Australian Government
Australian Maritime Safety Authority

AMSA **Webinars**

Welcome to our webinar

Hazardous gases on domestic commercial vessels

the session will commence soon

Australian Government
Australian Maritime Safety Authority

AMSA **Webinars**

Hazardous gases on domestic commercial vessels

Acknowledgement of Country

In the spirit of reconciliation,
the Australian Maritime Safety Authority
acknowledges the Traditional
Custodians of country throughout
Australia and their connections to land,
sea and community.

We pay our respect to their Elders past
and present and extend that respect to
all Aboriginal and Torres Strait Islander
peoples today.

‘Navigating the Tides of Progress.’
Created for the Australian Maritime Safety Authority by Alysha Menzel,
proud descendant of the Samsep people from Erub Island, Torres Strait Islands.

Housekeeping

- Be aware of the 30 second delay
- Turn on live captioning:
- Click ‘Captions’ at the top of your Teams window
- Post your questions in the Q&A chat
- You will receive a link to the recording after the webinar.

Contents

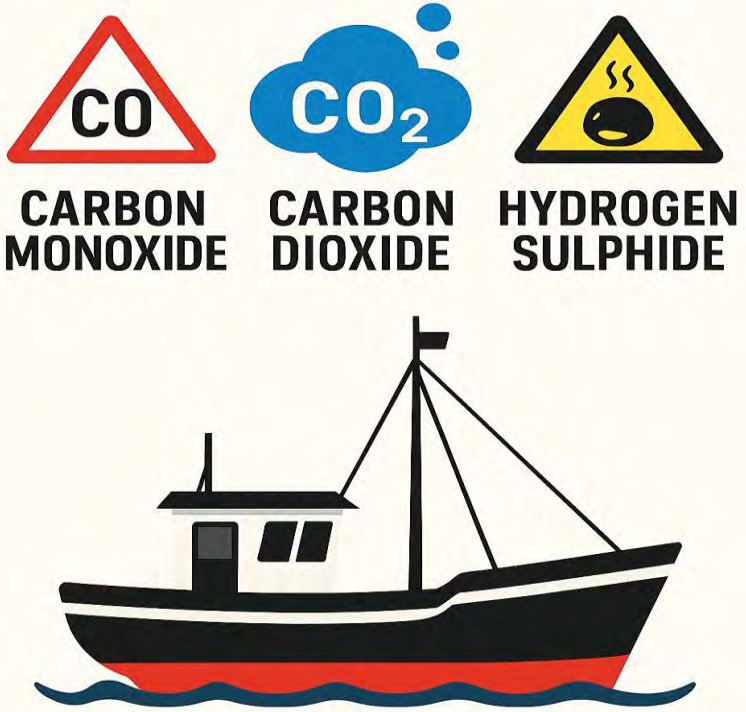
What we will cover:

1. Hazardous gases on vessels
2. What are the rules for DCVs
3. Carbon Monoxide
4. Hydrogen Sulphide
5. Carbon Dioxide
6. Risk assessment
7. Useful links and resources
8. Questions?

Question time

Have you assessed the risk of hazardous gases on your vessel and documented the controls in your safety management system (SMS)?

Hazardous gases on DCV's

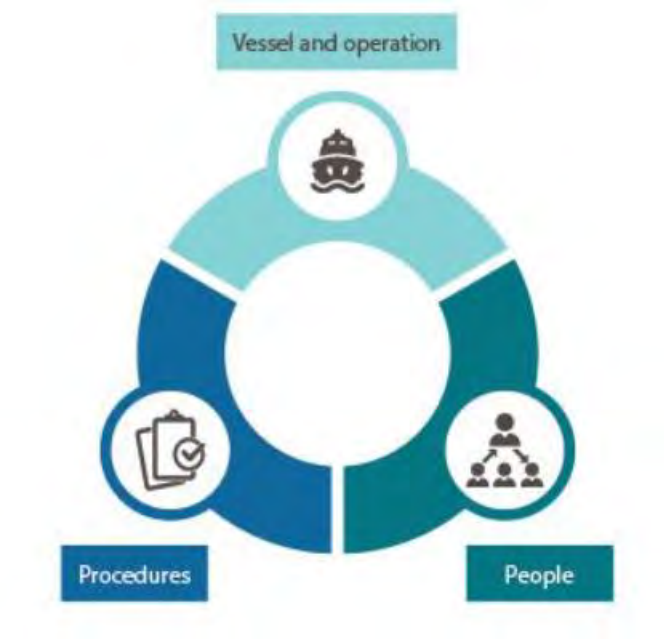


Hazardous gases found on vessels are a risk to crew and passengers that need to be:

- identified
- assessed
- controlled
- monitored

through the vessels risk assessment and included in your Safety Management System (SMS)

Hazardous gases – what are the rules?



