

**Annexure A - PTTEPAA's response to Seadrill's investigation report**

Number	Seadrill Investigation Report	PTTEP Response
1	<p><u>Page 6 (last paragraph)</u></p> <p>PTTEP drilling personnel changed the 20" tie-back program in order to run a clean-up brush on the 13 3/8" MLS hanger thread to be performed prior to running the 20" tieback casing.</p> <p>Along with other statements throughout about PTTEP initiated changes to Drilling Programs.</p>	<p>The Report does not set as background information the fact that:</p> <ul style="list-style-type: none"> <li>• Atlas' MODU Facility Safety Case Revision establishes the organisational structures and communications protocols which are the mechanism by which the PTTEPAA Drilling Program (and any changes thereto) is implemented by Atlas;</li> <li>• Atlas as the MODU Facility Operator, use well equipment and well services free-issued to Atlas by PTTEPAA during the course of the operations on the wells carried out at and from the MODU facility;</li> <li>• PTTEPAA prepares the drilling programs for the wells and issues the drilling programs to Atlas Drilling for its review;</li> <li>• When PTTEPAA drilling personnel change the Drilling Program, PTTEPAA's Drilling Supervisors prepare Instructions to Drillers/Forward Plans and provide them to the West Atlas OIM for his agreement; and</li> <li>• Instructions to Drillers/Forward Plans endorsed by the West Atlas OIM are then issued to the personnel who carry out the approved work (e.g. Atlas Drilling's Drillers and Toolpushers; personnel of PTTEPAA's well services contractors).</li> </ul>
2	<p><u>Page 13 (last paragraph)</u></p> <p>The 9 5/8" PCCC was installed 5 days prior to Change Order No 6 being issued.</p>	<p>The first statement about the PCCC being installed 5 days prior to Change Order No 6 being issued is somewhat incorrect. The statement is misleading because it does not distinguish between the change management process and the ultimate written record of that process. The third statement is misleading because it asserts that the date of issuance of the written Change Approval is evidence that approval, consultation and risk management processes were not followed. The PTTEPAA risk management process (as described in Activity 4.1.8 'Change Management' in PTTEPAA Management Standard 'Construct, Service or Abandon Well Process)</p>

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	<p><u>Page 41:</u></p> <p><b>M2 Work Performance</b></p> <p><i>Phase One (Jan - April 2009)</i></p> <p>Deviation from approved program without required approval, consultation or risk management processes followed (introduction of PCCC's into suspension program as recorded on IADC records but Change Approval issued 5 days after the event).</p> <p><u>Page 43:</u></p> <p><b>O3 Planning</b></p> <p><i>Phase 1 &amp; 1B Drilling Program</i></p> <p>Drilling Program changed without correct process followed or risk management competently performed.</p> <p>Evidence of Program Changes without engaging PTTEP Change Request Process.</p>	<p>was followed. The change control note was issued after the work was done. However, this was a clerical matter. The change had been engineered and risk assessed and communicated to the PTTEPAA Drilling Supervisor by email in advance; a request to change suspension had been communicated to the NT Department in advance; the Seadrill Rig Manager was aware of the planned change in advance; and the West Atlas OIM was provided with the related Instructions to Drillers/Forward Plan for his approval prior to the change being implemented. The PTTEPAA Well Construction Management System (Task 3 'Record and Disseminate Change' under Activity 4.1.8 'Change Management' in PTTEPAA Management Standard 'Construct, Service or Abandon Well Process') makes provision for changes to be implemented in advance of signature of the written Change Order so long as the change is disseminated to personnel involved and there is an auditable trail of the change.</p>
3	<p><u>Page 13, 2<sup>nd</sup> paragraph and 4<sup>th</sup> paragraph</u></p> <p>On the 30<sup>th</sup> January 2009, a PTTEP Change Control Order No 3 was issued requiring a further change in the cementing program of the 9 5/8" casing, bringing the TOC 50m inside</p>	<p>The original suspension planned in the Drilling Program was a carryover from the time when the Montara wells were going to be drilled and completed through the WHP with topsides installed. That would have resulted in a wellhead being installed at all times. In many wells in this situation, it is normal to not bring cement from the 9 5/8" casing up into the 13 3/8" casing shoe. PTTEPAA Well</p>

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	<p>the shoe of the 13 3/8" casing to eliminate the addition of a 13 3/8" PCCC at the surface MLS hanger (Annex 3 Item 2).</p> <p>On the 12<sup>th</sup> March 2009, a PTTEP Change Control Order No 6 was issued requiring a change to the suspension plan by using a 9 5/8" and 13 3/8" PCCC on H1 and eliminating the planned shallow set cement plug in the bore of the 9 5/8" casing (Annex 3, Item 3).</p>	<p>Construction Personnel recognised, after the Drilling Program had been approved and issued, that suspending the wells with a MLS meant that the formation below the 13 3/8" casing shoe would be open to just the 13 3/8" corrosion cap. This resulted in the change to the Drilling Program bringing the cement up into the 13 3/8" casing to eliminate that risk. The cement in the Annulus essentially turned the Annulus between the 9 5/8" casing and the 13 3/8" casing into a closed chamber capable of containing pressure from any leakage at the 9 5/8" corrosion cap.</p> <p>The change to the Drilling Program to replace the 9 5/8" cement plug with the 9 5/8" pressure containing corrosion cap and the 13 3/8" pressure containing corrosion cap was engineered, risk assessed and communicated in accordance with the Change Control requirements in the Well Construction Management System. The two corrosion caps, both of which were pressure containing and could be tested for pressure prior to removal, were assessed as improvements to well integrity and the mitigation of well hazards. Pressure containing corrosion caps allow pressure below the cap to be checked prior to removal, whereas cement plugs do not. The risk of damaging the 244mm casing when drilling out a cement plug was avoided.</p>
4	<p><u>Page 15, 4th paragraph</u></p> <p>The concern in the 9 5/8" cement job (designed to place cement 50m inside the 13 3/8" shoe) was that after the initial successful casing pressure test of 4000psi, the float equipment failed as pressure was bled off. 16.5bbls of inhibited seawater were returned to the cement unit. The cement unit was then used to pump 16.5bbls back into the 9 5/8" casing and pressure was held until the cement set. As it took 9.25bbls to press the fluid to 4000psi then the actual backflow through the floats would have been 7.25bbls or thereabouts. By pumping 16.5bbls back without impedance would indicate the plug leaked and the shoe was over</p>	<p>This paragraph relates to the over displacement of the casing shoe. PTTEPAA has now come to the same conclusion that pumping the 16.5bbls of fluid back into the well effectively pumped cement out of the shoe. The casing was cemented OK, the pressure testing of the casing was OK, the fluid was bled off and the floats were holding OK but with around 120psi pressure on the casing, the floats failed in service. When pumping back down, too much fluid was pumped into the well. This effectively invalidated the prior test of the cemented shoe being a tested barrier. The integrity of the casing shoe should have been retested. There were a number of people on the rig involved in that operation (Seadrill personnel and PTTEPAA personnel) who did not recognise this at the time. It is notable that, at the time, the Seadrill IADC Daily Drilling Report of 7<sup>th</sup> March 2009 records that after waiting on cement – "Retest Float Good".</p> <p>The failure to retest the shoe integrity at that time is one of the root causes in this incident, however it was consistent with the Seadrill Well Control Manual (a</p>

