JRC - Learning Opportunity Notification (LON) - 008

Incident Details	
Incident	Montara (West Atlas)
Date of Incident	21-Aug-09
Location/Country	Timor Sea, Australia
Type of Incident	Control of Well
Offshore/Onshore	Offshore
Asset Type	Fixed Platform
Asset Status	Well-Drilling
Immediate Cause	Inadequate Barriers
Similar Root Cause Incidents	LON-006
Date Updated	22-Jun-23

Incident Impact	
People	0 injuries / fatalities
Environment	Pollution (estimated up to 30,000 bbls of oil spilt)
Asset (adjusted claim at the time of loss)	USD $300 million (Property Damage) USD $125 million (OEE)
Reputation	Major

Incident Description

The Montara Development Project consisted of production licences AC/L7 (Montara field) and AC/L8 (Skua and Swift/Swallow fields) that are located in the Timor Sea in between 76 to 90 m water depth and approximately 650 km west of Darwin and 250 km northwest of the Western Australia coastline. Facilities at the location included an unmanned Well Head Platform (WHP) and a Floating Production, Storage and Offloading (FPSO) vessel for onward processing.

At time of loss, the development project was 100% owned and operated by PTTEP, Thailand's national petroleum E&P company, through its wholly owned Australian subsidiary PTTEP Australasia (Ashmore-Cartier) Pty Ltd (PTTEPAA). The well development plan involved nine producing wells; four in Montara, two in Skua and three in Swift/Swallow. The West Atlas jack-up drilling rig (owned and operated by Atlas) was employed to undertake the drilling works.

From January to April 2009, the West Atlas rig was positioned over the Montara WHP and the Montara Platform wells were batch drilled in two sets prior to the installation of the platform topsides. Each production well was drilled with a horizontal section into the reservoir, set and cemented with 9⅝ inch casing displaced with inhibited seawater. The wells were temporarily abandoned (suspended) and the West Atlas rig relocated to open water locations until installation of the jacket topsides was completed.

The suspension plan included a change in program to install 13⅜ inch and 9⅝ inch Pressure Containing Corrosion Caps (PCCC's) to the top of two wells at the surface hanger. The PCCC's replaced an originally planned shallow set 9 ⅝inch cement abandonment plug. The PCCC's were intended to seal the 13 ⅜inch and 9 ⅝inch annuli and were covered by a 20 inch trash cap.

The West Atlas returned to the Montara WHP on 19th August 2009 to tie-back the suspended wells. The approved Drilling and Completion Program (dated 30th June 2009) called for batching the tie-backs by casing string (all 20 inch followed by the 13 ⅜ inch and 9 ⅝ inch).

The first well for tieback was H1. The 20 inch trash cap was removed and the well top visually inspected by a PTTEPAA Drilling Supervisor. A 9 ⅝ inch PCCC was installed but not a 13 ⅜ inch PCCC. The 13 ⅜ inch PCCC was required as per PTTEPAA's suspension program and in compliance with the PTTEP barrier policy. Significant scale and corrosion was seen on the 13 ⅜ inch mud line suspension (MLS) hanger internal thread with cement debris on top of the 9 ⅝ inch PCCC. The absence of a 13 ⅜ inch PCCC had allowed corrosion to the internal casing thread.

PTTEPAA drilling personnel changed the 20 inch tie-back program in order to run a clean-up brush on the 13 ⅜ inch MLS hanger thread to be performed prior to running the 20 inch tieback casing. Running a 13 ⅜ inch brush required removing the 9 ⅝ inch PCCC. The 9 ⅝ inch PCCC was removed, the brush run, 13 ⅜ inch threads cleaned and brush laid down. The 20 inch tie-back program on H1 resumed without re-installing the 9 ⅝ inch PCCC. Upon completion of H1 20 inch tie-back, a loose hatch cover was placed over the new 20 inch casing on H1 and the rig skidded to next 20 inch tieback.

In the early hours of 21 August 2009 at approximately 05:30 hrs, the rig was retrieving the 20 inch tie-back cut off from another well (H4) when an influx of formation fluids into the borehole, also known as a "kick", was detected in the H1 well at the Montara Wellhead Platform (WHP). The oil and gas had travelled a distance of over four kilometres from the reservoir beneath the seabed. This initiated gas alarms, emergency response activity and muster of personnel onboard. This initial kick was a relatively small volume estimated as 40-60 bbls of fluid and was short lived. Following the subsidence of this activity and an assessment that the immediate danger had passed, the all-clear was ordered, musters released and emergency response stood down.