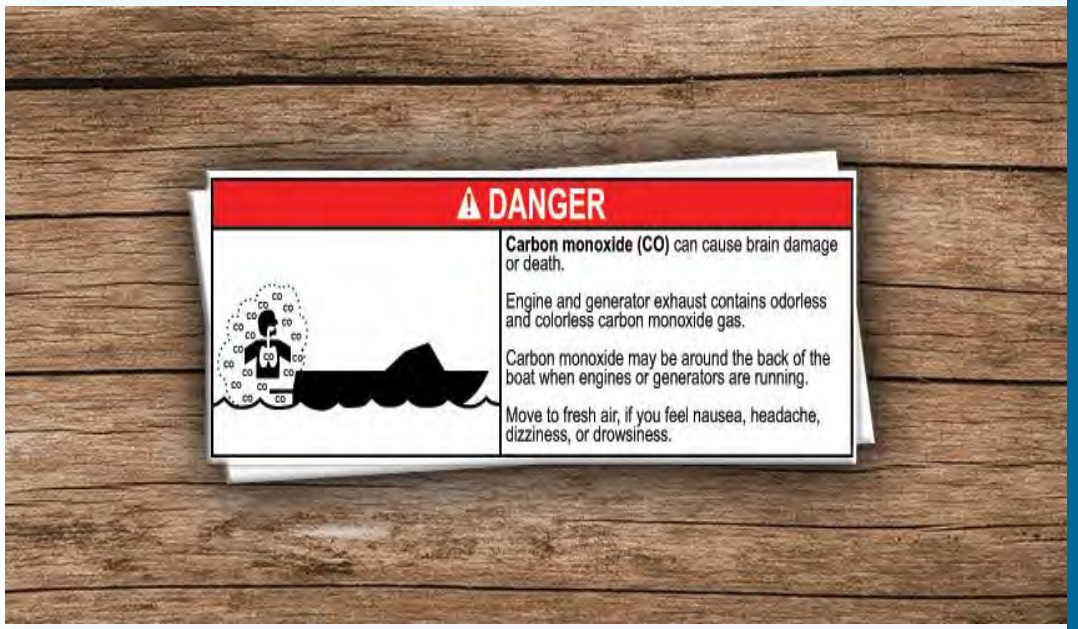
Requirement under Marine Order 504 and other standards:

- Do a risk assessment for hazardous gases
- Record this in your safety management system (SMS)
- Develop emergency procedures that address the risk of hazardous gases
- Induct and train crew to identify and manage those risks
- Regular maintenance of sewage and plumbing systems.
- Adequate ventilation in toilets and confined spaces

Applies to: **All vessels** - Class 1, 2, 3 and 4.

Carbon monoxide (CO)

Carbon monoxide - what is it?



Carbon monoxide also known as (CO) is a;

- colourless,
- odourless,
- flammable and
- poisonous gas
- produced by the burning of carbon-based fuels like wood, gas, petrol or coal
- Depletes oxygen in the blood, can cause tissue and organ damage

Carbon monoxide – sources on vessels

Sources of carbon monoxide on vessels include:

- engine exhaust fumes, swim deck area, when idling
- fuel-burning appliances like heaters, generators, barbecues, tools used in poorly ventilated areas (e.g. in the cabin, engine room)
- engine exhaust fumes of nearby vessels.

Carbon monoxide poisoning – cognitive signs and symptoms

Carbon monoxide is highly toxic to people and can cause:

- headaches
- dizziness
- eye irritation
- vomiting
- fainting
- loss of consciousness
- seizures
- respiratory failure
- permanent brain injury
- death

Image courtesy of Colorado Natural Gas

Carbon monoxide poisoning – cognitive signs and symptoms

- People affected by carbon monoxide poisoning can look like they are seasick or drunk and can delay receiving treatment.
- Failure to identify and treat carbon monoxide poisoning can result in permanent damage and death.