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	<p>displaced by 9.25bbls, allowing the shoe to become wholly wet giving a theoretical bottom of cement in the annulus, approximately 60ft above the casing shoe.</p>	<p>section titled Waiting On Cement – Surface Stacks which does not require a pressure test of the casing after waiting on cement), the West Atlas SD1 Operations manual (section 1.1.31 on cementing intermediate casing contemplates a failure of the float valves at step 15 of the procedure and does not require a pressure test of the casing after a suitable period of waiting on cement) and the PTTEPAA Well Construction Standards (section 5 states that “All other barriers may be pressure tested or inflow tested”).</p>
5	<p><u>Page 15, 1<sup>st</sup> paragraph and Page 16, 1st paragraph and Page 17, 1<sup>st</sup> paragraph and page 41</u></p> <p>Neither PTTEP nor Seadrill drilling personnel on-site for the suspension of Well H1 could provide any reason for the ‘missing’ 13 3/8” PCCC and the failure to comply with Change Control Order No 6 to fit such a cap onto H1.</p> <p>It is confirmed later that Well H1 was suspended with only the following well control barriers in place:</p> <ul style="list-style-type: none"> <li>• Cemented 9 5/8” casing job back to and inside the 13 3/8” Casing shoe;</li> <li>• 9 5/8” Pressure Containing Corrosion Cap;</li> <li>• Inhibited Seawater column inside 9 5/8” casing; and</li> <li>• In summary, only one barrier was in place internally (9 5/8” PCCC) and one barrier assumed in place externally via the 9 5/8” cement job.</li> </ul>	<p>It is correct that the 13 3/8” PCCC was not installed. PTTEPAA has not determined why. PTTEPAA’s onshore drilling management personnel received an email from the rig stating that the cap was installed. This is why the revised Drilling Program for the tie backs was written on the basis that it had been installed. There were a number of people on the rig involved in the operations at that time (Seadrill personnel and PTTEPAA personnel) who would have known it was supposed to be installed and should have reported installation status correctly.</p> <p>The inhibited seawater column inside the 9 5/8” casing is also a well control barrier when its pressure exceeds the reservoir pressure (Section 5 ‘Barriers’, ‘Barriers during Temporary Suspension’, PTTEPAA Well Construction Standards and Section 2.3.1 of the Seadrill Well Control Manual). PTTEPAA has verified that the pressure of the inhibited seawater column exceeded the reservoir pressure but PTTEPAA still has no explanation as to why the flow of hydrocarbons in the 9 5/8” casing was not stopped by the hydrostatic head created by the inhibited seawater.</p>

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	<p>While PTTEP refer to the installation of the 13 3/8" PCCC a number of times throughout this Program, the physical state of the well at the time of re-entry demonstrates that this was not the case.</p> <p><u>Page 41</u></p> <p><b>M2 Work Performance</b></p> <p><i>Phase One (Jan - April 2009)</i></p> <p>Deviation from approved plan and the change made was not in compliance with subsequent Change Approval (13 3/8" &amp; 9 5/8" Caps approved for installation on suspension but only 9 5/8" cap installed).</p> <p><u>Page 42:</u></p> <p><b>M3 Communication</b></p> <p>No communication within PTTEP (Phase 1) when 13 3/8" PCCC was not available at well suspension stage (no action taken to implement corrective action or address risk</p>	

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	<p>management requirements and make authorised Change Request to mitigate).</p> <p>No communication within PTTEP (Phase 1) when 13 3/8" PCCC not installed (as-built drawings produced in incorrect state and Montara Phase 1B Drilling &amp; Completion Program Rev.0 subsequently flawed).</p> <p>No explanation by PTTEP to Seadrill regarding non-compliance with approved Drilling Program and non-installation of 13 3/8" PCCC (at end of Phase 1).</p> <p><u>Page 43:</u></p> <p><b>T1 Design/Ergonomics</b></p> <p>State of well suspension flawed through failure to comply with approved program and install 13 3/8" PCCC (Phase 1).</p> <p><b>T2 Technical State</b></p> <p>'As-Built' drawings and approved Montara Phase 1B Drilling &amp; Completion Program Rev 0 (June 2009) were incorrect.</p>	<p>There is likewise no explanation by Seadrill to PTTEP regarding non-compliance with approved Drilling Program and non-installation of 13 3/8" PCCC (at end of Phase 1). It is Seadrill's rig personnel that do the work, not PTTEPAA's Drilling Supervisors.</p>
6	<p><u>Page 19, 3<sup>rd</sup> paragraph, sub point 2:</u></p> <p>The OIM was not party to this decision process and only found out when the hard copy supplementary plan was delivered to the rig floor.</p>	<p>On page 19 there are assertions that the OIM was not a party to the change process to remove the 9 5/8" PCCC. This is incorrect.</p> <p>Mr O'Shea's statutory declaration states that, he went up to the West Atlas rig floor where Atlas Drilling personnel were rigging up to run the 20" tie back conductor. He spoke to Mr Trueman and the Driller on shift about the corrosion of the 13 3/8" casing threads and the requirement to clean the threads, which would involve the removal of the 9 5/8" PCCC. He told Mr Trueman he would prepared a supplementary forward plan to cover this operation. Mr O'Shea subsequently</p>

