Working in Confined Spaces Guideline

DESIGNATED OFFICER

Director, Human Resources

1.0 Introduction

USC is committed to the health, safety and wellbeing of all staff, students, visitors, volunteers and contractors when at USC and/or engaged in USC activities.

This includes work done in confined spaces.

In accordance with Work Health and Safety Regulations 2011 (WHS Regs 2011), Schedule 19, 'A confined space means an enclosed or partially enclosed space that:

- is not designed or intended primarily to be occupied by a person, and
- is, or is designed or intended to be at normal atmospheric pressure while any person is in the space, and
- is or is likely to be a risk to health and safety from:
    - an atmosphere that does not have a safe oxygen level, or
    - contaminants, including airborne gases, vapours and dusts, that may causes injury from fire or explosion, or
    - harmful concentrations of any airborne contaminants, or
    - engulfment.'

Confined spaces at USC may include, but are not limited to:

- pits and degreasers
- pipes, sewers, storm water drains, shafts and ducts
- tanks

USC recognises that activities undertaken in confined spaces may be inherently hazardous to workers' health and/or safety and that such work involves a unique range of hazards and risks which are not normally associated with other work environments.

2.0 Purpose

The purpose of this guideline is to provide the requirements specified in the WHS Regs 2011 and the Confined Spaces Code of Practice 2011. As such, the purpose is to provide necessary resources to enable the management of health and safety risks associated with entering, working in, on, or near a confined space, as well as the risk of inadvertent entry.

3.0 Scope

All workers, students, volunteers and contractors must comply with this guideline when performing work that entails entering, working in, on, or near a confined space.

4.0 Responsibilities

4.1 Executive Staff of the USC

Senior staff have an overarching responsibility for ensuring the health and safety of workers, students, and other persons in USC workplaces or those that may be affected as a result of the undertaking of USC business. They have a statutory obligation regarding work in their area that entails working in, on or near a confined space.

4.2 Managers and Supervisors

Managers and Supervisors have a responsibility to know their statutory obligations regarding work in their area that is impacted by confined spaces issues.

Managers and Supervisors are to:

- ensure that adequate resources (time, equipment, personnel) are allocated for the effective implementation of this guideline
- ensure the Confined Spaces Guideline is adhered to for works undertaken in their area, including all relevant contracted work
- ensure that all work in confined spaces in their area has an authorised USC Confined Space Entry Permit and risk assessment and that the work is carried out in accordance with this permit and risk assessment
- provide supervision, information and training to manage risks encountered in confined spaces
- monitor work practices in their area and maintain records

4.3 Human Resources (Health Safety and Wellbeing)

Health, Safety & Wellbeing is to advise and inform USC, its workers and students on the development, implementation and delivery of:

- USC Confined Spaces Guideline

4.4 Facilities Management

Facilities Management are required to ensure that all new confined spaces are identified, classified and entered onto the Confined Spaces Register. Facilities Management are to ensure that the contents of the Confined Spaces Register is accurate, up to date and communicated to relevant staff and/or contractors.

Facilities Management are responsible for the authorisation of Confined Space Entry Permits and ensuring that staff or contractors engaged to work in these spaces are doing so in accordance with this guideline and the associated Confined Space Entry Permit.

4.5 Permit Authorisers

USC employees with the required training and competence to authorise Confined Space Entry Permits are:

- Maintenance Services: Tel:
  +61 7 5430 1195

It is the permit authoriser's responsibility to:

- Ensure that the risk assessment and Confined Space Entry Permit are in accordance with WHS Regs 2011 and Confined Spaces Code of Practice 2011, prior to authorising the permit and hence authorising commencement of confined space work.

4.6 Workers, students and contractors

Understand and follow the requirements of:

- USC Confined Space Guideline and Entry Permits
- the required training

5.0 Location of confined spaces

A Confined Spaces Register is located at Facilities Management. This register must be consulted prior to the commencement of work to ensure appropriate hazard identification and hazard controls are implemented. These must be documented in a risk assessment and a USC Confined Space Entry Permit.

This Register lists all known "spaces" that meet any of the confined space criteria as listed in the WHS Regs 2011. To be designated as a 'confined space', in accordance with the WHS Regs 2011 the enclosed or partially enclosed space must meet the following two criteria:

- is not designed or intended primarily to be occupied by a person
- is, or is designed or intended to be at normal atmospheric pressure while any person is in the space

The space must also be, or be likely to be a risk to health and safety from at least one of the following:

- an atmosphere that does not have a safe level of oxygen
- contaminants, including airborne gases, vapours and dusts, that may cause injury from fire or explosion
- harmful concentrations of any airborne contaminants
- engulfment

If the partially enclosed or enclosed space listed in the register does not meet all of the criteria as listed above, it is coded 'green' and classified as a non-confined space. If it does meet the requirements of a confined space it is coded 'red' in the register and is classified as a confined space. Any work which involves entering or working in, on, or near a classified confined space must be in accordance with this guideline.

