IMCA Safety Flash 03/17

February 2017

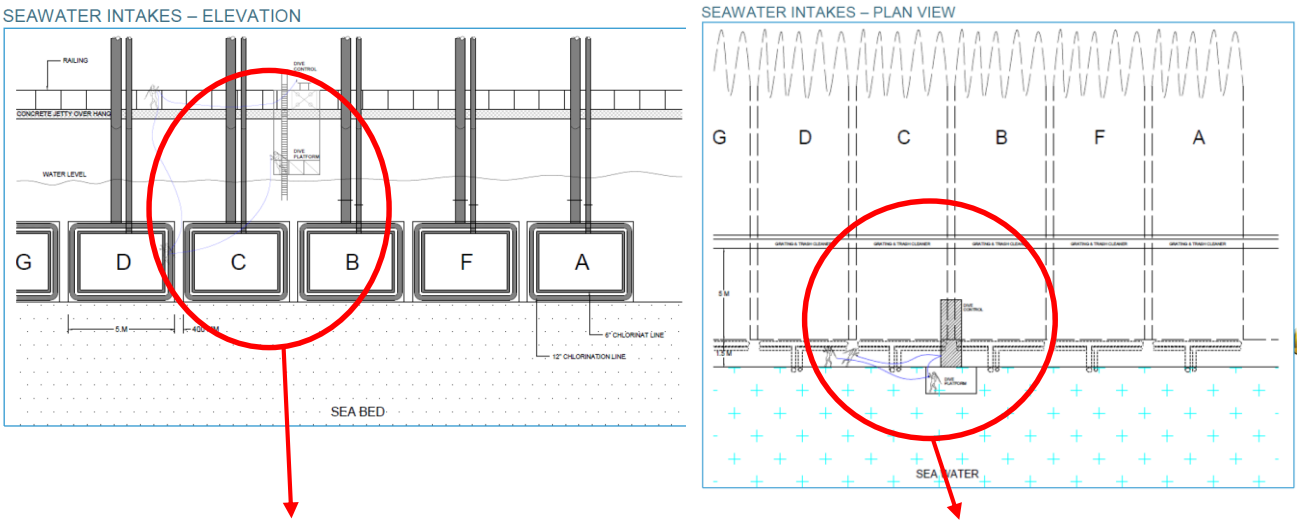
Focus: Diving Safety

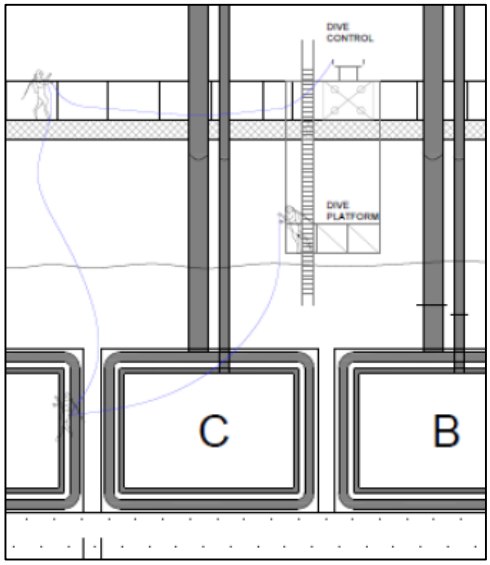
This safety flash refers to two diving-related items. The first incident, though inshore diving, was a potentially very serious near miss involving differential pressures and is therefore of interest to all in the diving community. The second incident is a timely reminder from NOPSEMA on the importance of thorough diving system audits.

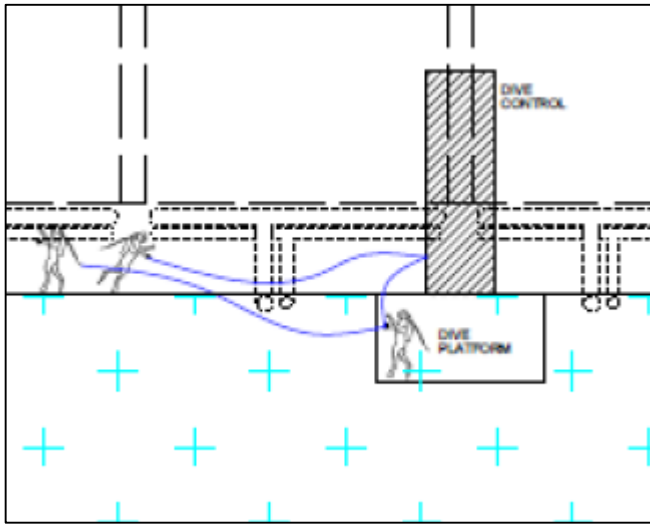
1 Near Miss: Unidentified Differential Pressure Led to Divers' Umbilical Getting Trapped

A member has reported an inshore diving near miss incident in which a divers umbilical became trapped and subsequently damaged – no divers were injured. The incident occurred when two divers were working on some underwater clamps associated with two chlorination dosing lines on either side of the entrance to a gravity fed seawater intake located in a culvert.