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		provided the supplementary forward plan to Mr Trueman, Tool Pusher (Mr Kok) and Driller and Atlas Drilling personnel. They did not raise any concerns about the supplementary forward plan operation during the execution of the operation.
7	<p><u>Page 22, last three paragraphs:</u></p> <p>After racking back the R/R Tool, the activity at well H1 reverted to the original approved plan for the 20” tie-back and 20” casing was run.</p> <p>Between 1500-1700hrs, the hot cut of the 20” Casing was undertaken (1m. above the Mezzanine deck) and the excess 20” Casing laid out. The rig was skidded over well GI for the continuation of the approved 20” tieback program.</p> <p>An excerpt from the programmed activity to follow the completion of the 20” tie-backs is included in Appendix 9. The published program is quite clear in the systematic removal of the intended 13 3/8” cap and installation of the slip and seal assembly, followed by the identical routine in relation to the 9 5/8”. The end result would have seen the controlled removal of each Pressure Containing Corrosion Cap, then replaced by the seal assembly.</p>	Seadrill has missed a few steps in the recounting of the facts. The rig did not just revert to the original approved plan after racking back the R/R Tool. After the running tool was racked back, the BA511 tool was run to clean the threads on the 13 3/8” MLS. This was the objective of the work that was the subject of the ‘Montara Platform Forward Plan #1b – 20” Tie-back supplementary plan 20 <sup>th</sup> Aug 09 Vers 2.0’. It was done with both Seadrill supervisory personnel and PTTEPAA supervisory personnel in attendance, checking the progress and observing the outcomes.
8	<p><u>Page 28</u></p> <p><b>3.1 Change Control:</b></p>	Seadrill takes the requirements for Management of Change from a table in the Drilling Superintendent’s job description (in Appendix 1 of PTTEPAA Well Construction Management Framework). However, the actual process for recording and disseminating change is described in Activity 4.1.8, Task 3 of the PTTEPAA Well Construction Process Manual (Construct, Service or Abandon Well Process).

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	<p>The requirements for Management of Change are referred under PTTEP Well Construction Management Framework (ID: D41-502432-FACCOM). The initiating responsibility lays with the PTTEP Drilling Superintendent, both for preparation of the Change Request and for the associated compliance with the Well Construction Standards (i.e. engineer change in accordance with the Standard, control risk management activity and complete formal program revision for issue to all Drilling Program holders following approval).</p> <p><u>Page 41:</u></p> <p><b>M2 Work Performance</b></p> <p><i>Phase One (Jan - April 2009)</i></p> <p>Non-compliance with Well Construction Management Framework (Change Request process inadequate).</p> <p><b>O3 Planning</b></p> <p><i>Phase 1 &amp; 1B Drilling Program</i></p> <p>Drilling Program changed without correct process followed or risk management competently performed.</p> <p>Evidence of Program Changes without engaging PTTEP Change Request process.</p>	<p>Seadrill also does not mention that its own involvement in this Change Control Process is a requirement of its own facility safety case (Sections 4.3.3 and 4.3.7 of Part 1 of West Atlas Safety Case Revision Document No HSE SCR WA 070002).</p> <p>This Change Control Process was followed. The West Atlas Safety Case Revision establishes that the PTTEPAA Drilling Supervisors have a line of communication with the MODU facility's OIM. The West Atlas OIM was provided with the related Instructions to Drillers/Forward Plan for his approval prior to the change being implemented. The process makes provision for changes to be implemented in advance of signature and issuance of the written Change Orders so long as the change is disseminated to personnel involved and there is an auditable trail of the change.</p> <p>It should be noted that the risk assessment at the time of this change, by those involved in proposing and approving the change, was that pressure containing corrosion caps allow a check for trapped pressure below the cap prior to removal of the cap. The removal of the 9 5/8" pressure containing corrosion cap was an operation that was part of the Drilling Program as amended by <u>Change Control Order No 6</u>. The change implemented under Montara Platform Forward Plan #1b – 20" Tie-back supplementary plan 20<sup>th</sup> Aug 09 Vers 2.0' was one of sequence, not substance.</p>

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	<p><u>Page 43:</u></p> <p><b>T1 Design/Ergonomics</b></p> <p>Program change (Supplementary Plan Vers 2.0 20.08.09) and resultant state not in compliance with Well Construction Standards (Barriers).</p>	
9	<p><u>Page 29 last paragraph (continues to page 30):</u></p> <p>An examination of Rig Manager records showed that no Change Control Forms related to any Montara Platform activity (Phase 1 or 2) were evident on file as distributed by PTTEP Document Control. Interview with the Rig Manager confirmed the non-receipt of any Change Control forms from PTTEP, as required for Controlled Copy holders (Copy#12 below), though the Rig Manager did confirm that he was party to discussions with the Drilling Superintendent on proposed changes on irregular occasions.</p>	<p>Seadrill states that they have no record of any of the change control notifications. PTTEPAA's document control records show receipts from Seadrill of email transmissions of change control advices. Our change control advices were sent to Peter Grinn, one of the six West Atlas Rig Managers engaged by Atlas during the contract period. The document control process was to send the updates and revisions to the recipient of the original document. PTTEPAA's document control personnel followed the procedure by sending the changes to the original recipient. PTTEPAA therefore queries whether Seadrill has examined the records of all of its Rig Managers for the West Atlas. In his statutory declaration Donald Miller refers to Peter Grinn forwarding emails from PTTEPAA's document control to him.</p> <p>There is nothing unexpected about the Rig Manager confirming that he had discussions with the Drilling Superintendent on proposed changes on irregular occasions given that proposed changes to the Drilling Program were irregular events.</p>
10	<p><u>Page 28-29 and Page 31:</u></p> <p>Accounts provided by the PTTEP Drilling personnel onboard West Atlas (including the PTTEP Well Construction Manager) was that this process of change control was complied with in relation to Well HI changes to program. Approval given verbally by the PTTEP Well</p>	<p>This section of Seadrill's Report is focussing on the change to the Drilling Program that was the subject of the 'Montara Platform Forward Plan #1b – 20" Tie-back supplementary plan 20<sup>th</sup> Aug 09 Vers 2.0' (i.e. removal of the 9 5/8" pressure containing corrosion cap in order to clean up casing threads on the 13 3/8" MLS). It should be noted that the removal of the 9 5/8" pressure containing corrosion cap was an operation that was part of the approved Drilling Program issued in June 2009 and applicable to the re-entry operations that began in August 2009. The</p>