Managing carbon monoxide on vessels

- Keep a distance from exhaust systems
- Reduce time passengers spend on the swim deck near engine exhausts
- Use fuel burning tools, appliances, engines, and equipment outdoors only.
- Consider other factors like wind direction.
- Keep fumes away from open windows and cabin doors.

Managing carbon monoxide on vessels

- Keep gas cylinders away from engine exhausts to reduce the risk of ignition.
- Monitor and service equipment regularly.
- Check equipment as part of the pre-start routines.
- Consider installing gas detection monitors
- Go outside and get fresh air

Australian Government
Australian Maritime Safety Authority

Risk assessment example

Risks	Controls	Responsible person	Changes
Carbon monoxide engine fumes Power tools fumes Indoor heating and cooking appliances	• Outboard motor to be serviced in accordance with manufacturer's instructions • Keep passengers and crew away from engine fumes, particularly when idling • Train crew on how to identify sources hazardous gases onboard the vessel • Be aware of gas entering cabin from other nearby vessels • Only use power tools outdoors and never inside cabin • Ensure appliance are switched off after use	• Master – regular maintenance checks and recording results in maintenance schedule • Master – following emergency procedures and training/supervision of crew • Master to induct new crew • Crew to report leaks to master • Master and crew review procedures during pre-starts	

EXAMPLE ONLY

Incidents involving hazardous gases – Carbon monoxide

Image courtesy of ABC News

Sydney (2016):

A 23-year-old sailor died from carbon monoxide poisoning on their yacht.
The stove was found in the on position.


BE BOATWISE
There are NO second chances

Hydrogen sulphide (H_2S)

Hydrogen sulphide (H_2S) - what is it?

- Hydrogen sulphide (H_2S) is a colourless, flammable, corrosive, poisonous gas that smells like rotten eggs.
- It's produced naturally from decaying organic matter (e.g. fish, effluents etc.)
- It is heavier than air, causing the gas to accumulate and travel in low lying areas.

Hydrogen Sulphide (H_2S) – what are the health risks?

- **Low concentrations**: Can cause irritation to the eyes, nose, and throat, as well as headaches, dizziness, and nausea.
- **High concentrations:** Can cause rapid unconsciousness, respiratory failure, and death within minutes.

Hydrogen Sulphide (H_2S) – cognitive signs and symptoms

Hydrogen Sulphide is highly toxic to people and can cause these common symptoms in low concentrations:

- headache
- dizziness
- staggering
- sudden collapse
- acute eye, nose and throat irritation
- shortness of breath
- tightness in chest
- wheezing
- loss of olfactory senses (loss of smell and taste).

Hydrogen Sulphide – cognitive signs and symptoms

Acute symptoms of hydrogen sulphide poisoning at high concentrations can cause:

- convulsions
- pulmonary edema (fluid in the lungs)
- coma
- death (in very high concentrations - almost instantly).

Hydrogen sulphide – sources on vessels

- Sewerage systems and plumbing
- Fishing vessels
- Low-lying, enclosed areas
- Ignition sources and sparks

