

CONFINED SPACES OTHER THAN SEWERS

1. PURPOSE

Confined spaces present unique health and safety problems often involving invisible hazards. This SOP focuses on all East Gippsland Water (EGW) staff and their shared responsibility for maintaining safe work practices at any work site involving confined space other than sewers. (*Sewers and related facilities are covered in SOP 057*). Typically this procedure would relate to any works undertaken in entering and cleaning water tanks, entering valve pits, working in dry wells etc.

2. APPROVAL

Managing Director.

3. SAFETY

This procedure recognises that employers, managers, employees and contractors have statutory obligations under *Occupational Health & Safety* legislation and has been prepared in order to meet specific needs and work conditions for EGW staff and contractors.

Potential risks and hazards involving confined spaces include:

- Fire and explosion from flammable liquids and gases;
- Toxic gases;
- Drowning;
- Asphyxiation due to lack of oxygen;
- Falling from ladders, stairs, landings etc;
- Fumes from welding and combustion engines;
- Manual handling in a restricted space;
- Vapours from solvents and paints; and
- Infections due to exposure to waste water and/or other pathogens.

4. DEFINITIONS

Authorised Persons:

Person who is authorised to take control of a confined space entry work crew.

Competent Person:

Any employee who has completed approved confined space entry initial or refresher training within the last 12 months, and has also been trained in these procedures and been deemed by their works superintendent/assistant works superintendent to be capable of correctly performing a confined space entry task.

Contaminant:

Is any dust, mist, vapour, gas, liquid or other substance which may be harmful to a person's health and safety.

Flammable Range:

The range of flammable gas or vapour (% by volume in air) in which explosion can occur upon ignition. Expressed by the range between the Lower Explosive Limit (LEL) and the Upper Explosive Limit (UEL).

Health and Safety Representative:

Any elected Health and Safety representative.

Lower Explosive Limit (LEL):

The concentration of flammable gas, mist or vapour in air below which an explosive gas atmosphere will not be formed.

Safe Oxygen Level:

A minimum oxygen content in the atmosphere of 19.5% per volume and a maximum oxygen content of 23.5% under normal atmospheric pressure.

Sewerage Facilities:

All elements of a sewer system including manholes, wet wells, pump stations and sewer treatment works components

Upper Explosive Limit (UEL):

The concentration of flammable gas, mist or vapour in air above which an explosive gas atmosphere will not be formed.

5. RESPONSIBILITIES

All EGW tasks involving confined space entry will be carried out in accordance with Part 3.4 of the Occupational Health and Safety Regulations 2007; the WorkSafe Victoria Code of Practice for Confined Spaces; and Australian Standard AS 2865-2001 Safe Working in a Confined Space. This SOP has been developed to accord with these documents. This version supersedes all previous instructions relating to such work in sewerage facilities.

5.1 Executive Manager Operations is to:

- ensure that all appropriate actions are taken to implement this SOP.
- ensure that resources are made available to enable initial training and the annual refresher training to be carried out.
- hold supervisors under his direction accountable for meeting the objectives of this policy.

5.2 Works Superintendents are to ensure that:

- all available information on Confined Space Entry is made available to all staff.
- Confined Space Entry training is carried out as required.
- equipment listed in Appendix 1 is available.
- Entry Permits and atmospheric test results for their area of responsibility are retained in accordance with this SOP.
- new employees receive training before they perform the roles of entry or standby person.

5.3 Competent Persons are to:

- ensure that the procedures detailed in this manual are followed by the Authority's staff and contractors whenever entry is required to a sewerage facility/confined space.
- present themselves for refresher training as required.
- record the results of atmospheric testing as required and advise the workplace supervisor and other staff of any dangerous atmospheres.
- ensure that the correct safety equipment is being used, and that all safety equipment is in good order and only being used for the task that it was designed.
- report any defective equipment to their supervisor.

5.4 Health and Safety Representatives.

Health and Safety Representatives should work with management in promoting the adoption on safe working practices in relation to work in confined spaces. In particular they should encourage the following practices:

- The prompt reporting of any unsafe atmospheres to the supervisor.
- The prompt reporting of any defective safety equipment to the supervisor.
- Bringing any suggestions for improvement to equipment or procedures to the notice of their Supervisor or the OHS Officer.