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	<p>Construction Manager while on-site was also considered to be in accordance with the Standard, by verbally appraising of the Drilling Superintendent Chris Wilson although after the fact.</p> <p>While the Change process undertaken onboard West Atlas on the 20 Aug 2009 in respect to Well H1 was loosely in accordance with the PTTEP Standard and included the approval (verbal) of the Well Construction Manager, the simple gaining of this approval does not make it correct. The circumvention of critical elements i.e. Drilling Superintendent's lack of involvement from outset and subsequent communication with the Rig Manager; was a serious flaw in what actually occurred and contributed to the subsequent outcome.</p> <p><u>Page 41:</u></p> <p><b>M2 Work Performance</b></p> <p><i>Phase 1B (Aug 2009)</i></p> <p>Non-compliance with Well Construction Management Framework (Change Request process inadequate)</p> <p>Deviation from approved plan without required consultation or risk management process followed (supplementary plan to remove 9 5/8" PCCC and run brush)</p>	<p>change on 20 August 2009 was a change in the sequence of a planned operation. The cap was to be removed in any event a little later on in the Drilling Program. Therefore, PTTEPAA would challenge Seadrill on its assertion that a lack of involvement of the Rig Manager (in the earlier than planned removal of the 9 5/8" pressure containing corrosion cap) "contributed to the subsequent outcome".</p> <p>Despite what Seadrill has stated about the OIM's involvement, the OIM was a party to the decision making process for this work in advance of its occurrence. Further, despite what Seadrill has stated, Chris Wilson was also informed and involved in advance, not "after the fact" as reported. PTTEPAA notes that it is the Seadrill OIM who has a reporting line to the Seadrill Rig Manager.</p>

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	<p><u>Page 42:</u></p> <p><b>M3 Communication</b></p> <p>No communication of Well H1 Program change (Supplementary Plan Vers 2.0) to Rig Manager by PTTEP Drilling Superintendent</p> <p>No communication of Well H1 Program change (Supplementary Plan Vers 2.0) Rig Manager by OIM</p>	
11	<p><u>Page 32/33:</u></p> <p>It is clear that all wells on Montara Platform were classified as ‘Long Term Suspensions’ in accordance to the definitions provided in this PTTEP Standard. These standards require two permanent tested barriers installed in annulus and well bore above any hydrocarbon zone or overpressure zone.</p> <p>Well H1 was suspended with the following well control barriers in place:</p> <p>Casing cement job back to and inside the 13 3/8” Casing shoe</p> <p>9 5/8 Pressure Containing Corrosion Cap</p>	<p>PTTEPAA does not agree with Seadrill’s interpretation of PTTEPAA’s Well Construction Standards.</p> <p>When PTTEPAA wrote the Well Construction Standards it did not contemplate the scenario that subsequently transpired with the Montara development wells, i.e. drilling and suspension of wells at a platform prior to topsides installation. The situations that were contemplated by the Well Construction Standards when they were written are (1) Section 5 ‘Temporary Suspension’ during (i) heavy weather (ii) rig movement (ii) BOP removal/installation or (iv) drilling/completion/testing/intervention operations and (2) Section 14 Long Term Suspension.</p> <p>The context of Section 14 is sub sea wells (not platform wells) when a discovery well is being suspended pending a future decision as to whether it will be used for later commercial production. In this situation the MODU leaves the well site so the well must be suspended in a manner that will enable it to be abandoned in the future with rig less intervention. The barrier standards established in Section 14 are particular and appropriate to that circumstance.</p> <p>The suspension of the H1 Well in March/April 2009, pending the subsequent re-entry after the platform topsides installation is more akin to a ‘Temporary Suspension’ than a ‘Long Term Suspension’ because it involves a temporary</p>

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	<p>Inhibited Seawater</p> <p>Comparing these conditions against the standards for permanent barriers set by PTTEP (Long Term Suspension) and subject to Safety Case inclusion, we find the following:</p>	<p>cessation of MODU operations (like there is when MODUs are evacuated during cyclonic weather). When PTTEPAA's senior drilling personnel designed a Drilling Program for the situation of drilling and suspending the wells at a platform prior to topsides installation, they were dealing with a deviation from the Well Construction Standards but they did not revise the Well Construction Standards document to specifically deal with that scenario. Rather, they followed the Well Construction Management Process in risk assessing the specific operations as expressly permitted by section 1.3 of the Well Construction Standards document.</p>
12	<ul style="list-style-type: none"> <li>• There was no pressure tested cement plug inside 9 5/8" casing;</li> <li>• There was no permanent packer installed;</li> <li>• There was no cemented casing with a proven TOC in place (no cement bond logs were run and the existing cemented casing was assumed to have integrity based on hole volume/cement volume calculations);</li> <li>• There was as yet no Hanger Packer installed;</li> <li>• There were as yet no Tubing Seals installed; and</li> <li>• There was as yet no Annular Master Valve installed.</li> </ul> <p>In respect to Well H1 the requirement for two permanent tested barriers installed in the annulus and well bore above any hydrocarbon or pressured zone was therefore not satisfied.</p>	<p>Had the H1 well been suspended as intended, and as reported to PTTEPAA's senior well construction personnel in Perth, the well would have been compliant with the Well Construction Standards.</p> <p>The casing was pressure tested and subsequently inflow tested in accordance with Section 8.1 of the Seadrill Well Control Manual and Section 5 of the PTTEPAA Well Construction Standards. This was compliant.</p> <p>PTTEPAA would refer Seadrill to section 5 of the Well Construction Standards where definitions of the cement validation method are described. This was compliant.</p> <p>The PCCC's whilst not specifically listed comply with the barrier definitions and are comparable to a hanger packer / tubing hanger. The Well Construction Standards define barriers by their functional characteristics. The references to tubing hanger and RTTS packer are essentially interchangeable and are synonyms for PCCCs in the context of a choice as a barrier. Each of a RTTS packer, tubing hanger and PCCC are designed to allow the pressure beneath them to be checked and released while they are in place. Two such PCCC devices were planned to be installed.</p> <p>The Well Construction Standards deal with completion fluids in exposed formations/open holes and do not expressly deal with the characteristics of displacement fluids used in cementing in cased holes (the circumstance of the suspension of the H1 well) other than to refer to fluids being overbalanced to</p>

