RO # 9

A Gas Blowout Tamed by Team CMT, ONGC

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Well was drilled & completed in the year 1988

Producing Gas at the rate of 45000-50000M3/day since then

Last work over done in the year 1997

Present work over was planned to convert the well in packer completion
Incident

- Well was subdued with 1.05 sp. gr. High viscous bentonite gel and the X-MAS tree was removed for installation of 7 1/16” BOP.

- Observed well flow, rig crew tried to tightened the X-MAS tree but the intensity of flow increased.

- Well was flowing dry gas vigorously, the fire tenders were mobilized to spray water on the gas flow to avoid fire.

- The area was cordoned off

- Gas Blowout at Well RO # 09 was reported at 20.30 hrs on 14\textsuperscript{th} June’2011 and Team CMT reached site on 15\textsuperscript{th} June at 1430hrs
Envisage plan to kill the well

Flow of gas from well on 15th June 2011 Morning
Laid Line from well to cementing unit
Plan was to pump water followed by mud to control the well
Revelation on pumping

When mud was pumped it came out immediately from the X-MAS tree flange
Observed no mud flow from crown valve
High Pressure Gas Flow Cutting Whole X-mas Tree
Damaged Tubing Hanger Flange
7-1/16” Flange Completely Gas Cut
Lower Master Valve Completely Gas Cut
Sharp Cut In Flow Arm Valves
RO-9 MOVIE
Lesson learnt & SOP to be followed

- Due to hole in tubing at 899 mts. Well was not killed properly.

- The well killing should be done by following a proper well killing method like Wait and Weight, Driller’s method or Volumetric method whichever is suitable for the particular well, using a choke manifold to apply back pressure while killing.

- While killing the well with direct circulation the volume of the fluid pumped in and return to the surface should be monitored closely specially in gas well.

- Any abnormality like early return or return after calculated well volume should be analyzed and should be brought to the notice of the senior officers before proceeding for further operations.
Lesson learnt & SOP to be followed

• Before opening the studs of the Xmas tree, it is to be ensured that well is fully subdued by keeping the well under observation for minimum of 2 hours in case of gas wells to check gas migration, if any.

• While going for work over operations ascertain whether tubing hanger is in the well or not.

• Xmas tree to be removed in two parts. First remove the top assembly leaving master valve with the bottom flange of the Xmas tree on the well head, till it is ensured that well is completely killed. So in case of any flow the master valve can be closed or installed easily.
Questions Please?
Artesian activity
At
well # TKAB, Silchar
Well Details

- Rig E-1400-12
- Well # TKAB
- Spudded on 29.03.10
- Target depth: 3500 Mts
Well Details

• 20” casing – 503 mts. cement rise up to surface.
• 13-3/8” casing – 1795 mts. Cement rise 500 mts from bottom.
• 12-1/4” hole drilled up to 2387 mts.
Chronological Sequence

- Well Drilled up to 2387 mts.
- Last ROP was 47 m/min.
- Mud weight in use was 1.20 sp. gr.
- P/O for wiper trip upto casing shoe at 10:45 AM
- Water flow in cellar pit was observed at 11:10 AM
- There was no activity from well bore.
Chronological Sequence

- For safety BOP was Closed
- Recorded SIDPP was Nil
- Flow from cellar pit intensified intermittently up to rig floor.
- CMT mobilized from Ahmedabad & Sivasagar.
- Evacuated personnel from drill site for safety.
- Due to massive flow soil below foundation started eroding.
Observations

- Observed big wooden pieces coming out from cellar pit area with the flow of water.
- LEL was maximum up to 6 to 7% near cellar pit.
- Huge crater was formed below main foundation.
- Both side foundation parted off and displaced.
- Rig mast toppled at 1815 hrs. on 04.08.10
- Drill site area was flooded with knee deep water.
Recharge Area for Artesian Aquifer
Inspection at Drill Site

- No hydrocarbon or gas detected in flow area,
- Salinity of flowing water was 2000-2100 ppm.
- Mast toppled towards drillers side.
- Foundation bolts were sheared off from A-frame.
- Drill pipe below Kelly parted off due to toppling of mast.
- Drill string fell into the well bore after parting.
The Aftermath
Foundation parted off
Perforated Pipe Placed At The Time Of Making Foundation
Wooden Pieces Came Out From Cellar Pit
Observations

- Due to heavy rains in hillocks the artesian aquifer got charged.
- No activity observed in wellbore during flow from cellar pit.
- Continuous rain fall from April’10 to July’10 (3400mm double than normal).
- Water flow from cellar pit lasted for 30 hrs.
Uncontrolled water flow occurred due to artesian effect due to incessant rain for last four months in nearby hills, which charged up the artesian aquifer and well bore below 30” conductor casing got connected to water recharge zone.
Recommendations

- Avoid making foundation where top soil is unconsolidated or near a river bed.
- To prepare foundation on unconsolidated soil proper soil testing and foundation to be made by RCC.
- If site is lying in an artesian effected area, an additional water well should be drilled to suitable depth to relieve the artesian pressure.
Probable Cause of the Incident

Probable cause 1: Flow from the 12 ¼” well bore due to swabbing or improper hole fill up during pulling out.

Probable cause 2: Accumulation of formation fluid/gas between 13 3/8” X 20” annulus, and when the pressure exceeded it fractured the 20” casing shoe and formation fluid/gas percolated behind the 20” casing and surfaced out from cellar pit resulting in flow of ground water from cellar pit.

Probable cause 3: Artesian Effect, pressure exceeded in the hills, resulting in artesian activity from the cellar pit.
Deliberations On Causes

- There was no activity from the well bore during the shallow water flow and even after the mast toppled and Kelly was disconnected from the string when drill pipe connected below it sheared off from the string; it clearly indicates that there was no kick from the well bore.
- No presence of gas/ hydrocarbon in the out coming flow around cellar pit area clearly shows that the uncontrolled flow is from very shallow depth.
- The salinity of uncontrolled water was about 2000ppm which is almost equal to technical water; had it been from well bore from a deeper depth the salinity would have been much higher, indicating that the origin of flow is from a sweet water zone.
- The annulus valve of 20” casing was found to be in open condition and no flow was observed from the same.

Probable cause 1 & 2 ruled out
The well was spudded on 29.03.2010 and while drilling the surface water zone and below no well kick was observed, however the rig lies very close to mountains and there has been continuous rain in hills form last four months i.e from April 2010 to July 2010, and the hydro static head in the water reservoir of the hills must have been increased substantially in this period which might have been connected due to artesian effect with formations below where the well TKAB was being drilled. Probable cause 3 is the most possible cause of the incident.
THANK YOU