

## Accident Advisory: Worker died in pump room

Ref: [1819076](#) WSH Alert Accident Notification dated 4 January 2019

On 21 December 2018 around 2am, six workers were dismantling valves in the pump room of a marine vessel when they smelt fumes. All the workers managed to evacuate from the pump room except for one who had lost consciousness. He was brought out from the pump room later and pronounced dead at the scene by attending paramedics.

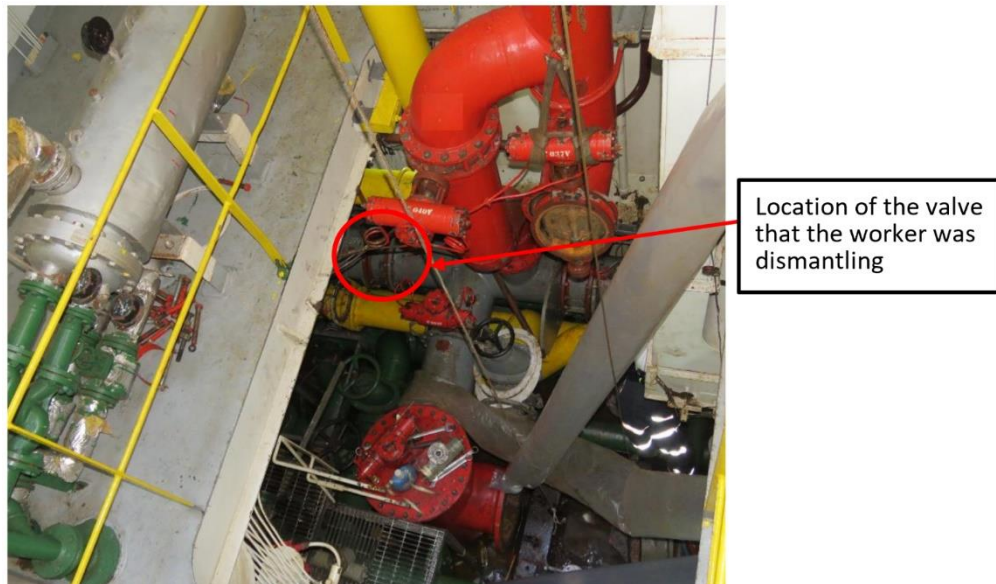


Figure 1: Overview of the accident scene.

## Recommendations

Persons in control of workplaces and work activities such as occupiers, principals and employers are advised to consider the following risk control measures to prevent similar accidents:

### **Work planning**

- Before opening a pipeline, adequate planning should be conducted to identify the following (non-exhaustive):
  - The specific pipeline(s) to be opened;
  - Roles and responsibilities of personnel performing the works;
  - Hazards associated with pipeline contents and the corresponding risk controls;
  - Means of communication between personnel performing the works;
  - Procedures for pipeline isolation, depressurisation, and Lockout Tagout (LOTO) of hazardous energy sources;
  - Procedure for removal of residual hazardous substance from the piping system;
  - Ventilation of the work environment;

- Emergency rescue procedures; and
- Communication of relevant information to stakeholders.

### **Safe working in enclosed spaces**

- All enclosed spaces (e.g. pump rooms, ballast tanks) onboard a marine vessel should be identified and clearly marked on site.
- Establish a system for controlling access to the enclosed space to prevent unauthorised entry.
- Before entry into any enclosed space, testing of atmosphere should be carried out by a competent person with the use of properly calibrated equipment. Workers may enter the enclosed space only if the results of atmospheric testing indicate it is safe to do so.
- Put in place adequate atmospheric ventilation to maintain oxygen levels and keep airborne concentrations of toxic vapours below their respective permissible exposure limit.
- If workers are required to work inside the enclosed space, continuous atmospheric monitoring using a suitable gas detector should be carried out to ensure that the work environment remains safe as the work progresses.
- For instances where the provision of adequate mechanical ventilation is not possible, suitable respirators or other breathing apparatus must be used so that the work can be carried out safely.

### **Opening the pipeline safely**

- Ensure that pipelines are isolated, depressurised and properly drained, vented, purged and/or flushed before being opened.
- Break open the pipeline slowly and carefully. In the event of an unexpected release, workers should evacuate the area immediately and raise the alarm.

### **Personal protective equipment (PPE)**

- Provide adequate PPE for workers performing works related to opening of pipelines. Examples of PPE include safety helmets, face shields, safety goggles, safety boots, chemical-resistant clothing, aprons and gloves. Reference should be made to the relevant Safety Data Sheet (SDS) to ensure that appropriate PPE are selected for the task based on the possible residual hazardous substance(s) that may be left within the pipeline.

### **Worker training and supervision**

- Provide supervision to ensure adherence to safe work procedures.
- Worker training to include topics such as:
  - hazards of working in an enclosed area;
  - correct use of PPE;
  - safe work procedure for opening a pipeline; and
  - emergency response procedures.

### **Emergency response**

- Establish a rescue plan for rescuing persons from the enclosed space in the event of an emergency.
- Ensure there is adequate supply of rescue equipment such as breathing apparatus, safety harness, ropes and reviving apparatus.
- Ensure that appointed rescue personnel had received adequate training which can include first aid procedures and use of rescue equipment.
- Provide a first aid kit, spill clean-up kit and portable eyewash kit near the work area.

## **Risk Assessment**

Conduct a thorough Risk Assessment (RA) for all work activities to control any foreseeable risk that may arise when opening pipelines in enclosed spaces. The RA should cover, but is not limited to, the following areas:

- Possibility of release of hot, flammable, corrosive or toxic substance when opening a pipeline.
- Possibility of release of asphyxiant (e.g. nitrogen gas) when opening a pipeline.
- Slip, trip and fall or struck by falling object hazards due to poor onsite housekeeping.
- Incorrect tool or technique used for opening the pipeline.

## Further Information

1. Workplace Safety and Health Act
2. Workplace Safety and Health (Risk Management) Regulations
3. Workplace Safety and Health (General Provisions) Regulations
4. Workplace Safety and Health (Confined Spaces) Regulations 2009
5. Workplace Safety and Health (Shipbuilding and Ship-Repairing) Regulations 2008
6. Code of Practice on Workplace Safety and Health Risk Management
7. SS 568: 2011 Code of Practice for Confined Spaces
8. SS 571: 2011 Code of Practice for Energy Lockout and Tagout
9. International Maritime Organisation (IMO) – Revised Recommendations for Entering Enclosed Spaces Aboard Ships
10. Oil Companies International Marine Forum (OCIMF) – An Information Paper on Pumproom Safety
11. UK Health and Safety Executive, OCE 11 – Breaking Containment – Non-hydrocarbon Lines
12. UK Health and Safety Executive, OCE 12 – Breaking Containment – Hydrocarbon Lines
13. UK Health and Safety Executive – The Safe Isolation of Plant and Equipment
14. UK Health and Safety Executive – A Guide to the Pipelines Safety Regulations 1996

\* Information on the accident is based on preliminary investigations by the Ministry of Manpower as at 31 January 2019. This may be subject to change as investigations are still on-going. Please also note that the recommendations provided here are not exhaustive and they are meant to enhance workplace safety and health so that a recurrence may be prevented. The information and recommendations provided are not to be construed as implying any liability on any party nor should it be taken to encapsulate all the responsibilities and obligations under the law.

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