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	<p><u>Page 41:</u></p> <p><b>M2 Work Performance</b></p> <p><i>Phase One (Jan - April 2009)</i></p> <p>Non-compliance with Well Construction Standards (insufficient Barriers)</p> <p><i>Phase 1B (Aug 2009)</i></p> <p>Non-compliance with Well Construction Standards (insufficient Barriers)</p> <p><u>Page 43:</u></p> <p><b>T1 Design /Ergonomics</b></p> <p>Well design and state of suspension flawed through failure to comply with Well Construction Standards (Barriers).</p>	<p>formation. The cement displacement fluid was compliant with Section 2.3.1 of the Seadrill Well Control Manual when ever the 244mm PCCC was removed.</p>
13	<p><u>Page 34</u></p> <p><b>3.3 Pre-Spud Meetings:</b></p> <p>The PTTEP Well Construction Management Framework (ID: D41-502432-FACCOM) Standard outlines specific positional requirements for conduct of Pre-Spud meetings upon the re-entry of a well.</p>	<p>Seadrill has never raised with PTTEPAA the matter of a Pre-Spud meeting prior to re-entry operations. Activity 4.1.4 Task 1 in the PTTEPAA Management Standard 'Construct, Service or Abandon Well Process details the requirements for holding pre spud meetings' states "Pre-spud meetings are held for the first well in a campaign or for complex wells (e.g. HTHP)". The operations in August 2009 were not the first well of the campaign nor was it the first drilling/intervention in respect of the Montara development wells. Pre-spud meetings were held at the beginning of the campaign, but the operations in August 2009 were a continuation of operations in the existing campaign. A meeting was held on West Atlas to review the differences in operation between normal operations and those planned during the work scope at Montara WHP. This meeting on 12 June 2009 covered SIMOPS and non standard procedures. The results of the meeting were used as input in the</p>

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	<p><u>Page 41</u></p> <p><b>M2 Work Performance</b></p> <p><i>Phase 1B (Aug 2009)</i></p> <p>Non-compliance with Well Construction Management Framework (No Pre-Spud meeting held)</p> <p>Page 46:</p> <p><b>Contributing Causes</b></p> <p>Non-compliance with PTTEP Well Construction Management Framework (Pre-spud meeting and crew briefing / re-familiarisation with program)</p>	<p>revision to the West Atlas Safety Case Montara SIMOPS Addendum accepted by NOPSAs on 14<sup>th</sup> August 2009. It should be noted that an attendance sheet for that meeting was filed and it includes signatures of the OIM, Barge Master, Day Toolpusher, Maintenance Supervisor and Safety Officer amongst others. PTTEPAA is of the opinion that all concerns that Seadrill raise in relation to the Pre-spud meeting are without basis.</p>
14	<p><u>Page 35 Paragraph 1 &amp; 2</u></p> <p>All Seadrill and PTTEP personnel interviewed, state that no Pre-spud meeting was held prior to the commencement of operations on Thursday, 20 August 2009 (i.e. the re-entry into the first well H1).</p> <p>The failure to prepare for this activity and then conduct a</p>	<p>The responsibilities of personnel under the PTTEPAA Well Construction Management System and the West Atlas Safety Management System to engage in correct evaluation and risk management are not contingent on whether they have attended a Pre-spud meeting.</p> <p>The suggestion that a Pre-spud meeting would have picked up on a missing corrosion cap, hidden below a trash cap and thus out of sight, is optimistic at best.</p>

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	<p>briefing could have contributed to the failure to recognize the non-conformity within the well (absence of the 13 3/8" PCCC) and engage in correct evaluation and risk management. Notwithstanding this possible contribution, it was also an example of inadequate management where the communication of information, competent instruction and re-familiarization of personnel is a critical element of program preparation and stipulated as a PTTEP Standard for that reason.</p>	
15	<p><u>Page 35, Paragraph 3</u></p> <p>There was no evidence of Senior Drilling personnel having a re-familiarization with the Drilling &amp; Completions Program, including the Seadrill OIM (holder of Controlled Copy #13).</p>	<p>Senior drilling personnel (including the Seadrill OIM) were in possession of the Drilling and Completion Program issued in June 2009 in advance of the re-entry operations that began in August 2009.</p> <p>A SIMOPS meeting held on West Atlas on 12 June 2009, attended by senior Seadrill personnel does not demonstrate familiarity with the Drilling Program as it was not issued at that time however all parties were engaged in considering the workscope and providing input to it.</p> <p>The suggestion that senior drilling personnel did not have a familiarity with the Drilling Program is misleading. In order to write the Instructions to Drillers/Forward Plan requires one to read the Drilling Program.</p>
16	<p><u>Page 35, Paragraph 2</u></p> <p>The failure to prepare for this activity and then conduct a briefing could have contributed to the failure to recognize the non-conformity within the well (absence of the 13 3/8" PCCC) and engage in correct evaluation and risk management. Notwithstanding this possible contribution, it was also an example of inadequate management where the communication of information, competent instruction and</p>	<p>The implication is that the failure to recognise the non-conformity of the missing 13 3/8" PCCC is entirely a failing of PTTEPAA's onshore drilling management. Senior drilling personnel (including the Seadrill OIM) were in possession of the program, in which PTTEPAA's onshore drilling management recorded that the 13 3/8" PCCC was installed based on communications they received from the offshore drilling personnel in March/April 2009. PTTEPAA is not aware of any personnel (either PTTEPAA or Seadrill) raising the non-conformity prior to the operations on 20 August 2009.</p>

