Confined Space Procedure

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1. PURPOSE

The purpose of this procedure is to ensure that hazards and risks relating to entry and work in confined spaces are effectively managed to prevent or minimise the risk of injury, property damage and environmental impact.

2. SCOPE

This procedure applies to workers and projects under Bardavcol's control.

3. DEFINITIONS

Confined space	refer to Section 5.2
Contaminant	any dust, fume, mist, vapour, biological matter, gas or other substance in liquid or solid form, the presence of which may be harmful to persons
Engulfment	the immersion or envelopment of a person by a solid or liquid (eg. grain, sand, soil etc) that is stored within the confined space
Flammable range	the range of flammable airborne contaminant (% by volume) in air at which an explosion can occur upon ignition. Expressed as lower explosive limit (LEL) and upper explosive limit (UEL)
Lower Explosive Limit	the concentration of a flammable contaminant in air below which the propagation of a flame does not occur on contact with an ignition source
Upper Explosive Limit	the concentration of a flammable contaminant in air above which the propagation of a flame does not occur on contact with an ignition source
Safe oxygen range	a concentration of oxygen in the atmosphere between 19.5% and 23.5% by volume, under normal atmospheric conditions
Worker	any person that carries out work in any capacity for Bardavcol, including a contractor, subcontractor, labor hire employee or visitor

4. RESPONSIBILITIES

Bardavcol, so far as is reasonably practicable, is responsible for ensuring:

- that this procedure is understood and applied by its staff;
- that appropriate resources are available to enable the identification of hazards, risk assessment, implementation and evaluation of controls; and
- that staff are provided with the tools, training and support required to effectively manage risks relating to entry and work in a confined space.

Project Managers are responsible for ensuring:

- the implementation of this procedure as appropriate to their project;
- a hazard and risk assessment is conducted to identify confined spaces and tasks that involve entry and work in these spaces;
- adequate controls are implemented to eliminate, or where this is not practicable, minimise risks relating to entry and work in confined spaces;
- confined space locations and related hazards, risks and controls are communicated to workers on the project;
- the effectiveness of controls are evaluated and revised, as appropriate to manage the hazards and risks;
- appropriate resources are available to ensure the identification of hazards, risk assessment and implementation and evaluation of controls;
- workers entering and working in confined spaces are trained and competent to perform the required tasks;
- SWMS are prepared for tasks involving the entry and work in confined spaces; and
- Emergency response (ie. rescue) plans are prepared and drills are performed to evaluate their effectiveness.

Supervisors are responsible for ensuring:

- that confined space hazards and risks are assessed;
- adequate controls are implemented to eliminate, or where this is not practicable, minimise risks relating to entry and work in confined spaces;
- workers are communicated and consulted with on entry and work in confined spaces, hazards, risks and controls relevant to the project;
- the effectiveness of controls are evaluated and revised, as appropriate, to manage the hazards and risks;
- workers entering and working in confined spaces are trained and competent to perform the required tasks;
- SWMS are prepared for tasks involving the entry and work in confined spaces;
- Emergency response (ie. rescue) plans are prepared and drills are performed to evaluate their effectiveness; and
- regular inspections of equipment (ie gas monitors, harnesses, anchor points, ladders) use for the entry and work in confined spaces are conducted.

Subcontractors are responsible for ensuring:

- that confined space hazards and risks are assessed in relation to their scope of work and other activities that could impact on their work (ie. tasks performed in another work area);
- adequate controls are implemented to eliminate, or where this is not practicable, minimise risks relating to entry and work in confined spaces;
- workers are communicated and consulted with on confined space hazards, risks and controls relevant to the project;
- the effectiveness of controls are evaluated and revised, as appropriate, to manage the hazards and risks;
- workers entering and working in confined spaces are trained and competent to perform the required tasks;
- SWMS are prepared for tasks involving the entry and work in confined spaces;
- Emergency response (ie. rescue) plans are prepared and drills are performed to evaluate their effectiveness; and
- regular inspections of equipment (ie gas monitors, harnesses, anchor points, ladders) used for the entry and work in confined spaces are conducted.

Workers are responsible for ensuring:

- compliance with the requirements of this procedure and any implemented controls in relation to the entry and work in confined spaces at the project;
- that they have been trained and are competent to perform the tasks required to enter and work in confined spaces; and
- the Project Team is notified of any hazards, at risk behaviour or improvements required to manage confined space risks.