A decision was made to run a Halliburton packer into well H1 to secure the well. However approximately two hours later, just as this activity was set to begin the H1 well kicked again with such force that a column of oil, fluid and gas was expelled from the top of the well, through the hatch on the top deck of the WHP, hitting the underside of the West Atlas drilling rig and cascading into the sea i.e. an uncontrolled kick, otherwise known as a "blowout". Management of emergency response activities were in accordance with the rig emergency response plans, culminating in the safe abandonment of all personnel from the drilling rig.

In response to the blowout, PTTEPAA decided two days later on 23 August 2009, to drill a relief well with aim to intercept the blown out H1 well. PTTEPAA contracted the Atlas owned West Triton jack-up rig to drill the relief well, which at this time was located in Singapore. The West Triton departed on 27 August 2009 and arrived at location in vicinity of the Montara WHP on 11 September 2009. On 13 September 2009, the West Triton commenced relief well drilling, located approximately 2km from the West Atlas.

After four unsuccessful attempts and approximately 10 weeks after the blowout, the relief well successfully intercepted the H1 Well on the morning of 1 November 2009. A combination of heavy mud and seawater was pumped into the well to regain well control. During these activities, on the same day of interception, fire broke out on the WHP and spread to the West Atlas rig. There was some speculation as to whether the interception activities of pumping seawater may have inadvertently led to a more flammable mixture of fluids being brought up out of the well leading to the ignition. The fire persisted until 3 November 2009 when it was finally extinguished upon fuel source isolation. Both the WHP and jack-up rig were a total loss.

Activities to secure the H1 well followed including pumping of cement downhole and setting of isolation packers at specific depths of the well. On 13 January 2010, PTTEPAA reported that operations to plug and secure the H1 well were completed.

In the 10 week period between the blowout initiation and successful interception, oil and gas continued to flow unabated into the Timor Sea. Patches of sheen or weathered oil could have affected at various times an area as large as 90,000 square kilometres. PTTEPAA estimated up to 30,000 bbls of oil were spilt over the course of the incident, although spill response prevented oil from reaching the shores of either Australia or Indonesia. Spill response was stood down by 3 December 2009.

Incident Analysis and Findings (including Causal Factors)

The Montara Inquiry concluded that PTTEPAA did not observe sensible oilfield practices at the Montara Oilfield prior to the blowout incident. Major shortcomings in the company's procedures were widespread and systemic, directly leading to the blowout. The below summary is a combination of the findings from the Montara Commission of Inquiry and the February 2010 Investigation Report produced by Seadrill.

Failure to comply with procedures
The predominant root cause is non-compliance of PTTEPAA Well Construction / Integrity standards and barrier policy for long term well suspension by PTTEPAA in March 2009. These failures included defective installation of a cemented shoe in the 9⅝ inch casing of the H1 well (intended to operate as the primary barrier against a blowout) and failure to install a PCCC on the 13 ⅜ inch casing string of the H1 well (intended to operate as a secondary barrier against a blowout).

Training and Competency
There was inadequate knowledge and supervision over displacement of the 9 ⅝ inch casing cementation. The acts and omissions of PTTEPAA personnel, both on-rig and onshore, were directly responsible for the creation and non-detection of the defective cemented casing shoe. Both on-rig and onshore personnel from PTTEPAA were involved in the creation of this defect.

An indirect and systemic factor which contributed to the blowout was widespread misunderstanding on the part of PTTEPAA personnel as to the barrier status of the displacement fluid contained within the 9 ⅝ inch casing in the H1 Well. Misconceptions as to the status of the casing fluid influenced PTTEPAA's approach to well control. Both on-rig and onshore personnel from PTTEPAA wrongly considered that the fluid could be relied upon as an effective barrier against a blowout. This failure set in motion the influx to the well whilst it was suspended.