Number	Seadrill Investigation Report	PTTEP Response						
	<p>re-familiarization of personnel is a critical element of program preparation and stipulated as a PTTEP Standard for that reason.</p>							
17	<p><u>Page 37</u></p> <p><i>The following open-hole excess volumes should be used for the design of casing cementation or cement plugs:</i></p> <table border="1" data-bbox="322 643 1041 794"> <thead> <tr> <th data-bbox="322 643 689 703"><i>Cementing Environment</i></th> <th data-bbox="689 643 1041 703"><i>Excess Slurry Volumes</i></th> </tr> </thead> <tbody> <tr> <td data-bbox="322 703 689 794">Structural Casing and conductor strings</td> <td data-bbox="689 703 1041 794">300% of nominal hole size</td> </tr> </tbody> </table>	<i>Cementing Environment</i>	<i>Excess Slurry Volumes</i>	Structural Casing and conductor strings	300% of nominal hole size	<p>The cement program had a planned top of lead cement of 1567m, 50m above the 13 3/8" shoe. In the original plan, i.e. prior to deepening the well TD, the total cement to be pumped was 417.3 bbls of which 80.4 bbls was excess. The annular volume inside the 13 3/8" x 9 5/8" Annulus was around 9.8 bbls per 50m. This means that if the hole was in gauge the highest TOC likely was 460m above the 13 3/8" casing shoe. There was always an expectation that some parts of the hole would be washed out so getting a full 460m of cement above the shoe was not expected. After the fact analysis of the cement jobs by Halliburton indicated an actual TOC of 1157m, some 460m above the 13 3/8" shoe. Taking in to account the over displacement of the shoe track after the floats failed, the actual TOC should have been a little less but still a comfortable margin.</p>		
<i>Cementing Environment</i>	<i>Excess Slurry Volumes</i>							
Structural Casing and conductor strings	300% of nominal hole size							
18	<table border="1" data-bbox="322 802 1041 1002"> <tbody> <tr> <td data-bbox="322 802 689 882">Hole Size 406mm or 445mm (Calliper log available)</td> <td data-bbox="689 802 1041 882">50% of nominal hole size</td> </tr> <tr> <td data-bbox="322 882 689 962">1. Other Hole Sizes (No calliper log available)</td> <td data-bbox="689 882 1041 962">Minimum 25% of assessed hole size</td> </tr> <tr> <td data-bbox="322 962 689 1002">2. All casing sizes (2-arm calliper log or acoustic calliper)</td> <td data-bbox="689 962 1041 1002">20%</td> </tr> </tbody> </table>	Hole Size 406mm or 445mm (Calliper log available)	50% of nominal hole size	1. Other Hole Sizes (No calliper log available)	Minimum 25% of assessed hole size	2. All casing sizes (2-arm calliper log or acoustic calliper)	20%	<p>Seadrill has misinterpreted the PTTEPAA Well Construction Standards. The Standards call for production casing to be cemented to at least 100m above any zone not previously cased containing fluid hydrocarbons. This means that the top of cement had to extend at least 100m above the reservoir or any other zones containing movable hydrocarbons. It does not require a 100m overlap as suggested by Seadrill.</p>
Hole Size 406mm or 445mm (Calliper log available)	50% of nominal hole size							
1. Other Hole Sizes (No calliper log available)	Minimum 25% of assessed hole size							
2. All casing sizes (2-arm calliper log or acoustic calliper)	20%							
19	<table border="1" data-bbox="322 1086 1041 1174"> <tbody> <tr> <td data-bbox="322 1086 689 1174">3. All casing sizes (4 - arm calliper log)</td> <td data-bbox="689 1086 1041 1174">10% of the integrated hole volume</td> </tr> </tbody> </table> <p><i>Casing strings (except those placed by jetting or driving) shall be cemented as follows:</i></p>	3. All casing sizes (4 - arm calliper log)	10% of the integrated hole volume	<p>Whilst the Annulus cement was not a tested barrier given that the 13 3/8" pressure containing corrosion cap was not installed and pressure tested, the Annulus cement did clearly qualify as a barrier verified in situ as specified in Section 5 of the PTTEPAA Well Construction Standards.</p>				
3. All casing sizes (4 - arm calliper log)	10% of the integrated hole volume							

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<i>String</i>	<i>Requirements</i>
Conductor	Cemented to seabed
Surface	≥ 450m above the shoe, or to the seabed if the string <450m in length
A. Intermediate and Production	≥150m above each cementing point; and ≥ 100m above any zone not previously cased containing fluid hydrocarbons
Production Liner	≥ 30m into the liner lap

The following analysis was made of the casing cement job at Well H1;

25% excess was pumped to bring theoretical Top of Cement up to 50m above the 13 3/8" shoe. However, this does not comply with the PTTEP policy for 100m of overlap. Additionally the cement volume to provide 50m of overlap is 10bbbls (out of 514 bbbls overall slurry volume). So it is fair to comment that the TOC may not have reached the 13 3/8" inch shoe or indeed it may have channelled to a height considerably above the shoe. In any case the cement job cannot be regarded as a barrier unless verified by CBL or an annulus pressure test.

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Number	Seadrill Investigation Report	PTTEP Response
	<p><b>T1 Design/Ergonomics</b></p> <p>9 5/8" Casing Cementation not in accordance with PTTEP Well Construction Standard</p>	
20	<p><u>Page 38 paragraphs 2 and 3</u></p> <p><i>Communication in HI 13 3/8" x 9 5/8" annulus:</i></p> <p>Observation of Bubbles seen in 13 3/8" x 9 5/8" annulus by Drilling Supervisor following the removal of Trash Cap (Thurs 20 Aug 2009) - Statement Brian Robinson):</p> <p><i>Evidence of gas bubbling in Well GI while being suspended during Phase One</i></p> <p>"The 244mm (9-58") casing was run and set at 2880m MD, where the plugs did not bump however the floats held. The casing was backed out at the MLS and a pressure containing corrosion cap was installed. Some time later, gas was observed at surface to be bubbling up the 244mm (9-5/8") x 340mm (13-3/8") annulus - it was suspected that this gas was migrating from a small sand within the Woolaston formation. Future wells had 244mm (9 5/8") casing centralisers run +/-100m across this sand, and the lead cement volume increased, ensuring this sand was isolated."</p>	<p>In relation to the observed bubbles in the 9 5/8" x 13 3/8" Annulus, there was no gas reading associated with this. Therefore it was concluded that this was just due to breakdown of mud in the Annulus.</p> <p>This is correct. A change control was issued to place casing centralisers to increase the probability of proper isolation of this thin sand package.</p>