If a confined space not on the register is identified, inform Facilities Management immediately.

6.0 Risk assessments for working in confined spaces

All work in confined spaces requires a risk assessment to be completed and approved by an authorised USC staff member and the Cost Centre Manager (or their representative) directly associated with the confined space work. USC staff with the required training and competence to approve a confined space risk assessment are:

- Maintenance Services: Tel: +61 7 5430 1195

The risk assessment process involves:

- identifying hazards
- assessing risks
- controlling the risks
- emergency procedures
- monitor and review

This process must be documented and approved by both a USC authorised person (as above) and USC Cost Centre Manager (or their representative) directly associated with the confined space work.

6.1 Identifying hazards

Confined spaces are environments with the potential to cause significant injury and illness or even death. Confined space hazards are not always obvious and may change upon entry or from one entry to the next.

6.1.1 Entry and/or exit

Persons working in confined spaces must pay particular attention to entry and exit points e.g. size, location, accessibility, etc. This is important for entry and exit purposes, for getting equipment in and out and for any special requirements associated with emergency situations (including extracting an injured worker).

6.1.2 Harmful airborne contaminants

Naturally occurring decay of organic material can release harmful concentrations of hydrogen sulphide and methane into the surrounding atmosphere. This is a particular issue with sewers and storm-water pits and drains. Waste water can also pool in unexpected areas (e.g. lift shafts) emitting harmful gas over time.

In addition to any harmful airborne contaminants already present within a confined space, consideration must be given to any activities that may contribute to a harmful atmosphere. Activities involving the use of paints, solvents, cleaning products, welding or brazing can produce toxic fumes and will require controls to be put in place when the tasks are performed in confined spaces.

If there is a possibility of harmful airborne contaminants in the confined space in which work is to be undertaken, or there is a likelihood that the work being undertaken in the confined space will produce harmful airborne contaminants, air monitoring will have to take place to ascertain the risks and subsequent controls.

Refer to Appendix 1 for more details on harmful airborne contaminants.

6.1.3 Unsafe oxygen level

A safe oxygen level is 19.5% - 23.5%. Oxygen reduced atmospheres may result in asphyxiation. Any oxygen level below 19.5% is dangerous and can affect workers' health and safety. Oxygen levels below 12% can cause unconsciousness, and below 6% will cause immediate death.

An oxygen rich atmosphere can increase the risk of fire and explosion.

Situations that can cause oxygen deficiency:

- slow oxidation – organic or inorganic
- rapid oxidation – combustion
- dilution of air with an inert gas
- absorption by grains, wood chips, chemicals or soils
- physical activity

Oxygen levels need to be tested prior to entry into a confined space and during the activity being undertaken in that space, to ascertain the risks and subsequent controls.

6.1.4 Fire and explosion

An atmosphere becomes flammable when the concentration of gas, vapour or mist is capable of igniting. This may result from the evaporation of flammable residue, flammable materials, a chemical reaction (e.g. formation of methane in sewers), or from the presence of combustible dust.

Flammable airborne contaminants must be maintained at a safe level, as per Confined Spaces Code of Practice 2011. Ignition sources must also be controlled.

6.1.5 Engulfment

Engulfment is the result of being immersed in a material that may lead to asphyxiation. This material can be a liquid or a solid. E.g. water, sewage, sand/soil or grain.

6.1.6 Additional hazards

Confined spaces may include a range of biological, environmental, mechanical or electrical hazards due to the nature and purpose of the confined space and the nature and purpose of any work being performed in a confined space. Other hazards which should be considered in the risk assessment are:

- plant and equipment used in or near the space
- microorganisms
- electricity
- noise
- manual tasks and other physical hazards
- temperature extremes
- individual physiological and psychological demands of working in confined space

Consideration must be given to whether the work tasks to be performed in the confined space will give rise to additional hazards (e.g. hazardous fumes from painting, cleaning, welding or machinery use in the confined space).

Appendix 2 details a list of factors that should be considered when identifying hazards and preparing to assess the risks associated with these hazards, as per the Confined Spaces Code of Practice 2011.

6.2 Assessing risks

When all of the hazards have been identified, the level of risk associated with each hazard must be ascertained, and documented.