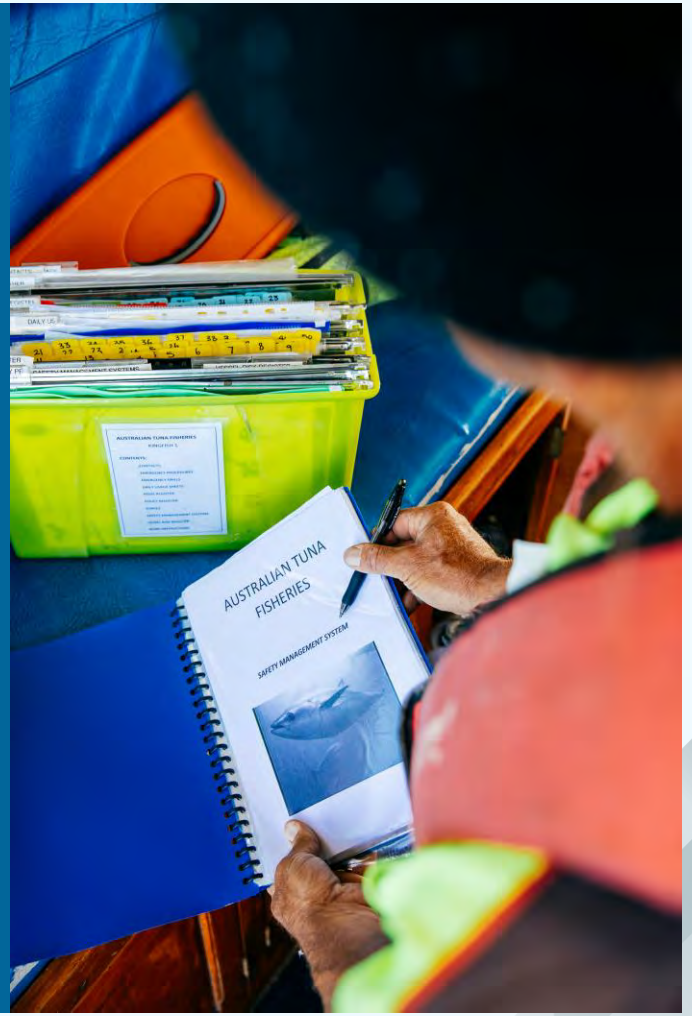
Hydrogen sulphide – control measures

Risk assessment:
Complete thoroughly; ensure crew awareness.

Sewage tanks:
Pump out after each voyage; check empty before departure.

System checks:
Include sewerage/plumbing maintenance in SMS; ventilate toilets/bathrooms.

Crew training:
Cover hydrogen sulphide hazards in induction; include emergency procedures for gas detection.



Hydrogen sulphide – control measures cont.

Report immediately:
Notify the master if you smell rotten eggs; start emergency procedures.

Avoid danger zones:
Gas settles in lower areas—move to open spaces.

Stay alert:
Be aware of hazardous gases during incidents.

Do not risk lives:
If someone collapses inside, stay outside and call 000 HAZMAT

Australian Government
Australian Maritime Safety Authority

Hydrogen Sulphide Risk assessment example

Risks	Controls	Responsible person	Changes
Exposure to hydrogen sulphide gas on vessel from sewage tanks	• Pump out after each voyage; check empty before departure. • Include sewerage/plumbing maintenance in SMS • Ventilate toilets/bathrooms. • Cover hydrogen sulphide hazards in induction; include emergency procedures for gas detection. • Notify the master if you smell rotten eggs; start emergency procedures. • If someone collapses inside, stay outside and call 000 HAZMAT • Install gas detectors	• Master – regular maintenance checks and recording results in maintenance schedule • Master – following emergency procedures and training/supervision of crew • Master to induct new crew • Crew to report gas leaks to master immediately • Master and crew review procedures during pre-starts	

EXAMPLE ONLY

Incidents involving hazardous gases – Hydrogen Sulphide

Lady Rose – Sydney Harbour 2019:
A passenger died on a commercial vessel in Sydney Harbour.

Investigation found the likely cause was hydrogen sulphide exposure, which entered a toilet cubicle through a faulty waterless basin trap.

The incident highlights the critical risks of poor system design and inadequate maintenance..

Incidents involving hazardous gases – Hydrogen Sulphide

Lady Rose – Key investigation findings;

- Faulty sewage piping and poor ventilation.
- Inadequate maintenance of wastewater systems.
- Failure to follow Safety Management System (SMS), including pre-departure checks
- Sewage tanks not emptied for 7 days before the voyage
- Passengers reported a “strange smell” to crew but it was not reported to the master promptly.

Incidents involving hazardous gases – Hydrogen Sulphide

Fishing trawler Malaysia 2016:

Three crew died onboard a fishing trawler in Sabah Port, Malaysia.

The crew died after exposure to poisonous hydrogen sulphide gas released from a fish storage chamber which had kept its contents beyond the time limit.

Carbon dioxide CO_2

Carbon dioxide - what is it?

- Also known as CO_2, is a naturally occurring gas, commonly stored in cylinders
- Primarily used in hospitality and tourism operations to carbonate beverages
- Is colourless, tasteless and odourless
- Can be fatal in high concentrations

Carbon dioxide – health risks

Acute carbon dioxide poisoning stops the respiratory and circulatory systems in the body which can cause:

- tachycardia (fast heart rate)
- cardiac arrythmias
- impaired consciousness.

Carbon dioxide – health risks

More serious symptoms of high exposure to carbon dioxide are:

- convulsions
- coma
- asphyxiation
- death.