5. PROCEDURE

5.1. Introduction

Confined spaces can take different forms and may not be immediately obvious without proper evaluation. Confined spaces pose a risk because they are not usually designed for people to occupy and perform work in, can be poorly ventilated and the hazards may not be obvious or may change following entry and commencing work (eg. operating equipment). Hazards associated with confined spaces may also change from one location to another (eg. atmospheric conditions in connected pits) and can be influenced by adjacent activities and emissions.

Entry and work in confined spaces is a high risk activity and has the potential to result in:

- loss of consciousness, impairment, injury or death due to the immediate effects of airborne contaminants;
- fire or explosion from ignition of flammable contaminants;
- asphyxiation due to oxygen deficiency or engulfment in a free-flowing material (eg, water, soil, grain, other liquids)
- difficulty rescuing and treating an injured or unconscious person that can place the health and safety of other workers at risk

This procedure provides an overview of evaluating a confined space and the hazard, risk assessment and control (HIRAC) process that applies to entering and working confined spaces. It also provides information on control options with reference to minimum requirements.

Where a space or work area is deemed not to be a confined space, but the risk of engulfment or a contaminated atmosphere remains, the hazards/risks must be effectively controlled (note: the information provided in this procedure may be relevant to the control of such hazards and risks).

5.2. Confined Space Identification and Evaluation

A confined space is determined by the structure and hazards associated with a set of specific circumstances and not just the need to perform work in a small space or with restricted entry/exit. The same space may not be a confined space depending on the circumstances when the space is entered. A space may become a confined space if work to be performed in the space would generate harmful concentrations of airborne contaminants.

Entry to a confined space occurs when a worker's head or upper body enters the space.

Spaces or work areas that have the potential to be a confined space must be evaluated prior to entry or work being performed. The evaluation must be performed by a person that has been trained in the safe entry and work in confined spaces and documented using the Confined Space Evaluation form.

Where the space is deemed to be a confined space, the requirements outlined in this procedure must be applied. Where space is not deemed to be a confined space, a risk assessment of the hazards associated with entering and working in that space must still be performed and controls implemented to effectively manage the risks.

A confined space is defined as 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 cause injury from fire or explosion, or
  - harmful concentrations of any airborne contaminants, or
  - engulfment.

Examples of common confined spaces include tanks, pits, ducts, flues, containers, pressure vessels, sewers, shafts, trenches and tunnels.

The use of temporary control measures (eg. providing temporary ventilation, satisfactory pre-entry gas test) does not allow a confined space to be de-classified. For a confined space to be de-classified, it needs to have undergone sufficient changes in structure and use to eliminate all inherent hazards that define a confined space.

Areas that are not considered to be confined spaces, with reference to the WHS Regulations, include:

- mine shaft or workings of a mine
- places that are intended for human occupancy and have adequate ventilation, lighting and safe means of entry and exit (eg. offices, workshops)
- some enclosed or partially enclosed spaces that at particular times have harmful airborne contaminants but are designed for a person to occupy (eg. abrasive blasting, spray paint booths)
- trenches based on the risk of structural collapse alone, however they are confined spaces if they potentially contain concentrations of airborne contaminants that may cause impairment, loss of consciousness or asphyxiation

5.3. Hazard Identification

The identification of hazards relating to the risk of persons entering and working in confined spaces requires the consideration of a range of factors, including the scope of work, location, adjacent or nearby activities, location of services, past and current uses of the confined space. The identification process should involve consultation with workers, subcontractors, service/asset managers (if applicable), client, premises owners and designers. In some situations, advice may be needed from technical specialists to assess potential hazards associated with the confined space (eg. atmospheric contaminants, isolation).

Hazards relating to confined spaces can include:

- restricted entry or exit to access the work area (ie. people, equipment) and rescue injured workers;
- harmful airborne contaminants (eg. hydrogen sulphide, carbon monoxide);
- unsafe oxygen levels;

- fire and explosion;
- engulfment;
- uncontrolled introduction of substances (eg. steam, water, other liquids, gases, solids from adjacent activities);
- biological hazards (eg., contact with viruses, bacteria or fungi present within the confined space);
- mechanical hazards (eg. plant such as augers, agitators, blenders, mixers that present a risk of entanglement, shearing, cutting or piercing);
- electrical hazards (eg. electrical wiring, lighting, circuits and powered plant/equipment);
- contact with hazardous substances (eg. skin contact with surface contaminants resulting in burns, irritation or reactions);
- noise;
- manual tasks;
- radiation;
- heat or cold stress;
- uneven or slippery surfaces, obstacles;
- inadequate lighting;
- hazards outside of the space (eg. risk of a person falling into the space, adjacent activities obstructing access or introducing contaminants); and
- physiological and psychological demands (eg. physical capability, restricted movement/claustrophobia, ability to wear the required PPE).