6. PROCEDURE

6.1 Procedures mandatory

Procedures specified in this SOP are mandatory; binding on all EGW staff and contractors; apply to all work in sewerage facilities; and are designed to minimise hazards associated with work in these environments. Failure by EGW staff to adhere to the processes specified may result in disciplinary action. Similar action or penalties may apply to EGW contractors found breaching requirements as specified in this SOP. This SOP is to be read in conjunction with SOP096 – Working with Wastewater.

6.2 Distribution of SOP

A copy of this SOP is available in the Contractor Safety On-line section of EGW's website.

6.3 Confined Space Entry Permit

All work in confined spaces is to be subject to the completion of a confined space entry permit, duly authorised and signed (see Appendix 7) before any person enters the

confined space. Completed permits are to be maintained at the relevant depot and held with the relevant Form 048 Field Work Hazard Identification and Control Checklist.

7. RISK MANAGEMENT

Adherence to this SOP will reduce the risk associated with confined space entry into sewers and sewer systems.

8. REFERENCES

- Occupational Health and Safety Act 2004
- Occupational Health and Safety Regulations 2007, Part 3.4
- WorkSafe Victoria Code of Practice for Confined Spaces
- WorkSafe Victoria Code of Practice for Hazardous Substances
- Australian safety and Compensation Commission (formerly National Occupational Health & Safety Commission) Exposure Standards for Atmospheric Contaminants in the Occupational Environment, 3rd edition
- AS 2865:2001 Safe Working in Confined Spaces
- EGW SOP 057

Legal ramifications are dealt with in detail in the *SafeAS Management System Guide* (Volume 1 section 8 OHS Legal Framework).

9. REFERENCED FORMS

- Form 036 - Confined Space Entry Permit
- Form 048 - Field Work Hazard Identification and Control Checklist

APPENDICES

Appendix 1 - Procedure for Confined Space Entry (non-sewer)

Appendix 2 - Safety Equipment

Appendix 3 - Personal Hygiene

Appendix 4 - Check Lists

Appendix 5 - Dangerous Gases

Appendix 6 - Emergency Procedures

Appendix 7 - Work District Emergency Numbers

PROCEDURE FOR ENTERING CONFINED SPACES OTHER THAN SEWERS

PURPOSE

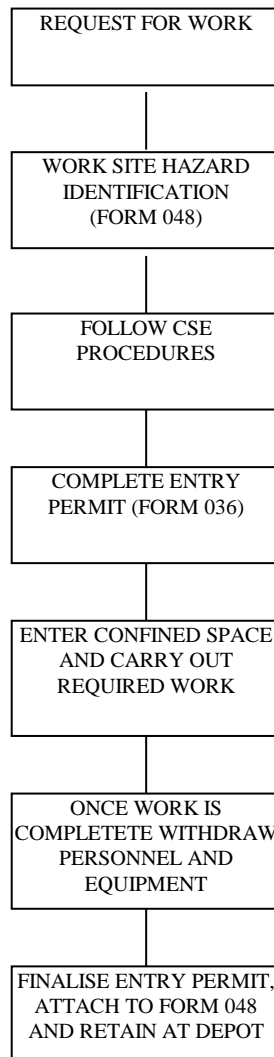
To provide systematic instruction in the processes required to safely enter and work in Confined Spaces other than those referred to in the EGW SOP 057. Typically this procedure would relate to any works undertaken in entering and cleaning Water Tanks, entering valve pits, working in dry wells etc.

Generally this procedure may be used to enter Confined Spaces (other than Sewers) and should be regarded as the minimum safe entry requirement.

PROCEDURE

1. Prior to entering any new Confined Space a Work Site Hazard Identification must be carried out using Form 048.
2. Complete Form 036 - Confined Space Entry Permit.
3. Ensure that adequate trained personnel (at least two) are on site.
4. Ensure CSE signage is erected at the work site.
5. Ventilate the Confined Space.
6. Carry out a pre-entry atmospheric test on the Confined Space using a gas detector. (Check for within calibration date.) If the atmosphere is found to be safe, continue,
7. Prior to entering the Confined Space the entry permit (Form 036) must be completed and particular emphasis paid to ensuring pre-entry test results are recorded and that a review of Isolation Requirements and Changing Conditions in the Confined Space has occurred.
8. Review and carry out any Lockout and Isolation needs that may be required to stop any machinery or electrical equipment or valves activating operating whilst work is carried out in the Confined Space.
9. Ensure that continuous monitoring of the atmosphere occurs whilst work is carried out in the Confined Space.
10. Once work is completed in the Confined Space and all staff have been removed the entry permit must be finalised. The completed Form 036 should be attached to the Form 048 and retained at the depot in accordance with normal requirements.

