Accident Advisory: Diver drowned while on job underwater

On 5 May 2018 around 12.35pm, a commercial diver went missing while cleaning the hull of a vessel underwater. His body was eventually found two days later, on 7 May 2018.

Figure 1: The dive boat that was deployed to clean the hull of a vessel.

Recommendations

Commercial diving work can be dangerous if not planned or managed well. Hazards in commercial diving work such as working under ships / hull cleaning in Singapore are addressed in the WSH Council’s Technical Advisory on Inland/Inshore Commercial Diving Safety and Health and the Singapore Standard SS 511 Code of Practice for diving at work. Some important safety measures include:

**Pre-dive:**
- Obtain permit to dive from the relevant authority or the owner of the dive site;
- Obtain permit to dive from the vessel being worked on;
- Ensure all potential energy/pressure differential areas are locked-out and tagged-out;
- Conduct a comprehensive Risk Assessment for all diving work activities;
- Ensure a dive plan is available for the planned work activities;
- Brief all parties involved in the jobs out including the vessel owner, master of the vessel and the dive boat personnel on the safe work procedures and emergency procedures;
• Establish the dive team, in accordance with SS 511 – Code of practice for diving at work comprising:
  - Diving Supervisor
  - Diver
  - Diver Attendant
  - Standby Diver and
  - Standby Diver Attendant

• Review competency of all divers and the diving supervisor involved in the job which include training certificates and associated certification, log books record for their experience and medical fitness to dive including fatigue consideration before the dive;
• Inspect all equipment in accordance with equipment standards to be used in the job including Surface Supplied Diving Equipment (SSDE) and Commercial Self Contained Underwater Breathing Apparatus (CSCUBA), communication equipment and monitoring equipment such as hat camera video records, and air purity test of compressor;
• Conduct pre-dive checks and record conditions of PPE such as hard hat, dive watch, divers’ helmet/mask, umbilical connection, divers harness and bailout checks;
• Ensure standby diver is available for immediate response and an injured diver recovery system is in place;
• Ensure emergency response plan is available and checked; and
• Ensure suitable access and egress of the water is available for the diver and standby diver.

**During the dive**
• Maintain effective communication and record all communications between divers in the water and the diving supervisor;
• Maintain diving operations log book accurately recording the activities carried out by the divers, including the time left surface, depth of dive, work carried out, time left bottom depth and time arrived surface;
• The diving supervisor must monitor environmental conditions such as tide/current, weather and stop work when conditions cause the environment to be unsafe to work; and
• Provide aid for situations such as equipment failure, adverse environmental conditions, medical illness, distress or injuries.

**Post-dive**
• Check and record the divers’ physical and well-being; and
• Check all Permit-to-Work that are in place.
**Risk Assessment**
Review and conduct a thorough Risk Assessment (RA) for all commercial diving works involving hull cleaning. Hazards and control measures identified should be communicated to the dive team and all relevant personnel. The RA should cover but not limited to the following areas:

**Environmental hazards**
This include the effect of sea currents, tides, tidal range and slack water on divers. Night diving is to be avoided where possible as poor visibility and fatigue can result in additional hazards. Storms or lightning may be a hazard to exposed personnel or equipment.

**Marine animals**
The presence of dangerous marine animals that may be found at the dive location should be ascertained before diving operations commence. The risks and treatment if contact is made with those dangerous marine animals should be included in the project risk assessment and dive plan.

**Entanglement in water**
Entanglement of divers’ lifeline and/or umbilical can occur if not suitably managed. Mitigation measures include:

- Continuous check during the dive that lifeline/umbilical is free from entanglement. This can be carried out by using line signals between the diver and attendant can ‘feel’ the diver moving at the end of the umbilical line.
- Management of the umbilical line by the attendant is carried out by ensuring only the length the diver requires to work at the job site is provided and any excess is retained on deck. The diving supervisor must ensure that the diver checks if his umbilical is free from entanglement on a regular basis during the dive.

**Supervision**
The dive sites should be inspected for safety lapses. There must be adequate supervision when underwater works are being carried out for adherence by the employees to the safe work procedures.

**Diver health condition**
Encourage diver to report to their supervisors if they are under medication, feeling unwell, or experiencing severe fatigue.
Further information

1. Workplace Safety and Health Act
2. Workplace Safety and Health (Risk Management) Regulations
3. Approved Code of Practice on Workplace Safety and Health Risk Management
4. Prevailing Singapore Standard SS 511 - Code of practice for diving at work
5. Technical Advisory for Inland Inshore Commercial Diving Safety and Health

* Information on the accident is based on preliminary investigations by the Ministry of Manpower as at 5 July 2018. This may be subject to change as investigations are still on-going. Please note that the information provided here is not exhaustive and for the benefit of enhancing workplace safety and health so that a recurrence may be prevented. The information provided is not to be construed as implying any liability to any party nor should it be taken to encapsulate all the responsibilities and obligations under the law.

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