11 fatalities

Deepwater Horizon Offshore Disaster of 2010

The assumption that finding and then correcting the "root cause" of a problem will prevent future problems from occurring is not entirely accurate. That type of right-answer thinking ignores the simple fact that all the causes of an incident are required to produce that incident. Too often, accident investigations blame a failure on just one cause - in what is really a complex system. A more comprehensive understanding of the incident can reveal other causes that might contain more and even better solutions.

Problem

Step 1

Problem

Why did it happen?

Step 2

Analysis

What will be done?

Step 3

Solutions

"Complex systems almost always fail in complex ways." - Columbia Accident Investigation Board

Detailed Cause Map Used as a case study in the workshops.

8 Key Findings - numbered on Cause Map

1. Cement failure
2. Shoe track barrier failure
3. Incorrect assessment of negative-pressure test
4. Influx not recognized by crew
5. Hydrocarbons diverted to mud-gas separator
6. Gas vented onto rig
7. Fire and gas system did not prevent ignition
8. Blowout preventer did not seal well

DEEPWATER HORIZON Cause Map

Even the mid-level Cause Map below can begin to demonstrate the complexity of this case. The oil spill began when the sinking rig damaged the well head and riser. The well could have been shut using the emergency blow out preventer (BOP) system. However, the BOP system was unresponsive because the explosion severed communication lines controlling the system. Backup systems should have then activated the BOP's Blind Shear Ram automatically, but failed to do so effectively.

Looking more closely at the explosion, the presence of a large hydrocarbon gas cloud provided the fuel for the fire. That cloud was present because the gas was vented into the mud-gas separator (MGS) system, instead of overboard as prescribed. The crew was unaware of how massive the kick was, and incorrectly used the MGS system.

The well blew out because of the hydrocarbon kick, but also because the crew didn’t act to stop it in time. Why was there a kick? First, the well seal failed due to a poor cement job. One of the functions of a well is to contain the oil and gas within the ground. Second, the crew underbalanced the well as part of their plan to temporarily abandon it.

Copyright ThinkReliability 2012

For a free copy of our Root Cause Analysis Template in Microsoft Excel, used to create this page, visit our web site: Houston, Texas 281-412-7766 ThinkReliability.com