Central cause: failure of cement barrier in the production casing string

Swapping of cement and drilling mud (“fluid inversion”) in the shoe track (the section of casing near the bottom of the well)

Contamination of the shoe track cement

Pumping the cement past the target location in the well, leaving the shoe track with little or no cement ( “over-displacement”)

BP and Transocean personnel onboard the Deepwater Horizon missed an opportunity to remedy the cement problems when they misinterpreted anomalies encountered during a critical test of cement barriers called a ‘negative test’.

Configuration of the Deepwater Horizon general alarm system and the actions of rig crew members on the bridge of the rig contributed to a delay in notifying the entire crew of the presence of very high gas levels on the rig. Transocean had configured the Deepwater Horizon’s general alarm system in “inhibited” mode, which meant that the general alarm would not automatically sound when multiple gas alarms were triggered in different areas on the rig.

Despite a number of additional anomalies that should have signalled the existence of a kick or well flow, the crew failed to detect that the well was flowing until 9:42 p.m. By then it was too late – the well was blowing drilling mud up into the derrick and onto the rig floor. If members of the rig crew had detected the hydrocarbon influx earlier, they might have been able to take appropriate actions to control the well.

A forensic examination of the BOP stack revealed that elastic buckling of the drill pipe had forced the drill pipe up against the side of the wellbore and outside the cutting surface of the Blind Shear Ram blades. As a result, the BSR did not completely shear the drill pipe and did not seal the well.

Other contributory factors:
(i) Scheduling conflicts and cost overruns.
(ii) Personnel changes and conflicts.