

Fatality at a drilling rig during testing operations.

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Introduction:

An incident took place at drilling rig during testing.

This caused serious forehead injury to one person. The injured officer was immediately transported to the hospital in the emergency vehicle. He was declared brought dead in the hospital.

Brief description:

The exploratory well was drilled to target depth of 4373 meters. 7" production liner was lowered with shoe at 4372 meters and cemented. After hermetical testing of the well, 7" liner was tie backed to the surface as the landing collar was to be drilled because the lowermost hydrocarbon bearing interval was found to be against it as per logging data interpretation.

After drilling landing collar, 7" casing shoe and cement above it failed while negative integrity testing.

The cement column and 7" shoe was further cleared and a cement plug was placed at the bottom (4371 - 4344 mts). The plug was tested at 4000 psi with 1.98 gm/cc mud.

7" scrapper was lowered to bottom. BOP was replaced with 15 M X-mas tree.

1.98 gm/cc drilling fluid displaced with 1.50 gm/cc drilling fluid and well was observed for 24 hours.

Started displacement of 1.50 gm/cc mud with water by pumping through 7" X 3 ½" annulus with the Rig mud pumps. The pumping pressure increased to 2550 psi after displacement of approx. 2/3rd annulus volume.

Pumping was stopped and main valves adjacent to the X-mas tree were closed. Pressure gauge on the annulus was showing 2550 psi pressure.

High pressure Fracturing unit was lined up for further displacement. Return line was flushed with water.

While opening the main valve adjacent to the X-mas tree (Having 2550 psi differential pressure), suddenly loud sound was heard and the victim was found lying on the ground near the cellar pit with bleeding from his forehead. The Valve was closed immediately.

The victim was immediately taken to the hospital where he was declared brought dead.

Observations:

1. The pumping line and return line network was made of 2" chikson lines having hammer union connections, low torque valves and swivel joints.
2. The line network was not anchored / secured.
3. The main valve (annulus valve in this case, having 2550 psi differential pressure), in the pumping line between fracturing unit and 7" X 3 ½" annulus, was opened without equalizing the pressure on both sides.
4. Persons were standing in the area of pipe lines network which were not anchored and were in use for high pressure operations.
5. SOP for this specific operation was not available at the site.
6. There was no safe and clear escape route to be used in emergencies.

7. The testing programs issued by the 'Multi-disciplinary Team' to the rig personnel were having only operations related instruction. These programs were not having safety related instruction for each activity of the program.
8. Housekeeping near the cellar pit area where the line network was made was not up to the mark.

Root cause of the incident:

The root cause of the incident was non-adherence to the 'Standard Operating Procedures'.

- The line network was not anchored and secured. This is the basic safety practice that the lines are to be firmly anchored and secured prior to being put into operation.
- The isolation valve was opened without equalizing pressure on both sides.
- Personnel were standing near the lines at the time of high pressure pumping operation.

The isolation valve was having 2550 pressure on X-mas tree side and zero pressure on pumping unit side. As the isolation valve was opened, a sudden high pressure pulse caused severe jerk in the unanchored & unsecured pipe line network.

The small free portion of return line having swivel joint and hammer union in open condition may have lifted up dangerously due to the severe jerk in the pipe line network.

The victim, standing near this line, may have been hit by the nut of the hammer union on his forehead.

Recommendations:

- I. SOP for each operation being carried at the rig should be available at the site and shall be followed diligently.
- II. Lines shall be secured and anchored firmly prior to operation.
- III. The line network should be pressure tested at maximum anticipated pressure + 10% prior to operation and documented.
- IV. It shall be ensured prior to operation that no unnecessary personnel is present near the lines.
- V. Before opening a valve having pressure, it shall be ensured that pressure is equalized on both the sides.
- VI. It is recommended that there should be minimum joints in high pressure line network.