Each of a number of culverts at the location contained a seawater intake fitted with an automated grating and trash cleaning system recessed 5m from the main opening. The diving operation necessitated moving repeatedly back and forth across the 5m wide intake opening between the clamps. This allowed some slack to be unintentionally introduced into the divers deployed umbilical. After an extended period of incident free operations, one of the divers' umbilicals became entrapped with the automated trash cleaning system, resulting in the diver being pulled towards the intake. The 2nd diver cut the umbilical to facilitate escape and both divers ascended to the surface in a controlled manner without injury.







Our member's investigation revealed the following:

- The presence of an automated trash removal system was not communicated by the asset owners to the project team;
- As a consequence of this omission there was no system in place to ensure the automated trash removal system was effectively isolated;
- There was a "lock out/tag out" system in place for the seawater intake valves;
- The project risk assessment was not effectively reviewed on site to identify appropriate controls for site-specific hazards;
- The position of the dive tender was not relocated as the dive progressed across the face of the multiple intakes, meaning that excess umbilical was deployed in the water, increasing the potential for snagging.

Our member identified the following recommendations and corrective actions:

- Improvements were made to the project start up process to ensure that critical information related to automated systems is properly passed on;
- Physical barriers to be placed across the intakes;
- Lock out/tag out confirmation of the automated systems to be verified before resuming diving activities. This is captured in the Pre-dive checklist;
- Project manager to verify and confirm that the activity risk assessment has been reviewed on site by the team before resuming operations;
- Dive tender to be repositioned throughout the diving operations to ensure that the optimum amount of deployed umbilical is in the water column to minimise the likelihood of snagging.

IMCA notes that this was actually a **differential pressure incident** where the divers' line was drawn into the gravity fed seawater intake by the suction generated. This is an excellent example of the very serious (and often potentially fatal) risks faced by divers in differential pressure situations. In this case, the important point is that the pressure differential was *not identified*. Differential pressure situations are subtle and difficult to spot, widespread, and potentially deadly to divers. Vigilance is key to the prevention of such incidents.

Members may wish to review the following similar incidents (search words: *differential, pressure*):

- IMCA SF 14/11 – Incident 2 – *Identification of differential pressures subsea during diving operations*;
- IMCA SF 06/14 – Incident 1 – *Fatality during air diving operations*.

The following information will also be of use and interest:

- Association of Diving Contractors International (ADCI) video on the dangers of differential pressure: http://videos.adc-int.org/dangers-of-delta-p;
- UK Health & Safety Executive (UKHSE) Diving Information: Sheet No 13 *Differential pressure hazards in diving*;
- UKHSE research report: RR761 *Differential pressure hazards in diving*.

2 Quality Assurance of Diving System Audits

The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) of Australia has published Safety Alert 63 regarding the quality assurance of diving system audits.

"A number of NOPSEMA inspections have identified a trend in the standard of audits conducted on diving systems and equipment. Specifically, a number of operators of diving projects and diving contractors have failed to ensure diving system audits have been conducted to an appropriate standard. While reviewing the audits conducted by the diving project operators and the diving contractors, NOPSEMA's inspectors identified the following deficiencies:

- *Man-riding wire destructive test certification was not adequately assessed, resulting in the failure to identify that the percentage deterioration was greater than that permitted by the relevant International Marine Contractor's Association (IMCA) code/guidelines and therefore should have been replaced;*
- *Inappropriate application of a management of change process to justify the deferral of man-riding wire destructive tests;*
- *Utilisation of a self-propelled hyperbaric lifeboat (SPHL) with the connections for the emergency services (e.g. breathing gas, cooling, etc.) located in a place on the SPHL that was not readily accessible, and therefore not as required by the relevant IMCA and International Marine Organisation (IMO) codes/guidelines;*
- *Failure to make an emergency services umbilical available for SPHL connection to its life support package;*
- *A high pressure (200 bar) flexible oxygen hose was found during a NOPSEMA inspection to be too long, made up with joins and was damaged, however it was marked as compliant during an earlier audit;*
- *Older diving systems built to class have not been upgraded, where practicable, to meet current class requirements e.g. fire suppression systems within diving chambers unable to be externally actuated.*

Each of the deficiencies outlined above should have been identified and rectified as a result of the third party or in-house audits."

NOPSEMA notes that *"Failure to identify audit non-conformances associated with safety-critical elements of a diving system may result in an increased level of risk to the air and saturation divers. The non-conformance examples provided above have the potential to compromise the integrity of the system components and reduce functionality in an emergency. Any loss of integrity or system redundancy has the potential to result in serious injury or fatalities to divers and others involved in diving operations."*

The full Safety Alert can be found here.