning systems should be turned off to avoid spreading gas. However, if a large amount of gas escapes, the area should be evacuated. If it is safe to do so, before evacuating, ventilate the area and remove or isolate ignition sources. Contact the gas supplier for advice, or in an emergency, contact the emergency services authority.

Asphyxiation hazards: Key considerations in minimising the risk of asphyxiation include:

- avoiding work being carried out in oxygen-depleted (under 19 per cent) atmospheres (this can be done by testing the workplace atmosphere using an approved and intrinsically-safe gas monitor);
- keeping the work area well-ventilated, particularly in low-lying areas and roof spaces where gases can accumulate– this can be done by ensuring windows are open where necessary and ventilation and extraction systems are on and are fully functional;
- purging;
- using an air-supplied respirator, particularly in confined spaces; and
- checking cylinders, cylinder fittings, hoses and connections to ensure that they are not damaged or in poor condition – this might include checking fittings and hoses for signs of corrosion or degradation or spraying them with a small amount of detergent solution or leak-detection spray and looking for bubble formations which may indicate the presence of a gas leak.

5.6 Maintaining control measures

To ensure that the integrity of chemical handling systems is preserved, planned maintenance programmes will be designed and implemented consistent with manufacturer's instructions or advice provided by other competent persons. If this is not reasonably practicable, inspections and maintenance will be carried out, as a minimum, on an annual basis.

Examples of preventative maintenance and integrity testing include:

- Inspection of glass linings on steel or metal alloy reaction vessels to ensure there are no cracks or holes which might allow contact of incompatible materials with the metal vessel.
- Regular checking of bursting (rupture) discs and pressure-relief systems on pressure vessels to ensure they have not "blown" and are of the correct pressure rating for the work being performed. Bursting or rupture discs are safety features of cylinders that prevent damage or injury from over-pressurisation.
- Checking spill bunding walls for cracks or other signs of wear to ensure that, in the event of a spill, the bunding will not leak or fail.
- Checking for signs of corrosion or degradation on tanks, pipework and compressed gas fittings.

Where preventative maintenance checks show that the integrity of any chemical handling system is in doubt or not performing as it is intended, repair or replacement of the faulty system will be carried out as soon as practicable and before its next use.

5.7 Providing information, training, instruction and supervision

Information, training and instruction on activities involving chemical management will include the following:

- the nature of the hazardous chemicals involved and the risks to the worker;
- the control measures implemented, how to use and maintain them correctly e.g. how and when to clean or replace filters on a spray painting booth;
- the arrangements in place to deal with emergencies, including evacuation procedures, containing and cleaning up spills and first aid instructions;
- the selection, use, maintenance and storage of any personal protective equipment (PPE) required to control risks and the limitations of the PPE;
- any health monitoring which may be required and the worker's rights and obligations;
- the labelling of containers of hazardous chemicals, the information that each part of the label provides and why the information is being provided;
- the availability of SDS for all hazardous chemicals[6], how to access the SDS, and the information that each part of the SDS provides (*refer to* Accessing SDS document); and
- the work practices and procedures to be followed in the use, handling, processing, storage, transportation, cleaning up and disposal of hazardous chemicals.

Records of training provided to workers will be kept as per endorsed record keeping processes.

5.8 Monitoring and Review

5.8.1 Workplace Chemical Inspection Checklist

Inspections should be scheduled for all sites involved in the storage and handling of workplace chemicals. Where possible, cross departmental/port inspections shall be completed to maintain the integrity of data and promote best practice.

Inspections shall be undertaken using the Workplace Hazardous Chemical Inspection Checklist and the frequency of these inspections will be dependent on the level of exposure and interaction that a business unit has to workplace chemicals.

Dangerous Goods transported by Road should be subject to period inspections using the Workplace Chemical (Road Transport) Inspection Checklist.

5.8.2 Health monitoring

Health monitoring identifies changes in a person's health status due to exposure to certain substances. It involves the collection of data in order to evaluate the effects of exposure and to confirm that the absorbed dose is within safe levels. This allows decisions to be made about implementing ways to eliminate or minimise the worker's risk of exposure e.g. reassigning other duties that involve less exposure or improving control measures.

Schedule 14 of the *WHS Regulations 2011* includes the type of health monitoring that must be carried out for each hazardous chemical listed, unless:

- an equal or better type of health monitoring is available;
- the use of that other type of monitoring is recommended by a registered medical practitioner with experience in health monitoring.

Health monitoring is not an alternative to implementing control measures. If the results indicate that a worker is experiencing adverse health effects or signs of exposure to a hazardous chemical, the control measure must be reviewed and, if necessary, revised.

A person conducting a business or undertaking must:

- inform workers and prospective workers about health monitoring requirements;
- ensure health monitoring is carried out by or under the supervision of a registered medical practitioner with experience in health monitoring;
- consult workers in relation to the selection of the registered medical practitioner;
- pay all expenses relating to health monitoring;

[6] It is recommended that operational personnel should also have access to the Hazardous Chemical Risk Assessment, as this would provide more contextual detail in relation to the use of the chemical and the associated hazards and controls.

- provide certain information about a worker to the registered medical practitioner;
- take all reasonable steps to obtain a report from the registered medical practitioner as soon as practicable after the monitoring has been carried out ;
- provide a copy of the report to the worker and the regulator if the report contains adverse test result or recommendations that remedial measures should be taken. Also provide the report to all other persons conducting a business or undertaking who have a duty to provide health monitoring for the worker;
- keep reports as confidential records for at least 30 years after the record is made (40 years for reports relating to asbestos exposure);
- not disclose the report to anyone without the worker's written consent unless required under the WHS Regulations.