Number	Seadrill Investigation Report	PTTEP Response
21	<p data-bbox="315 268 595 296"><u>Page 38, last paragraph</u></p> <p data-bbox="315 395 1032 459"><i>Communication between Wells H4 and GI, Phase 1 Drilling (Jan - Apr 2009):</i></p> <p data-bbox="315 496 1010 627">Several statements made by drilling personnel regarding ‘communication’ between the wells during drilling, including one specific recount of communication between Wells H4 and GI during drilling operations.</p>	<p data-bbox="1066 268 2029 427">Communication between the annuli is fairly common. It occurs in the formations just below the conductor shoes where the wells are close together and the formation may have substantial vugs which communicate. This is communication between the conductors, not communication deeper in the wells in hydrocarbon-bearing zones.</p>
22	<p data-bbox="315 667 416 695"><u>Page 40</u></p> <p data-bbox="315 799 763 828"><b>6.0 Evaluation of Witness Accounts</b></p> <p data-bbox="315 927 1010 1086">Witness accounts were generally open and forthright with few instances of conflicting information. Where this did occur, it was not of a critical nature and more understandably confusion, resultant from the nature of the event.</p> <p data-bbox="315 1190 1032 1350">PTTEP were requested by Seadrill to allow interview of the offshore PTTEP personnel but this request was denied, however, offshore PTTEP personnel did provide written statements (Appendix 2 PTTEP). These statements were detailed and entirely consistent with the accounts given by</p>	<p data-bbox="1066 667 2051 858">The denial of Seadrill’s request to interview offshore PTTEP personnel occurred after Seadrill refused to allow its personnel to be interviewed for PTTEPAA investigations. The request was also made at a time when PTTEPAA and the Seadrill operations team managing West Triton were fully focussed on drilling a relief well to stem the flows from H1 well. Interruption to management of the relief well would have been a distraction best left until afterwards.</p>

Number	Seadrill Investigation Report	PTTEP Response
	<p>Seadrill personnel, both in relation to pre and post blowout actions.</p> <p>Seadrill personnel were cooperative and transparent upon interview and follow ups.</p>	
23	<p><u>Page 45</u></p> <p><b>Root Cause/s:</b></p> <p>Over displacement of 9 5/8" primary cement job leaving shoe wet and having no barrier integrity</p>	<p>Seadrill summarising this point as 'over displacement' of the cement simplifies this root cause too much. The conclusion being reached is that the failure of personnel on the rig (after having knowledge that the floats failed in service and too much fluid was pumped into the well) to recognise that the integrity of the casing shoe could only be demonstrated by pressure testing the casing again after the cement had cured. It is possible that the failure to recognise the potential shortcomings in the cement integrity was also due to inadequate procedures in the Seadrill Well Control Manual. It is also possible that the failure to recognise potential shortcomings in the cement integrity was also due to the communications from offshore to onshore not adequately alerting others to the true status of the well.</p>
24	<p><u>Page 45:</u></p> <p><b>Root Cause/s:</b></p> <p>Removal of and failure to re-fit 9 5/8" PCCC - August 20th 2009</p> <p><u>Page 46:</u></p> <p><b>Contributing Causes</b></p>	<p>The removal of the 9 5/8" PCCC was not a root cause. It was a planned operation conducted a few hours sooner than programmed. A change control process was followed for the change in sequence. The PCCC is designed to enable a check for pressure under the cap and checks were done on 20 August 2009 with no pressure observed. Competent personnel witnessed the cap removal and there was no flow. The 9-5/8" PCCC was not re-installed before skidding the drilling package to the H4 well. However, re-installation of that cap was not required by the Drilling Program due to the nature of the tie-back operations. We still do not know what changed resulting in a flow from the well.</p>

Number	Seadrill Investigation Report	PTTEP Response
	<p>Unnecessary Program change Well H1 - Supplementary Plan 20 Aug Vers - no consideration for re-installation of 9 5/8" PCCC following completion of the Brush run.</p> <p>Non-compliance with PTTEP Well Construction Management Framework (Change Control process including risk management and mitigation processes - non-installation of 13 3/8" PCCC and alternative measures reqd.)</p>	
25	<p><u>Page 45:</u></p> <p><b><u>Root Cause/s</u></b></p> <p>Failure to install 13 3/8" PCCC - March 7th 2009</p> <p><u>Page 46:</u></p> <p><b>Contributing Causes</b></p> <p>Non-compliance with approved Change Control (install 13 3/8" PCCC)</p> <p>Inaccurate compilation of Montara Phase 1b Drilling &amp; Completion Program Rev: 0 (program and as-built diagram still included 13 3/8" PCCC)</p>	<p>The failure to install the 13 3/8" PCCC was not a contributing cause. If it had been installed in March 2009 then it would have been removed in any event if the 13-3/8" tie-back operations in August 2009 had proceeded as per the Drilling Program. The removal of the PCCC in August, had it been installed would have led in due course to the removal, as planned, of the 9 5/8" PCCC. It is hypothetical what would have happened then because the latent hazard was, at that time, unknown.</p>
26	<p><u>Page 45:</u></p>	<p>PTTEPAA does not follow Seadrill's line of thinking on this point. It is optimistic</p>