FLOW CHART SUMMARY OF ENTRY REQUIREMENTS



SAFETY EQUIPMENT

Equipment Checklist

The following is a list of equipment that is to be available for use for confined space entry tasks.

1. First Aid Kits
2. Safety Helmets
3. Safety Harnesses
4. Safety Lines
5. Self Rescue Breathing Apparatus (Australian Standards approved)
6. Air Line Breathing Apparatus and sufficient spare air cylinders.
7. Torches and other lighting
8. Personnel Winches
9. Electronic Gas Detection Meters (Australian Standards approved, four sensor)
10. Mechanical Blowers and Ducting
11. Water Hoses for Spray Ventilation
12. Traffic Warning Signs, Barricades, Flashing Lights, Witches Hats, Delineators and Red Flags (conforming to Australian Standard 1742.3, Manual of uniform traffic control devices Part 3: Traffic control devices for works on roads, or Standards Australia Handbooks HB81.1 – 1996 or HB81.2 – 1996, as appropriate)
13. Portable Radio Facilities or Mobile Telephone
14. Spare Battery for radio/telephone and torch
15. Confined Space Entry warning signs
16. Gloves, safety glasses/goggles, gumboots.
17. Hand cream

PERSONAL HYGIENE

A3.1 Prevention

- Good personal hygiene is important.
- Rashes and skin irritations should be seen early by a local doctor, then reported to the Occupational Health Division.
- Recurring cases of rashes should be investigated with the view to finding a cause.
- Substitution of chemicals known to be irritants or allergens should be made.
- Maintain cleanliness of general work areas.
- Ensure availability of adequate washing facilities at the job site.
- Use protective clothing (i.e gloves, spectacles, overalls, etc.)

A3.2 Hand Care

- Use protective gloves provided that are appropriate to the task.
- Barrier creams should be re-applied frequently during the day (wash before re-application). They act as a barrier to irritant chemicals, promote “skin consciousness” and make the removal of contact factors easier.
- Harsh detergent, chemical or petroleum based solvents (kerosine, turpentine, thinners), or hard mineral spirits, must be avoided as they damage the skin making it more vulnerable to drying and cracking.
- Abrasive cake soaps containing around 30% insoluble mineral abrasive silica and feldspar should not be present. Abrasive soaps should not be used on a regular basis as they are harsh on the skin. Their use should be limited to difficult cleaning tasks. They should be used rapidly and thoroughly rinsed off, followed by the application of a moisturising cream.
- Only recommended hand cleaners and barrier creams should be used. These have been chosen for their safe properties (lack of solvents so they do not dry out the skin’s natural oils).

A3.3 Personal Hygiene Practices

- Hands and face should be thoroughly cleaned prior to eating, drinking and smoking.
- Hands should be washed before and after using the toilet.
- Shower at the end of the day.
- Use clean clothing as often as possible.
- Take care of your hands.

CHECK LISTS

Confined Space Entry

A4.1 Isolation of the confined space:

Water
Electrical services (pumps, penstocks)
Hazardous substances (sewage, sludge)
Mechanical services (drive shafts)

A4.2 Hazards likely to be encountered:

Oxygen deficiency
Flammable gas
Toxic gases - Hydrogen Sulphide
- Carbon Monoxide
- Other (check for likely Trade Waste discharges in the vicinity)

Work processes - Welding
- Power leads
- Drilling
- Chemicals
- Traffic and/or pedestrians

A4.3 Safety Equipment:

Respiratory protection- Airline
- Self Contained Breathing Apparatus (SCBA)
- Self Rescue Breathing Apparatus
Gas detector(s) - ensure battery operation and within 6 month calibration date

Harness
Winch
Eye protection
Hand protection
Safety footwear
Safety helmet
Hearing protection
Ventilation - Natural
- Mechanical
- Spray

Traffic warning devices

Lighting

Confined Space Entry warning signs

A4.4 Work crews:

Training
Gang sizes required
Responsible Officers

A4.5 Communications:

With emergency services
Between ground party and entry personnel

DANGEROUS GASES

There are three main gas hazards in a confined space environment:

- ❑ Lack of oxygen
- ❑ Explosive gases
- ❑ Toxic gases

Following is a brief description of the type of flammable and toxic gases that may be encountered in the sewer environment.