5.8.3 Reviewing control measures

In relation to chemical management, control measures must be reviewed (and revised where necessary) in the following circumstances:

- the control measure does not control the risk so far as is reasonably practicable
- a change at the workplace that may create new or different risks that the control measure cannot effectively control
- a new relevant hazard or risk is identified
- the results of consultation indicate that a review is necessary
- a health and safety representative requests a review if that person reasonably believes that:
    - a circumstance in any of the above points affects or may affect the group represented by the health and safety representative
    - the control measure has not been adequately reviewed in response to the circumstance
- if an SDS or register of hazardous chemicals is changed
- if a health monitoring report for a worker contains:
    - test results that the worker has been exposed to a hazardous chemical and has an elevated level of the chemical or metabolites for that hazardous chemical in their body
    - any advice that test results indicate the worker may have contracted a disease, injury or illness as a result of carrying out the work that triggered the need for health monitoring
    - any recommendation that remedial measures are taken, including whether the worker can continue to carry out the type of work that triggered the requirement for health monitoring
- if atmospheric monitoring indicates that the airborne concentration of a hazardous chemical at the workplace exceeds the relevant exposure standard
- at least once every 5 years.

The following questions should be considered when undertaking the review:

- Are the control measures working effectively in both their design and operation?
- Have the control measures introduced new problems?
- Have all hazards been identified?
- Have new work methods, new equipment or chemicals made the job safer?
- Are safety procedures being followed?
- Has instruction and training provided to workers on how to work safely been successful?
- Are workers actively involved in identifying hazards and possible control measures? Are they openly raising health and safety concerns and reporting problems promptly?
- Are the frequency and severity of health and safety incidents reducing over time?
- If new legislation or new information becomes available, does it indicate current controls may no longer be the most effective?

5.9 Emergency Plan

The purpose of the emergency plan is to plan for and therefore minimise the effects of dangerous occurrence or near miss at a workplace resulting from handling of hazardous chemicals.

Additional information regarding emergency management associated with the storage and handling of flammable hazardous chemicals is available in *AS 1940: The storage and handling of flammable and combustible liquids*.

Content of emergency plan: The emergency plan must provide for:

- emergency procedures that include:
    - an effective response to an emergency
    - evacuation procedures

  - notification procedures to advice emergency services organisations at the earliest convenience
  - medical treatment and assistance
  - communication procedures between the person coordinating the emergency response and all persons at the workplace
- the testing procedures and how often this will be done
- how relevant workers will be provided with information, training and instruction about implementing the emergency procedures

A comprehensive emergency plan should also include:

- a site map that indicates where hazardous chemicals are stored;
- responsibilities of key persons in managing emergencies;
- circumstances to activate the plan;
- systems for raising the alarm;
- estimating the extent of the emergency;
- alerting emergency services organisation to the emergency or if it has the potential to become a dangerous occurrence;
- procedures that account for all people at the workplace;
- isolation of the emergency area to prevent entry by non-essential personnel;
- roles of on-site emergency response teams (including First Aid Officers, Emergency Wardens);
- containment of any spillage;
- the requirement for fire-water retention to ensure that contaminated fire-water cannot enter waterways, drains or ground water;
- disconnection of power supplies and other energy sources except when required to maintain safety of a critical operation or to run emergency equipment such as fire booster pumps;
- prevention of hazardous chemicals or contaminated material of any kind from entering drains or waterways;
- provision of relevant information and assistance to the emergency services authority, both in anticipation of emergencies and when they occur;
- maintenance of site security throughout the emergency;
- provision for dealing with the public and the press; and
- site rehabilitation requirements.

Emergency procedures

The extent of emergency procedures required will depend on the size and complexity of the workplace, types and quantities of hazardous chemicals and the processes involved when the goods are in use. As a minimum, emergency procedures should include instructions on:

- how to raise the alarm, including how to contact the appropriate emergency services organisation;
- any actions to be taken by workers in an emergency to ensure the safety and health of all persons at the workplace to minimise risks, damage to property as well as the environment; and
- any actions to be taken by prescribed persons such as fire wardens, for example how to evacuate the workplace or use fire extinguishers.

Off-site considerations

Where any foreseeable incident may have effects beyond the boundary of the workplace, the emergency plan should also address managing the off-site effects. Where off-site effects are a possibility, the plan should contain information on necessary warnings or communications with neighbouring premises.

Where the emergency plan includes activities that involve persons who reside or work adjacent to the workplace, the relevant parts of the plan should be communicated to those persons.

Implementation and testing

The emergency plan should be tested when first devised and after each modification. Throughout the year, at suitable intervals, practice drills and simulated emergencies should be undertaken and involve all workers and the emergency services authority. These drills should be focussed on familiarising anyone who would be involved in an accident related to the storage and handling of hazardous chemicals with the workplace procedures.

Reviewing the emergency plan

The emergency plan should be reviewed:

- within five years of its development
- in intervals of no more than five years
- if there is a change of risk at or in the proximity of the workplace
- when updated information becomes available
- a possible deficiency is identified, for example through regular testing.

Emergency plans should be readily available in hard copy form at all times. The location of the emergency plan should be easily located by all workers and should be discussed with the emergency services organisation when it is updated or reviewed.

6 Tools and Forms

Accessing SDS
New Chemical Introduction Flowchart
Dangerous Goods Classification and Safety Tool
Placard and Manifest Guidance Tool.
Workplace Chemical Spill Containment Guidance Tool
Workplace Hazardous Chemical Inspection Checklist
Workplace Chemical (Road Transport) Inspection Checklist
Qantas Group Risk Assessment Guide.

7 Definitions

Glossary

8 Reference and Related Documents

National Legislation Reference Matrix
Workplace Exposure Standards for Airborne Contaminants
Storage Incompatibilities Segregation Guide