Carbon dioxide – sources on vessels

CO2 cylinders

Uses: Common in hospitality for carbonating drinks; often carried on tourism vessels

Storage: Typically kept in small cupboards or confined spaces

Hazard: Leaks can cause gas buildup, leading to suffocation within minutes when cupboards or confined spaces are opened.

Carbon dioxide – control measures

- Include the use, storage and maintenance of CO_2 in risk assessment, emergency plans and crew induction within the vessel's Safety Management System
- Store CO_2 cylinders in open, well-ventilated areas.
- Never store in small rooms or cupboards without CO_2 monitors
- Check for leaks regularly
- Train crew on CO_2 risks and emergency actions during induction and daily briefings
- Consider installing gas monitors near sources

Australian Government
Australian Maritime Safety Authority

Carbon dioxide Risk assessment example

Risks	Controls	Responsible person	Changes
Exposure to carbon dioxide gas from cylinders	• Store CO_2 cylinders in open, well-ventilated areas. • Never store in small rooms or cupboards without CO_2 monitors • Check for leaks regularly • Train crew on CO_2 risks and emergency actions during induction and daily briefings	• Master – regular maintenance checks and recording results in maintenance schedule • Master – following emergency procedures and training/supervision of crew • Master to induct new crew • Crew to report gas leaks to master immediately • Master and crew review procedures during pre-starts	

EXAMPLE ONLY

Risk Assessment

Risk assessment – identify hazards

- Owners, masters and crew **work together** to develop the risk assessment
- **Identify types and sources** of hazardous gases on the vessel
- **Consider** how gas can be generated on board or enter from external sources

Risk assessment – assess the risks

- Think about the severity and consequences of exposure to hazardous gases on your vessel
- Ask yourself do you have procedures in place to manage hazardous gases already?
- Do you have equipment or devices to monitor gases onboard?
- Do you have an emergency plan if there is a gas leak?
- Are your crew trained and aware on how to identify and manage gas exposure, where to assemble and where not to go to or enter, rescue protocols, who to call for help?

Risk assessment – control the risks

- Identify sources, equipment, appliances and systems (sewage and plumbing) and areas on board that hazardous gases are either stored or have the potential to be created
- Develop policies and procedures for known sources of stored gases onboard your vessel – think confined spaces where leaked gases can accumulate
- Develop maintenance procedures for sewage and plumbing systems
- Pump out sewage tanks after each voyage and start voyages with an empty sewage tank
- Remove fish from holds as soon as possible

Risk assessment – control the risks

- Consider installing gas **monitoring devices**
- **Induct and train** crew, and educate hirers (Class 4) so they are prepared to deal with hazardous gas situations.
- Keep talking about it – **discuss the potential** for hazardous gases exposure at crew meetings
- Remind crew to look for the signs and **report to the master** immediately
- **Practice** what to do in an emergency gas leak and log training
- **Record risks and controls** in your SMS

What steps will you take after today's session?

Focused Inspection Campaign (FIC)

Upcoming Hazardous gases Focused Inspection Campaign (FIC)

When: commences 2 February to 30 April 2026

Where: Australia wide, all states and territories

Vessel types: All class 1 – 4 DCVs

Focus areas:

- Documented risk assessment, procedures and included in SMS.
- Crew training and induction
- Appropriately placed signage
- Information provided to hirers of Class 4 vessels
- Sufficient ventilation in sanitary facilities.

Upcoming hazardous gases Focused Inspection Campaign (FIC)

Inspection process:

- Conducted during regular DCV inspections
- Any deficiencies found will be discussed with the person in charge to bring the vessel into compliance

Outcome of the FIC

- FIC report will be published on the AMSA website outlining the findings
- Findings will be used to identify whether further compliance and education activities are required.

Useful resources and links

AMSA website sources:

- Hazardous gases
- Risk management in the national system
- Safety Management Systems
- How to develop a Safety Management System
- Focused inspection campaign - hazardous gases

Other sources:

- Safety Advisory - Risks of hydrogen sulphide exposure on Domestic Commercial Vessels - Lady Rose - 28 May 2020, Office of Transport Safety Investigation
- Carbon monoxide video, Maritime Safety Tasmania

Questions & answers

We value your **feedback**! Please take a moment to complete our **survey**.

Thank you.

Australian Government

Australian Maritime Safety Authority

Safe and clean seas, saving lives

www.amsa.gov.au/hazardousgases