IMCA Safety Flash 01/04

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These flashes summarise key safety matters and incidents, allowing wider dissemination of lessons learned from them. The information below has been provided in good faith by members and should be reviewed individually by recipients, who will determine its relevance to their own operations.

The effectiveness of the IMCA safety flash system depends on receiving reports from members in order to pass on information and avoid repeat incidents. Please consider adding the IMCA secretariat (imca@imca-int.com) to your internal distribution list for safety alerts and/or manually submitting information on specific incidents you consider may be relevant. All information will be anonymised or sanitised, as appropriate.

A number of other organisations issue safety flashes and similar documents which may be of interest to IMCA members. Where these are particularly relevant, these may be summarised or highlighted here. Links to known relevant websites are provided at www.imca-int.com/links Additional links should be submitted to webmaster@imca-int.com

1 Diver's Lost Gas Incident

Keywords: Gas

A member has reported a lost gas incident that occurred with two of its divers on a third party vessel. They do not normally dive from this vessel and were not involved in the maintenance of the diving system. Part way through a bell run, both divers reported a loss of main gas supply. It also appeared that the bell onboard gas failed to automatically operate through the MARA panel. The main gas supply was quickly reinstated to the divers by the actions of the bellman.

The member's investigation identified the following sequence of events:

1 Gauges in the bell panel had been changed from the manufacturer-supplied type of gauge that measures line pressure relative to the ambient pressure inside the bell to sealed units that measure line pressure relative to atmospheric pressure.

2 This change had not followed a management of change process and consequently its significance was not adequately assessed. As a result of this, vessel specific procedures were not updated and thus these contained inaccurate criteria.

3 Bell checks on this vessel followed the company's standard practice of creating vessel-specific bell checks based on the actual requirements of the specific bell, which in turn were based on this vessel's standard procedures.

4 During diving operations it was apparent to the divers that, following the vessel bell check, settings gave an inadequate gas supply pressure. This was adjusted as required by each diving team by increasing the flow pressure in excess of the stated 12 bar (the correct pressure setting being 12 bar above ambient). This adjustment was not communicated to the surface and was therefore not recorded.

5 A dive commenced to 100 msw with the bell at 85 msw. This should have required the diver's supply pressure to be set at 20.5 bar (8.5 + 12) because the sealed gauge did not subtract ambient pressure but it was set at 12 bar as stated in the bell check sheet. At depth, a supply to the divers was achieved by the bell man increasing the supply pressure prior to lockout.

6 During the dive the bellman re-adjusted the supply pressure back to 12 bar which was insufficient to adequately supply the divers as it only gave 2 bar of pressure above ambient. The divers lost gas and went on to bailout supply. The emergency onboard gas supply did not operate automatically as this had been set at 10 bar on the gauge as required in the bell checks. It thus did not have sufficient pressure to supply the divers.

7 The divers supply was quickly re-instated when the Bellman increased the supply pressure at the panel.

The investigation concluded that the equipment specification change had resulted in the requirement for a significant change to standard operating practices. However, as this had not been subjected to a management of change process, those required changes to operating practices had not been recognised or implemented.

The divers had identified that the gas supply pressure required adjusting from the levels stated in the bell checklist in order to obtain an adequate supply. This went unrecorded and was not communicated to supervisors.

This incident could have had considerably more severe outcomes than were experienced and it is suggested that the following lessons could be learned:

♦ The importance and value of following management of change procedures, particularly for any change to the original manufacturer's requirements.

- No equipment should be replaced (unless identical to the original) or modified without a competent person considering all of the implications. A dive system technician, even if very experienced, may not have the competence required for this consideration.
- Bell check procedures should include recording of diver main gas supply pressure and onboard backup, downstream of panel regulators;
- Divers should be reminded of the importance of communicating any changes or alterations to normal operating practice to the diving supervisor.

2 Gas Release from Pipeline During Diving Operations

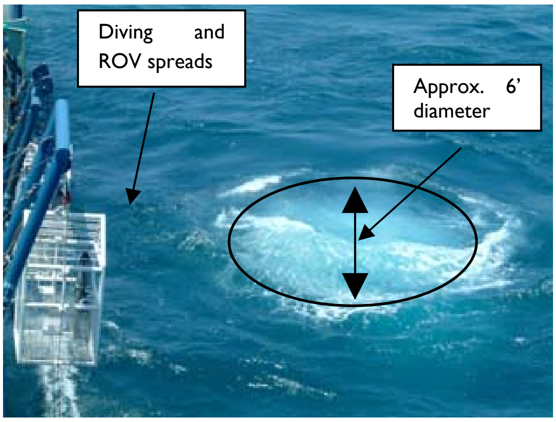
Keywords: Gas

We have recently learned of a gas release from a pipeline during a diving operation. Gas was released from the open flange face at the end of the 20 inch diameter subsea trunkline. The gas passed a gel slug that had been injected through a ¾ inch valve on the flange during the diving operation to install a pig launcher.

2.1 The Incident

On the day prior to the incident a 200 metre (approx) gel slug had been injected into the 20 inch subsea gas export pipeline in order to install a pig launcher. After this was done a request was made to increase the pipeline pressure from 33 psig to 38 psig to ensure a positive pressure in the line before removing the blind flange.