DEFINITIONS

Exposure Standard represents an airborne concentration of a substance in a person's breathing zone, which according to current knowledge, should neither impair employees' health nor cause them undue discomfort.

mg/m³ means milligrams of substance per cubic metre of air at 25°C and at one atmosphere pressure

ppm means parts of vapour or gas per million parts of contaminated air by volume

PEAK means the maximum concentration that should not be exceeded at any time during a working day – applied to rapidly acting substances and irritants

STEL means 'short term exposure limit' – an atmospheric concentration averaged over a 15 minute period, and the maximum uncontrolled exposure to a substance allowed for this period – usually applied where adverse health effects can be caused by relatively high short term exposure

TWA means 'time weighted average' – an atmospheric concentration averaged over an 8 hour working day and applies to a 40 hour working week, and the maximum uncontrolled exposure to a substance allowed for this period

HEAVY GASES

Hydrogen Sulphide

- | | | |
|---------------------|---|---|
| Relative density | - | 1.19 (air = 1) |
| Exposure standard | - | TWA 10 ppm STEL 15 ppm |
| Gas characteristics | - | Distinctive odour (rotten eggs) but not evident at high concentrations. Colourless, explosive, very poisonous, inflammable (5% LEL=2150 ppm) |
| Effects on the body | - | This gas is rapidly fatal even in low amounts, a concentration of 0.2% (2000 ppm) causing death in a few minutes. In low (but dangerous) concentrations, the gas will be initially detectable by its distinctive rotten egg odour. However, the gas will quickly paralyse the sense of smell and it may be mistakenly believed that the gas has dispersed. In high concentrations, paralysis of the sense of smell will occur after only seconds contact. It will cause |

irritation of the eyes and nose slightly less intense than that due to chlorine.

Testing method - Electronic gas detection meter, Drager tubes.

Petrol Vapour

Relative density - 2.50 to 4.00 (air = 1)

Exposure standard - TWA 900 mg/m³

Gas characteristics - Distinctive odour, colourless, flammable, explosive.

Effects on the body - Suffocating. A concentration of 1 to 2% is dangerous and over 2% is rapidly fatal.

Testing method - Smell, Drager tube.

Anaesthetics

Gas characteristics - Usually sweet - sickly.

Effects on the body - Dulls senses.

Testing method - Can be detected by smell.

Carbon Dioxide

Relative density - 1.53 (air = 1)

Exposure standard - TWA 5,000 ppm
STEL 30,000 ppm

Gas characteristics - Odourless, colourless, non-flammable, will not support combustion.

Effects on the body - This gas has no odour. It acts as a stimulus to the respiratory nerves which will increase the breathing possibly up to the gasping stage. If present in large quantities, it may cause an acid taste. Causes ears to ring. 10% concentration (100,000 ppm) cannot be endured for more than a few minutes. Collapse or death will be caused by asphyxiation due to lack of oxygen.

Testing method - Electronic meter (low oxygen), Drager tubes.

Chlorine

Relative density - 2.49 (air = 1)

Exposure standard - 1 ppm (**peak** limitation)

Gas characteristics - Yellowish-green gas, choking odour, non-flammable.

Effects on the body - Yellow-green gas, irritates eyes, nose and throat causing coughing and pain in the chest. In liquid form, it irritates the skin. Will kill quickly even in very low concentrations.

Testing method - Drager tubes. Concentrations as low as 0.02 parts per million can be detected by smell.

LIGHT GASES

Ammonia

Relative density - 0.60 (air = 1)

Exposure standard - TWA 25 ppm
STEL 35 ppm

- Gas characteristics - Colourless, strong characteristic odour, irritating, explosive.
- Effects on the body - Irritant to respiratory system, eyes and skin.
- Testing method - Concentrations from 5 ppm can be detected by smell, Drager tubes.