6.3 Controlling the risks

Ideally, risks should be controlled by eliminating them as far as is practicable. With respect to confined spaces, this would mean, eliminating the need to enter the confined space. This should be done wherever possible. Where it is not possible, the risks of entering the confined space should be minimised in accordance with the hierarchy of controls.

The Hierarchy of Controls

6.3.1 Eliminate

Eliminate the need to enter the confined space, e.g. through use of remote controlled equipment.

If the hazard (and hence the risks) cannot be eliminated it must be reduced or minimised as far as is reasonably practicable by the following controls.

6.3.2 Substitution

Substitute the hazard for something less hazardous (e.g. substitute or use electric equipment/machinery, instead of petrol based, to avoid carbon monoxide fumes in the confined space).

6.3.3 Engineering

This is usually implemented in the design stages, e.g. design the space such that it has adequate ventilation and sufficient access and exit routes for workers, especially in the event of an emergency. This also includes: ventilation of a confined space with fresh air, by natural, forced or mechanical means to disperse hazardous airborne contaminants and introduced fresh air (with safe oxygen levels).

6.3.4 Isolation

This involves separating the worker from the hazard, e.g. isolation of potentially hazardous services (e.g. electrical services, water and/or waste water). All potentially hazardous services must be isolated prior to entry into a confined space. There must be a system in place to ensure that such isolation cannot be removed whilst confined space work is being undertaken.

6.3.5 Administration

This refers to the implementation of policies, procedures, guidelines and training for people to follow. This also includes organising/managing work practices to reduce risks, for example:

- prevent the introduction of ignition sources into the confined space
- prevent or minimise the production/release of harmful airborne contaminants into the space whilst work is being undertaken by ceasing mechanical activity (e.g. cars, machinery) in proximity to entry or ventilation points
- plan work to take place when there is minimum pedestrian traffic in the area to reduce the risk of inadvertent entry
- limit the number of people working in the confined space and the duration of time spent in the space
- only people with recognised confined space training and relevant certificate can enter USC confined spaces
- use of a Confined Space Entry Permit

6.3.5.1 Confined Space Entry Permit

“A confined space entry permit provides a formal check to ensure all elements of a safe system of work are in place before people are allowed to enter the confined space” (Confined Spaces Code of Practice 2011. p. 19). The USC confined space entry permit (PDF 133KB)*, must be completed and authorised by a USC employee with the required training and competence. Please contact:

- Maintenance Services:
  +61 7 5430 1195

This permit must be completed and authorised in conjunction with a risk assessment, prior to entry into any USC confined space.

6.3.6 Personal Protective Equipment (PPE)

PPE should only be used when the use of other controls have not sufficiently reduced the risk.

6.3.7 Additional Controls

Any people not involved in the confined space work must be prevented from entering the space. Entry to the confined space must be effectively barricaded and signed when the confined space is accessible. All signage must:

- identify the confined space
- state that entry is only allowed with an authorised USC confined space entry permit
- be displayed clearly at each entry point.

When the confined space is not in use, inadvertent entry must be prevented by reasonably practicable means.

Confined space controls are to be detailed in the risk assessment and in accordance with the USC Confined Space Entry Permit.

For further details of controls please refer to Confined Spaces Code of Practice 2011 and Australian Standard 2865-2009.

6.4 Emergency Procedures

Persons authorised to undertake confined space work must prepare and communicate an emergency plan. The emergency plan must be clearly documented on the USC Confined Space Entry Permit.

The WHS Regs 2011 s74 states that first aid and rescue procedures to be followed in an emergency must be established. These procedures are to be practised as necessary to ensure that they are efficient and effective. First aid and rescue procedures must be initiated from outside the confined space as soon as practicable in an emergency.

It also states that openings for entry and exit are to be of a sufficient size to allow emergency access; openings are not obstructed; and any plant, equipment and personal protective equipment provided for first aid or emergency rescue are maintained in good working order.

Considerations when preparing a confined space emergency plan are contained in Appendix 3.

6.4 Monitor and Review of Process

It is paramount that all implemented controls are monitored and reviewed continuously to ensure:

- the risk assessment process has been effective in identifying all hazards
- that hazards are being effectively controlled
- that the implemented controls are not introducing more uncontrolled hazards
- that workers are working in accordance with the risk assessment and the Confined Space Entry Permit.

Appendix 1 Harmful airborne contaminants

(from Confined Spaces Code of Practice 2011 p. 11)

The following table illustrates the kinds of harmful atmospheres that may be present in a confined space, and how they may be created.