5.4. Risk Assessment

Where workers are required to enter and/or work in a confined space, a risk assessment must be undertaken and documented before commencing the work. Overall project risks are to be documented in the Project Risk Register and task specific risks documented in a SWMS. The risk assessment must be reviewed where there is a change in the scope of works, hazards associated with the confined space or the control measures. The risk assessment should consider:

- the hazards associated with the work to be performed, including activities performed adjacent or near the confined space;
- what could happen if conditions within the confined space change (eg. increase/decrease in oxygen levels);
- the potential consequences (ie. severity of the risk);
- whether any existing control measures are effective;
- what additional measures or actions are required to control the risk;
- how urgently controls need to be implemented to effectively manage the risk; and
- what emergency response procedures and equipment are required and how can they be implemented.

When assessing the risks arising from confined space hazards, consideration should be given to the following:

- the atmosphere in the confined space, including whether testing or monitoring is to be undertaken;
- 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:
    - to maintain equipment essential for the task being undertaken within the confined space
    - to provide continuous communication with the persons within the confined space, and
    - to properly initiate emergency response procedures;
- 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:
  - 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 (eg. mobile plant),
  - prohibiting spark-generating equipment, clothing and footwear;
- 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.

The risk assessment process should include testing and monitoring of the atmosphere within the confined space to assist with the determination of appropriate controls for safe entry and work. Testing and monitoring must be conducted using a suitable and calibrated gas detector that can test for gases that are likely to be present in the confined space. Testing should typically assess oxygen content, airborne concentration of flammable contaminants and airborne concentrations of potentially harmful contaminants (eg. hydrogen sulphide, carbon monoxide).

Gas testing must not be conducted using a worker’s senses, as many toxic or flammable gases and unsafe oxygen levels cannot be detected using this method

Initial gas testing must be performed from the outside of the confined space using suitable equipment to enable testing of different levels/parts of the confined space and assess the potential for settlement of gases that are heavier (eg. hydrogen sulphide) or lighter (eg. methane).

Where entry to the confined space is required to test areas that are remote or difficult to access, this activity must be documented in a risk assessment (eg. SWMS) with emergency response procedures and details of equipment (including PPE) required for safe entry and rescue. A Confined Space Permit must also be issued prior to entry and complied with at all times.

Continuous monitoring is required while present in the confined space.

5.5. Controls

Control measures must be developed and implemented based on the outcome of the risk assessment and documented in the Project Risk Register, SWMS or other applicable document. Project wide controls must be communicated through the project induction and communication and consultation on task specific controls managed through the SWMS development, review and induction process.

Controls must be selected according to the hierarchy of control, with the preference to eliminate the need to enter the confined space, where this is reasonably practicable (ie. perform the work from outside the confined space). If entry to the confined space cannot be avoided, the associated risks must be minimised so far as is reasonably practicable by:

- substituting the hazard(s) with a safer alternative;
- isolating the hazard(s) from workers exposed to it; or
- implementing engineering controls.

Administrative controls (eg. signage) and PPE must also be implemented in support of the above, but not as the only controls.

Controls must also be selected with consideration to the following:

- the nature of the confined space (eg. location, number and size of entry/exit points, temperature, lighting)
- if the hazard is associated with any airborne contaminant or unsafe oxygen level (eg. maintaining safe levels of oxygen and airborne contaminants)
- the work to be performed in the confined space, the different methods that can be used to perform the work and the proposed method (eg. introduction of new hazards, ignition sources, airborne contaminants, PPE requirements)
- the type of emergency procedures, equipment and training required

5.5.1. Confined Space Permit

A Confined Space Permit must be issued, prior to any worker entering and working in a confined space, including entry for the purpose of initial monitoring, hazard identification or risk assessment. Each permit applies to one confined space and all workers (including the Standby Person) must read and sign onto the permit prior to entry and work commencing.

The permit must be used to record the time of entry and exit of all workers and gas test monitoring results at the frequency specified in the permit.

5.5.2. Isolation

Services and other energy sources that are present in the confined space or could result in the entry of liquids, gases, vapours and solids must be identified and where reasonably practicable, isolated to prevent:

- the introduction of contaminants or conditions through piping, ducts, vents, drains, conveyors, service pipes and fire protection equipment;
- the activation or energising of machinery in the confined space;
- the activation of plant or services outside the confined space that could adversely affect the space (eg. generators, pumps etc);
- the release of any stored or potential energy in plant; and/or
- the inadvertent use of electrical equipment.