Carbon Monoxide

- Relative density - 0.97 (air = 1)
- Exposure standard - TWA 50 ppm
STEL 200 ppm
- Gas characteristics - Odourless, colourless, flammable (5% LEL = 6,250 ppm), explosive, non-irritating, very poisonous.
- Effects on the body - Exceedingly poisonous when inhaled and it is colourless, tasteless and odourless. The symptoms are dizziness, headache, drowsiness, weakness of legs, dimness of vision, loss of hearing and palpitations all leading to complex collapse. Victims must be moved into the open air, kept warm and must not exert themselves. Victims must be kept awake at all costs and if this is not possible, apply artificial respiration (not mouth to mouth) and oxygen.
- Testing method - Electronic gas detection meter. Drager tubes.

Methane

- Relative density - 0.55 (air = 1)
- Gas characteristics - Odourless, colourless, flammable (5% LEL = 2,500 ppm)
- Effects on the body - Deprives tissue of oxygen and does not support life.
- Testing method - Electronic meter, Drager tubes.

Sludge Digestion Tank Gas

- Relative density - variable
- Gas characteristics - May be practically odourless and colourless but flammable. Consists principally of Methane and Carbon Monoxide with small amounts of Hydrogen Sulphide Nitrogen and Sulphuric compounds.
- Effects on the body - Will not support life.

Nitrogen

- Relative density - 0.97 (air = 1)
- Gas characteristics - Colourless, odourless.
- Effects on the body - High concentrations are associated with a lack of oxygen.
- Testing method - Electronic meter (low oxygen levels).

EMERGENCY PROCEDURES

If a worker is overcome:

- 1 Do not attempt to rescue if you cannot protect yourself from the same hazards that have overwhelmed your workmate.

- 2 Summon help:
 - a From the rest of the work crew;
 - b From your Depot contact number:

| | |
|------------------------|------------------|
| Bairnsdale: | 5152 4012 |
| Lakes Entrance: | 5155 1367 |
| Mallacoota: | 5158 0414 |
| Omeo: | 5159 1548 |
| Orbost: | 5154 2205 |
 - c From the Ambulance Service and/or Fire Brigade **000**

3 Apply first aid as quickly as possible.

4 **Obtain medical treatment:**

If the victim is unconscious or showing significant symptoms, summon an ambulance. If the victim has been only mildly affected, he or she may be driven to the nearest public hospital.

Remember to provide your exact location (including VicMap reference if possible) and a return mobile telephone number.

Medical opinion must be obtained in every case of gas attack or suspected gas attack.

Gassing victims must never be permitted to drive until declared fit by a doctor.

5 Once the needs of the patient have been attended to, report the circumstances to your supervisor (to allow the incident to be fully investigated and the cause identified).

6. **Emergency Phone Numbers:**

| | |
|--------------|------------|
| Fire Brigade | 000 |
| Ambulance | 000 |
| Police | 000 |

WORK DISTRICT EMERGENCY NUMBERS

Emergency Phone Numbers for Work Districts

| | | |
|--------------------------|---------------|-----------|
| <i>Bairnsdale</i> | Ambulance: | 000 |
| | Hospital: | 5150 3333 |
| | Fire Brigade: | 5152 3000 |
| | Police: | 5152 0500 |

| | | |
|------------------------------|--------------------------|-----------|
| <i>Lakes Entrance</i> | Ambulance: | 000 |
| | Community Health Centre: | 5155 1314 |
| | Fire Brigade: | 5155 1737 |
| | Police: | 5155 1206 |

| | | |
|--------------------------|---------------|-----------|
| <i>Mallacoota</i> | Ambulance: | 000 |
| | Hospital: | 5158 0777 |
| | Fire Brigade: | 5158 0288 |
| | Police: | 5158 0280 |

| | | |
|--------------------|---------------|-----------|
| <i>Omeo</i> | Ambulance: | 000 |
| | Hospital: | 5159 1233 |
| | Fire Brigade: | 5159 1231 |
| | Police: | 5159 1222 |

| | | |
|----------------------|---------------|------------------|
| <i>Orbost</i> | Ambulance: | 5154 3000 or 000 |
| | Hospital: | 5154 1277 |
| | Fire Brigade: | 5154 1323 |
| | Police: | 5154 1073 |