SOURCE	EXAMPLES
Substances stored in the confined space or its by-product(s)	• build-up of hydrogen sulphide in sewers and pits • release of toxic substances e.g. hydrogen sulphide in tanks of decomposing organic material, especially when the material is disturbed
Work performed in the confined space	• use of paints, adhesives, solvents or cleaning solutions • welding or brazing with metals capable of producing toxic fumes • exhaust fumes from engines used in the confined space • painting or moulding glass-reinforced plastics
Entry of natural contaminants e.g. groundwater and gases into the confined space from the surrounding land, soil or strata	• acid groundwater acting on limestone with the potential to produce dangerous accumulations of carbon dioxide • methane released from groundwater and from decay of organic matter
Release of airborne contaminants	• when sludge, slurry or other deposits are disturbed or when scale is removed
Manufacturing process	• residues left in tanks, vessels etc., or remaining on internal surfaces can evaporate into a gas or vapour
Entry and accumulation of gases and liquids from adjacent plant, installations, services or processes	• the contamination of underground confined spaces by substances from plant in the vicinity of the confined space • carbon monoxide from the exhaust of LPG-powered forklifts operating in, or in the vicinity of, the confined space

Appendix 2 Factors to be considered when undertaking a risk assessment

(from Confined Spaces Code of Practice 2011 p. 15)

- the atmosphere in the confined space, including whether testing or monitoring is to be undertaken
    - to maintain equipment essential for the task being undertaken within the confined space
    - to provide continuous communication with the persons within the confined space
    - to properly initiate emergency response procedures
    - prohibiting hot work in adjacent areas
    - prohibiting smoking and naked flames within the confined space and adjacent areas
    - avoiding contamination of breathing air from operations or sources outside the confined space, for example, from the exhaust of an internal combustion engine
    - prohibiting movement of equipment in adjacent areas, for example forklifts
    - prohibiting spark-generating equipment, clothing and footwear
- the risk of engulfment of a person
- all proposed work activities, particularly those that may cause a change to the conditions in the confined space
- the number of persons occupying the space
- the soundness and security of the overall structure and the need for lighting and visibility
- the identity and nature of the substances last contained in the confined space
- any risk control measures needed to bring the confined space to atmospheric pressure
- the number of persons required outside the space:
- risks associated with other hazards, such as noise or electricity

- arrangements for emergency response, for example first aid and resuscitation
- the physiological and psychological demands of the task and the competency of persons involved in the tasks or emergency response duties
- the adequate instruction of persons in any required procedure, particularly those that are unusual or non-typical, including the use and limitations of any personal protective equipment and other equipment to be used
- the availability and adequacy of appropriate personal protective equipment and emergency equipment for all persons likely to enter the confined space
- the need for additional risk control measures, including:
- whether purging or cleaning in the confined space is necessary
- whether hot work is necessary
- conditions that could impede entry and exit or the conduct of the tasks in the confined space, for example, plant layout, dimensions, manual handling and ergonomic aspects of the task activity.

Appendix 3 Considerations when preparing a confined space emergency plan

(from Confined Spaces Code of Practice 2011 p. 28-29)

RELEVANT CONSIDERATION	QUESTIONS
Location of the confined space	What is the geographic location of the space, how accessible is it in an emergency and how far away is it from appropriate medical facilities?
Communications	How can workers working inside the space communicate to people outside in an emergency?
	Exactly how will the alarm be raised and by whom?
	Planning needs to ensure that rescue and emergency personnel can access the workplace during night shift, weekends and holiday periods.
Rescue and resuscitation equipment	What kinds of emergencies are contemplated?
	The provision of suitable rescue and resuscitation equipment will depend on the potential emergencies identified. Selected rescue equipment should be kept in close proximity to the confined space so that it can be used immediately.
Capabilities of rescuers	Are rescuers properly trained, sufficiently fit to carry out their task and capable of using any equipment provided for rescue (e.g. breathing apparatus, lifelines and fire-fighting equipment)?
	How will rescuers be protected during the emergency operation?
First aid	Is appropriate first aid available for immediate use?
	Are trained first aid personnel available to make proper use of any necessary first aid equipment?
Local emergency services—if they are to be relied on for rescue	How will the local emergency services (e.g. fire brigade) be notified of an incident?
	What information about the particular dangers in the confined space will be given to them on their arrival?
	Have prior arrangements been made with local emergency services to ensure they are able to respond in a reasonable time and have the specialist confined space retrieval equipment readily available?

Note: If a person inside a confined space has been overcome by lack of oxygen or airborne contaminants (or if this is suspected], it should always be assumed that entry for rescue is unsafe unless air-supplied respiratory protective equipment is used.

* For PDF documents you must have the free Adobe Acrobat Reader, which can be downloaded from the Adobe Download Page

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