

711 Well control Incident

Location 711
Customer Shell
Date/Time 23rd December 2009 / 17:10 hrs
Loss 11.2 Days £5.2mm to recover
0.9 MT OBM spilled to sea
Transocean Loss of reputation

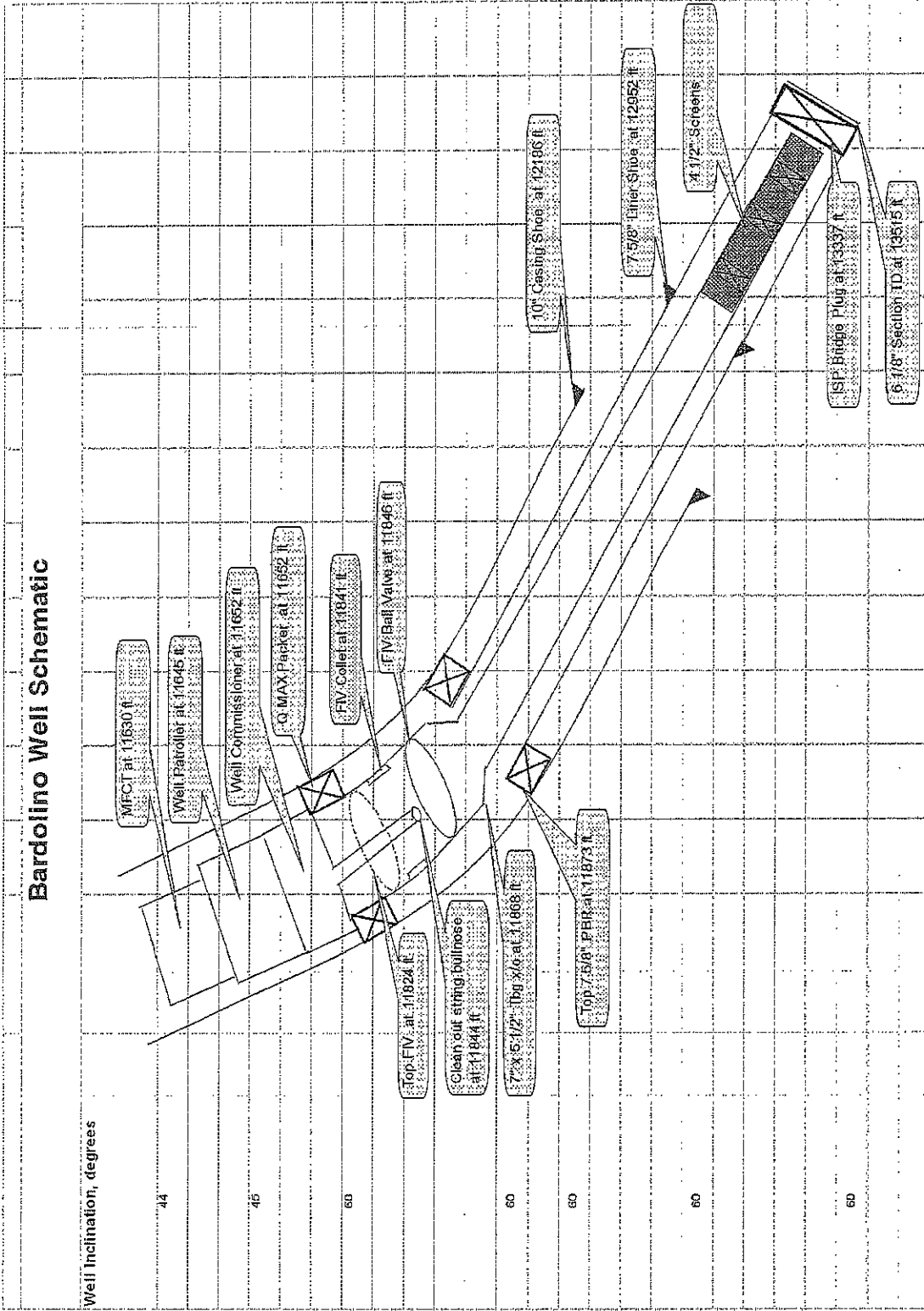
What Happened?

- **Uncontrolled release of hydrocarbons on the drill floor due to:**
 - **unplanned activation of the down hole barrier**
 - **failure to notice kick indicators**
- **95 bbl mud evacuated from the marine riser and 0.9 MT spill to the sea**

Primary Root Causes:

- **Schlumberger internal lateral learning mechanism weakness**
- **Well clean up roles and responsibilities inadequate**
- **Lack of clear well control procedures**
- **Risk assessment weakness in planning and execution**

Well Schematic.