The following day when the diver had removed all but two of the bolts and the flange was lose and a couple of inches away from the end of the pipeline, the diver reported discharge from the open face and that bubbles of gas were clearly visible from the flange.



A few minutes later after he reported that he had a burning sensation on his skin, the diver was instructed to return to the diving bell. After the bellman reported a chemical smell and a feeling of nausea in the bell, the bell was flushed through and brought to the surface.

During recovery of the bell, the gel plug passed an increasing volume of gas to surface. The escaping gas was clearly visible in the area around the diving bell and remained visible for approximately 40 minutes until the pipeline was depressurised from the shore. It was fortunate that the diving bell was recovered to the surface just moments before the gas escape, as the bell was in close proximity to the open flange face.

The diver was treated for the skin irritation.

After the gas was no longer visible at the surface, an ROV was put into the water to monitor the open flange. After 24 hours and additional risk assessments, the flange was reinstated onto the pipeline.

The client company has reported the following:

2.2 What Went Well

- Calm reaction by the dive supervisor once the decision had been made for the diver to return to the bell.
- Medical assessment and follow on treatment of the diver

- Subsequent management support for thorough review of the project execution plans and procedures before continuing with the operation.

2.3 What Went Wrong:

- Lack of understanding of the gel mechanism. The gel slug was not designed to withstand pressure differential.
- The management of change process did not undertake sufficient engineering analysis before being approved.
- Lack of pressure control and monitoring mechanism during increasing the pipeline pressure, e.g. the scales of the gauges were not appropriate.
- The risk assessments of the work scope had failed to integrate the onshore aspects.
- The toolbox talk did not communicate the identified risks from risk assessment exercises to the divers undertaking the work.

2.4 Resultant Actions

The following resultant actions were identified by the client company involved:

1. Establish a completely integrated team with clear roles and responsibilities to execute the work scope. Ensure all parties involved understand the complete scope and the interactions
2. Reinforce the 'Stop the Job' practice.
3. Ensure that the risk assessment process is clear and effective. Provide additional training, coaching and facilitation if required.
4. Ensure risk assessments are adequately completed.
5. Ensure that there is complete integration of the project activities, particularly with combined offshore and onshore operation activities.
6. Ensure that the project work scope is planned sufficiently in advance to undertake meaning risk assessments.
7. Review permit to work system
8. Ensure full implementation of isolation procedures, and ensure that all personnel assigned are fully competent to use procedures.
9. The process of a formal management of change should be reinforced at further training carried out for the project team and all contractors involved with the work scope.

2.5 Key Message

An integrated, early understanding of the work scope is essential in ensuring effective risk assessments and to help manage future changes during execution.

3 Near-Miss During Connector Pressure Tests

Keywords: Pressure

A member has reported a serious near-miss event which occurred recently during a diving operation.

Divers had fitted a collet connector to the open end of a flooded pipeline and were testing the annulus between the seals within the connector to ensure that it had sealed correctly to the pipeline. A quick disconnect (QD) type hydraulic (male) fitting had been connected to the annulus port of the collet connector and a hydraulic test line run from the surface to apply test pressure of 900 psi. The QD male connector had an integral non-return valve, which would allow flow in both directions through a poppet arrangement on the male and female parts.

The test was applied and a successful result was achieved over the test period. The pressure was reduced to zero on the surface and the test hose removed, by undoing the female QD from the male part fitted to the collet connector.

When the diver started to unscrew the male fitting from the annulus port, it blew off, as a result of entrained pressure within the void of the annulus.

The fitting was lost in the mud on the seabed, so it could not be examined afterwards. However, the most likely cause of the event appears to be due to failure of the poppet arrangement on the QD. Such failure had not been taken account in the procedure or the risk assessment.

The company has determined that an additional check should be made by the use of a tee and needle valve – a check which it will introduce in future onto the annulus port/QD part of the circuit, so that pressure can be confirmed as being bled to ambient before disconnection of the hose from the QD fitting.

The company has noted that this configuration may also be applicable for other pressure testing situations, to confirm that the pressure has been brought to ambient, but, as a minimum, procedures and risk assessments should evaluate whether there is the possibility of entrained pressure through blockage or through the failure of a hydraulic valve and should take that possibility into account when removing the test fittings.

4 Oxygen Near-Miss

Keywords: Gas

A member reports the following near miss whereby a worker was observed blowing oxygen into the welding hood of a co worker who was welding on a pipe. This was stopped immediately.

All three occupants of the tented area where work was taking place were interviewed and stated that the welder's hood was 'fogging up' and that the oxygen was being used to keep the lens clear. It was then explained to them that the potential existed for a flash fire in the welder's clothes, under his hood and in his lungs as a result of the high concentration of oxygen in those areas.

The company involved has taken the following actions:

- Immediate stoppage of work;
- Instructions to the prime contractor to conduct a safety 'stand down' with its sub-contractor immediately and with its own key personnel when they returned to work the following Monday;
- Inclusion of this subject matter in site-specific training for all newly employed workers on the project;
- Instructions to other sub-contractors doing similar work to have safety 'stand downs' to get this important message across.

The company notes that although oxygen in normal concentrations is necessary to sustain life, it can also be potentially hazardous in concentrations above normal breathing amounts or in conditions where high levels of heat or a major ignition source are present.

The company has restated the importance making clear potential hazards at each worksite through training and familiarisation and noted the danger of assuming awareness of 'obvious' hazards.