Number	Seadrill Investigation Report	PTTEP Response
	<p><b><u>Root Cause/s</u></b></p> <p>Failure to recognise this anomaly as a warning signal and investigate barrier conditions on H1</p> <p>Page 46:</p> <p><b>Contributing Causes</b></p> <p>Inadequate Supervision (non-recognition of anomaly [missing 13 3/8" cap] when H1 Trash Cap removed) - PTTEP Drilling Supervisors</p>	<p>to conclude that recognition by personnel on the rig that the 13 3/8" PCCC was missing would have led to an investigation of the other barrier conditions (i.e. cementing of the 9 5/8" casing shoe) on the H1 well.</p>
27	<p><u>Page 45</u></p> <p><b><u>Root Cause/s</u></b></p>	<p>There is another root cause not mentioned by Seadrill: the failure of the hydrostatic head established by the inhibited seawater column inside the 9 5/8" casing (which exerted a pressure exceeding the reservoir pressure) to stop the flow of hydrocarbons in the 9 5/8" casing to surface.</p> <p>It is also possible to conclude that the primary root cause to the incident was the failure to recognise that a positive pressure test was required to verify shoe cement integrity after float failure. This did not occur and a contributing factor was procedures generated by Seadrill to manage their MODU which contemplated float valve failure during cementing operations but did not suggest any course of action other than what was actually performed. The procedure was followed.</p>
28	<p><u>Page 49 and 50</u></p>	

Number	Seadrill Investigation Report	PTTEP Response
	<p><b>10.0 Conclusion</b></p> <p>The high level failure leading to the blowout of the Montara H1-ST1 well, the environmental damage caused and the destruction of West Atlas was the consequence of a failure of PTTEP to meet its documented management system standards regarding barrier policy. The component failures that led to the high level failure included:</p> <p>A well design philosophy, incorporating minimum requirements in cost and time.</p> <p>Changes to the cementation programs (barriers) that could have been decided during the planning phases (under planned). These changes extended only to meet minimum theoretical practices and were not tested to confirm whether barrier practices were met or otherwise.</p> <p>A deviation from a pre-planned programme in using newly available surface set PCCC's instead of normal cement suspension plugs for the temporary abandonment of the Montara H1 well.</p>	<p>For the reasons outlined above, PTTEPAA rejects Seadrill's assertion that the "high level failure" is the consequence of "a failure of PTTEP to meet its documented management system standards regarding barrier policy". It is also disappointing to PTTEPAA that Seadrill can attribute failures solely to PTTEPAA in the same report in which Seadrill recognises its duties of care and obligation to operate its facility in accordance with its safety case. If and to the extent that H1 well operations exhibited a failure to meet a barrier policy in the PTTEPAA Well Construction Management System, this would also be a failure by Seadrill to comply with the West Atlas Safety Case Revision (refer to Section 4.3.5 'Integrity Management').</p> <p>PTTEPAA absolutely rejects Seadrill's assertion that the well design philosophy is to minimise cost and time.</p> <p>The change to the cementation program after the Drilling Program had been approved and issued and was to bring the cement up into the 13 3/8" casing to eliminate the risk of the formation below the 13 3/8" casing shoe being open to just the 13 3/8" PCCC.</p> <p>The change to the use of PCCCs instead of a cement suspension plug for the temporary suspension of the H1 well was the subject of a change control process in accordance with the PTTEPAA Well Construction Management System involving a risk assessment that concluded the change improved well integrity and mitigated well hazards.</p>

Number	Seadrill Investigation Report	PTTEP Response
	<p>A departure from PTTEP's Long Term Suspension policy. At no time (even after change order regarding Pressure Controlling Corrosion Caps) did the well design for well H1 satisfy the requirements for Long Term Suspension as stipulated in the PTTEP Well Construction Standards. An examination of H1's physical status following removal of the trash cap should have led to a reconsideration of any activity on well H1 until the anomaly had been considered and risk assessed to ensure personnel and assets were not placed at risk.</p> <p>Failures in communication between on and offshore PTTEP personnel in not identifying the missing 13 3/8" PCCC but it being included on the 'as built' information supplied in the Phase 1b Programme and communication between PTTEP and Seadrill regarding planning changes.</p> <p>Loose application of PTTEP Management of Change policy by circumventing the formal procedure and using verbal instructions and late follow up of documentation.</p> <p>Onboard Supervision that did not recognise the risk associated with over displacing the 9 5/8" casing shoe or the need for remedial cementing or the effect this would have on the integrity of the well or how this might impact PTTEP's barrier policy.</p>	<p>The H1 well was not designed to satisfy the requirements for Long Term Suspension as stipulated in the PTTEPAA Well Construction Standards because those requirements were not applicable to the H1 well drilling and completion operations. Therefore there was no departure from PTTEPAA's Long Term Suspension policy. Had the H1 well been suspended as designed, and as reported to PTTEPAA senior well construction personnel in Perth, the well would have been compliant with the Well Construction Standards.</p> <p>There was a risk assessment following the examination of the H1 well's physical status upon removal of the trash cap. It resulted in a planned operation being conducted a few hours sooner than programmed, and conducted in a manner that involved checks for pressure under the PCCC.</p> <p>Offshore PTTEPAA personnel did not communicate to onshore PTTEPAA personnel that the 13 3/8" PCCC had not been installed. Neither the investigations by PTTEPAA or by Seadrill have determined why it was not installed and to date, who was aware of the true well condition.</p> <p>PTTEPAA disputes Seadrill's assertions that the PTTEP Management of Change policy was loosely applied. The PTTEPAA procedures makes provision for changes to be implemented in advance of signature of the written Change Order so</p>

Number	Seadrill Investigation Report	PTTEP Response
	<p>Onboard supervision that failed to recognise the significance of a missing 13 3/8" PCCC on well H1 at the start of Phase 1B and the agreed removal of the 9 5/8" PCCC leaving at best a single theoretical barrier at the 9 5/8" shoe.</p> <p>This combination of a failure to follow barrier policy, a failure to follow long term suspension policy, a relaxed approach to Change Management, opportunistic program changes, poor communication both on and offshore and poor onsite decision making culminated in the conditions which led to well H1 blowing out and the consequences that followed.</p>	<p>long as the change is disseminated to personnel involved and there is an auditable trail of the change. PTTEPAA's Drilling Supervisors delivered written (as well as verbal) instructions to the West Atlas OIM, and the West Atlas OIM approved the operation before it proceeded.</p> <p>The failure of supervisory personnel on the rig (after having knowledge that the floats failed in service and that too much fluid was pumped into the well) to recognise that the integrity of the casing shoe should be re-tested is one of the root causes.</p> <p>The 9 5/8" PCCC would have been removed in any event if the tie-back operations had proceeded on 20 August 2009 as per the Drilling Program (i.e. its removal was a planned operation conducted a few hours sooner than programmed).</p>