DRAFT (N C Lyne)

Background info.

- The well had been drilled to TD with 720 pptf OBM. Sandscreens were installed as the lower completion. Barrier isolations to the reservoir were a Formation Isolation valve (FIV), 7" / 5 ½" tubing and a liner packer.
- The completion fluid was base oil, so a full well clean up was planned in two stages to seawater and then to base oil.
- The lower barrier envelope was pressure tested in mud and inflow tested in base oil successfully with 4300 psi pressure differential across the barrier.
- Problems experienced in unseating the test packer post inflow test
 - Unable to pick up and unseat test packer
 - Had to function second circulation tool in string to remove base oil and 4300 psi pressure in drill string.
 - Required to apply torque in drill string to release
 - Evidence of string plugged
 - Evidence of hold up in well 3-4 ft from land off position with 10 k restriction.
 - Tail pipe hung up at FIV – not recognised.
- Investigation team believe that the FIV was mechanically shifted at this point.

Description of Incident

- The well was being circulated to seawater as per well programme and on site instructions and pit plans. This included base oil, Soapy Hi-viscous pills and then seawater.
- After the base oil had been displaced into the annulus the well started to go under balanced to the reservoir.
- The circulation continued. The seawater was pumped via one pit with a constant top up (no volume control) as the pump rate increased to 10-12 bbl/min
 - An increase in flow show was noticed by Sperry mud logger
 - An increase in the pits was noticed on the rig monitoring PVT
 - Problems were perceived at the shakers
- Different Interpretation were made due to: changes in clean up parameters on the one pit fill, perceived rig trimming issues; and potential blockage in lines from shakers to pits.
- With continuing problems, decision made to decrease pump rate and then the well was shut in as the influx came to the BOP and the mud started to evacuate at the rotary table.

Description of Incident

- **The well was successfully closed in as per Transocean and Shell Well Control Procedures (Hard shut in method)**
 - 90 bbl mud displaced volume from marine riser onto rig
 - Commenced environmental exercise to limit discharge mud to sea – 3 bbl lost
 - Rig went to muster
 - Start clean up rig and preparing for well kill
 - Gas on surface
- **Drill pipe and annulus pressures taken – showed direct communication to the reservoir. (4000 psi on annulus and 3000 psi on tubing)**
- **ER response conducted from Transocean offices**
- **Plan to kill well by Wait and weight method (SID prepared)**
 - Insufficient mud at correct mud weight available
 - Required to weigh up and treat available mud on rig
 - Required boat to manage pits logistics and return additional mud

Description of post Incident

- **Plan changed and decision made to perform Driller's kill method (No revised SID)**
 - Unable to weigh up mud in sufficient time frame
 - Criticality seen in reducing high pressures from surface equipment
 - Communications with onshore verbal agreement only
 - Verbal THINK plan held to manage operations
- **Driller's method wrongly identified as well control method**
 - Plan was to pump mud into drill string, but it contained seawater, so requirement to maintain drill pipe pressure would have led to the breakdown of the formation.
- **Operation stopped and management of change held. Step down chart and correct procedure agreed and well circulated under controlled conditions to intermediate mud weight then final kill weight fluid. (26/12 - 03:00 hrs)**

Summary of Learning

Tested barriers can fail

risk awareness and control measures need to be implemented
The risk perception of barrier failure was blinkered by the positive inflow test

Learning's from Schlumberger FIV equipment failure were not adequately captured in specific equipment procedures to be incorporated into individual well risk assessments

Fluid displacements for inflow test and well clean up operations are not adequately covered in our well control manual or adequately cover displacements in under balanced operations.

Well Control preparedness was not compliant in completion phase –
change in mindset

- No pre-kick sheets for well clean up operations
- No SCR' s taken for the clean up string
- No well control drills for 10 days (required weekly)
- No consideration of crew changes and well control drills

Summary of Learning

Tested barriers can fail. Are we ready?

WHAT IF?

- High vigilance when reduced to one barrier underbalanced.
- Closed pits for displacements.
- Management of pits – remember WC requirements.
- Recognise when going underbalanced heightened vigilance.
- WC drills based on risk not just weekly routine.
- Highlight what are the kick indicators when not drilling.
- Maintain kick sheets.
- Think if SCR' s are required when not Drilling.
- Adequate mud to kill the well?