Isolations must be undertaken in accordance with the Isolation Procedure and Permit and where reasonably practicable, implemented prior to entry into the confined space. Where entry is required to apply the isolation, this task must be risk assessed in the SWMS and the Confined Space Permit.

Isolations relevant to the confined space must be communicated to the workers that enter and work in the confined space

Isolations must not be removed until all workers have exited the confined space and in accordance with the Isolation Permit.

5.5.3. Maintaining a Safe Atmosphere

A safe atmosphere must be maintained, so far as is reasonably practicable, during work in the confined space. A safe atmosphere is one that:

- has a safe oxygen level;
- is free of airborne contaminants or any airborne contaminants are in concentrations below their allowable exposure standard (if any);
- any flammable gas or vapour in the atmosphere is at concentrations below 5% of its LEL.

Options to maintain a safe atmosphere include:

Purging

- using an inert gas to clear flammable gases or vapours and ventilating the confined space with sufficient fresh air before work commences (note oxygen or gas mixtures with an oxygen level >21% by volume must not be used for purging)

Ventilation

- using fresh air by natural, forced or mechanical methods (this may also assist to control temperature)
- factors that must be considered when using ventilation as a control include:
    - where the fresh air is drawn from so that it is not contaminated (eg. exhaust fumes) and where it is vented so that it doesn't cause other hazards/risks
    - ventilation techniques must ensure that there is effective circulation within the confined space with regard to the size and configuration of the space, location of the opening and type of contaminants
    - extraction equipment must be located as close as possible to the source of the pollutants and adequate make-up air provided
    - ventilation equipment must be monitored to ensure continuous operation and clearly identified and protected to prevent unauthorised interference

Elimination of ignition sources

- where a flammable atmosphere may exist and there is a risk of fire or explosion, all ignition sources in the vicinity must be eliminated
- potential ignition sources include open flames, hot surfaces, electrical equipment, internal combustion engines, metal tools striking metal surfaces, spark producing equipment, static electricity
- controls include:
  - electrical equipment such as two-way radios should be intrinsically safe
  - where the concentration of any flammable gas, vapour or mist in the atmosphere of the confined space is equal to or greater than 5% but less than 10% of its LEL, the worker(s) must be immediately removed from the space unless a suitability calibrated continuous monitoring flammable gas detector is used in the space;
  - where the concentration of any flammable gas, vapour or mist in the atmosphere of the confined space is equal to or greater than 10% of its LEL, the worker(s) must be immediately removed from the space

Where it is not reasonably practicable to ensure that there is a safe oxygen level or safe levels of airborne contaminants in the confined space and the work must be performed, respiratory protective equipment (eg. breathing apparatus) must be worn.

Respiratory PPE:

- must be selected according to the type and concentration of contaminants and the work to be performed;
- must be maintained and serviced in accordance with the manufacturers requirements; and
- workers must be trained and competent in the use of respiratory PPE and

5.5.4. Communication and Monitoring

Communication protocols must be established to ensure that continuous communication is maintained between the workers that enter the confined space and those that remain outside of the space (eg. standby person) and in the event of an emergency. Communication methods and equipment must be appropriate to the location, size and conditions within the confined space. The preference is for two-way radios or an equivalent method to be used with consideration given to the length of time that workers will be present in the confined space, battery life and the need for equipment to be intrinsically safe.

Communication protocols and equipment must be documented in the SWMS and emergency response procedures.

A standby person must be positioned at the entrance, prior to any workers entering the confined space. The standby person must:

- remain outside the confined space and do no other work which may interfere with their primary role of monitoring the workers inside the space, including gas test monitoring;
- understand the nature of the hazards inside the particular confined space and be able to recognise signs and symptoms that workers in the confined space may experience;
- must be trained and competent to perform the role (refer to Training and Competency Section);
- have all required rescue equipment (eg. harnesses, lifting equipment, lifeline) immediately available;
- have the authority to order workers to exit the space if any hazardous situation arises;
- initiate emergency procedures, as required;
- never enter the space to attempt rescue.

The responsibilities of the standby person can be transferred to another worker, provided they comply with the requirements listed above and that their details and date/time that they became the standby person is recorded on the Confined Space Permit.

5.5.5. Entry and Exit Procedures

The standby person must ensure that all workers sign in and out on the Confined Space Permit when they enter and exit the confined space.

5.5.6. Signage, Exclusion Zones and Unauthorised Access

Signage must be erected to indicate the location of confined spaces to workers on site. Signs should be placed in visible locations and ideally placed at the entrance(s) to the confined space.

When work is performed in the confined space, exclusion zones should be established to prevent unauthorised access and minimise the potential for impacts on the confined space from adjacent/nearby activities (eg. ingress of plant emissions).