Leadership and Operating Integrity
Personnel from PTTEPAA were responsible for the decision to remove, and not re-install, the 9 ⅝ inch PCCC. However, Atlas' OIM did not take any steps to ensure that the 9 ⅝ inch PCCC was re-installed, despite being aware of its removal. In respect of these failures the largest share of responsibility must be borne by PTTEPAA rather than Atlas. Under arrangements agreed between them, PTTEPAA took on primary responsibility for well control, and in its day-to-day operations it did not in fact rely upon Atlas for expert supervisory oversight of well control operations.

Insufficient Risk Assessment process
A factor which is likely to have indirectly contributed to the blowout is that a sufficiently detailed risk assessment was not undertaken by PTTEPAA in relation to the general topic of use of PCCCs as secondary barriers against a blowout, particularly in the context of batched tie-back operations which were to occur at Montara. In particular the PTTEPAA personnel wrongly thought that the PCCCs in question were designed to operate as barriers against a blowout. Had the use of PCCCs been properly risk assessed a decision would probably have been reached to rely upon some other form of secondary barrier such as a cement plug (original intent). In that event, it is unlikely the blowout would have occurred.

Insufficient barrier testing
The PCCC used in the H1 well should have been tested by PTTEPAA soon after installation. However, no instruction was given by PTTEPAA to carry out such a test. Had such an instruction been given it may have come to light that the manufacturer did not endorse any post-installation test for barrier integrity and at that point in time there was no method or equipment available to reliably test the PCCC after installation. That may have prompted a review of the use of PCCCs as barriers.

Insufficient handover communication process
There were a number of significant deficiencies in PTTEPAA's management systems for recording and communicating information within the company - between personnel working day and night shifts, between personnel at the time of hitch handover (usually on 21-day cycles), between on-rig and onshore personnel, and between onshore personnel. These deficiencies were, in aggregate, an important systemic factor which indirectly contributed to the blowout.

Insufficient Regulatory Action
Well control practices approved by the delegate of the Designated Authority (DA), the Northern Territory Department of Resources (the NT DoR), most likely would have been sufficient to prevent the blowout if PTTEPAA had adhered to them and to its own Well Construction Standards. However, the NT DoR was not a sufficiently diligent regulator: it should not have approved the Phase 1B Drilling Program for the Montara Oilfield in July 2009 as it did not reflect sensible oilfield practice; it also adopted a minimalist approach to its regulatory responsibilities. The way the regulator (the NT DoR) conducted its responsibilities gave it little chance of discovering PTTEPAA's poor practices.

Root Causes

Equipment Failure				Human Performance				Other	
Repeat Failure		Unexpected Failure		Human Engineering	X	Training	X	Sabotage	
Preventive/Predictive Maintenance				Procedures	X	Management System	X	Natural Peril	
Design	X			Communications	X	Quality Control	X	Other	
Equipment/Parts Defective				Immediate Supervision	X				

Lessons Learned

Well Design, Construction and Control Practices - A minimum of two independent and tested barriers should be in place at all times (including during batched operations) whenever it is reasonably practicable to do so. Well construction and management plans, and drilling programs, should include provision for testing and verifying the integrity of all barriers. It should be standard industry practice to re-test a cemented casing shoe whenever the plugs do not bump, or the float valves apparently fail.

Leadership - Achievement and maintenance of well control should be written into the job responsibilities of key personnel, at every level up to and including CEOs.

Risk Assessment Process - If a risk assessment or compliance review is triggered by the happening of a pre-determined event, specific consideration should be given to whether a 'hold point' should be introduced such that work must cease until the problem is resolved. As soon as a risk of barrier failure arises, no other activities should take place in the well other than those directed to removal of the risk.

Training and Competency - Consistent well control training programs are essential for all staff associated with drilling and completion activities including operator and contractor staff alike. Training should ideally include for sound well construction, integrity, kick detection and kick response as relevant to the field development.

Emergency Response - Memoranda of Agreement should be entered into between operators in relation to provision of emergency assistance in the event of blowouts.

Regulatory Oversight – Offshore regulatory oversight of process and personal safety should not be conflicted with other responsibilities and should place an emphasis on industry for managing major hazards and empower proactive regulatory oversight.

References

1. Montara Commission of Inquiry (June 2010)

2. Seadrill Investigation report; Blow-out Montara Platform (February 2010)