When entry to the confined space is not required, unauthorised access must be prevented through the installation of locks, fixed barriers or an equivalent method.

5.5.7. Calibration and maintenance of equipment

Equipment used to monitor and/or control hazards and risks associated with the confined space must be regularly inspected, maintained and calibrated (where required) to ensure that they are in good working order. Where applicable this must be undertaken in accordance with the manufacturer's requirements. Records of calibration must be maintained on site

Equipment that typically requires inspection, maintenance and/or calibration includes:

- Gas testing and sampling equipment;
- PPE (including respirators);
- Ventilation equipment;
- Safety harness, lines and related heights safety equipment;
- Emergency rescue equipment; and
- Tools and equipment.

5.6. Emergency and Rescue

Appropriate emergency procedures, facilities and equipment (including first aid) must be established and provided for all activities that require entry and work in a confined space.

In developing emergency procedures, the different types of emergency and rescue scenarios that might arise and the confined space hazards and controls identified in the project risk register and SWMS must be considered.

When establishing emergency procedures, the following must be taken into account:

- location and nature of the confined space;
- access to the confined space and adjacent areas (ie. for emergency services);
- proposed scope and work methods;
- changes in hazards associated with the confined space (eg. levels of oxygen, airborne contaminants, adjacent activities)
- need for emergency services;
- response times of emergency services;
- communications;
- type and location of rescue equipment;
- training requirements and competence of workers and rescuers; and
- appropriate first aid.

Once established, emergency procedures must be tested to confirm their effectiveness, the suitability of rescue equipment and identify opportunities for improvement. The testing of emergency procedures must be documented and actions taken to implement corrective actions or improvements opportunities that are identified

5.7. Training and Competency

Bardavcol must ensure that workers that enter and with work in a confined space are adequately trained for the type of work being carried out. The level of training obtained must be demonstrated with a relevant certificate, ticket or licence and confirmed prior to the commencement of work. This may be done prior to, or as part of the project induction.

As a minimum, all workers involved in activities that require entry and work in a confined space must:

- complete the project induction;
- be trained and understand the Confined Space Permit process;
- be trained and understand the applicable safe system of work (eg. safe work method statement, standard operating procedure, risk assessment);
- be trained on the equipment to be used and emergency response and rescue procedures (note: this may form part of the SWMS induction); and
- be trained according to the requirements set out in the table below for specific activities/roles

Additional training and competencies may be required for the use of plant, tools and equipment to perform the scope of work (eg, working at heights) and/or rescue procedures. Additional training requirements must be document in the SWMS and confirmed prior to workers entering the confined space.

Activity/Role	Minimum Competency
Evaluate a confined space	• Confined Space – no BA (MSMPER205/ 200), or • Confined Space with BA (MSMPER205/200, MSMWHS216/217)
Issue Confined Space Permit	• Confined Space – no BA (MSMPER205/ 200), or • Confined Space with BA (MSMPER205/200, MSMWHS216/217)
Enter and work in a confined space without the use of breathing apparatus	• Confined Space – no BA (MSMPER205/ 200), or • Confined Space with BA (MSMPER205/200, MSMWHS216/217)
Enter and work in a confined space using breathing apparatus	• Confined Space with BA (MSMPER205/200, MSMWHS216/217)
Standby person	If not required to conduct continuous gas test monitoring: • Confined Space – no BA (MSMPER205/ 200) If required to conduct continuous gas test monitoring: • Confined Space with BA (MSMPER205/200, MSMWHS216/217)
Gas test monitoring	• Confined Space with BA (as above) or Gas Test Atmospheres (MSMWHS217)

To ensure that worker knowledge and understanding of confined space hazards, risks and controls is maintained, confined space training must be conducted at least every 3 years. Where a worker can provide documented records to demonstrate that they have regularly performed confined space work during this period, refresher training may be extended to 5 years.

6. REVIEW

The implementation and effectiveness of this procedure will be assessed through project inspections, internal audits and scheduled reviews. Additional review will be triggered by the report of hazards and incidents relating to the identification, entry and work in confined spaces. Areas for improvement, including non-compliance that is identified will be actioned at a project and corporate level, as appropriate.

7. RECORDS

Each project will maintain a filing system that adequately stores all records relating to working at heights. This includes records of communication, consultation and review of the risk register, SWMS, Confined Space and inspection and calibration records for equipment used (as applicable).

8. REFERENCES AND RELATED DOCUMENTS

WHS Act and Regulations

Confined Spaces, Code of Practice

AS 2865 Confined Spaces

Confined Space Evaluation

Confined Space Permit