

KLIV PROBLEM STATUS UPDATE

Update No. 003

HIGHLIGHTS:

A. Updates from Offshore

- Now clear that the 16" KLIV is not opening, and this is NOT a hydrate problem
- Proceeding to remove KLIV actuator for further investigation
- Photos of square drive sent to Wade Tharp by Dave March
- Risk assessment for Actuator removal completed at 12:30pm today with Marine, Diving, Operations, HSE, Subsea, Process and Rigging teams
- Permit for diving operation tomorrow morning being worked. Ready at 4pm. Isolations outstanding and lifting one section of grating
- Awaiting all approvals for the ALARP demonstration. Currently have Naren and Dave's. Awaiting approval of Chidozie (Safety) and Casper (Diving).
- First Oil achieved today, with permits returned and personnel asked to stay clear of plant area for some hours. Thus, rigging and other preparations cannot be made until tomorrow.
- Pressure, if required to equalize pressure on Bonga side of KLIV could be generated by Methanol or gas (if gas system is up and running). Nitrogen is not necessarily required.
- Earliest estimate for local rep of AOS ORWELL Actuator OEM arriving is Monday 10th Apr 2017
- There is one complete spare Power Module/ Drive Module and Spring Module assembled on the Bonga FPSO with certified Lift Frame and Lift Pad eyes.
- Intemperate weather impacted ability to carry out KLIV Act. dive today – awaiting improved weather.
- Current plan is to first carry out SBM dive work (approx. 2-hour activity) in view of first offtake readiness and then KLIV investigative dive work (approx. 4-hour activity).
- Offshore team is currently working and focused on carrying out function test of the spare actuator.
- Investigative guideline (First Revision) presented by David March and discussed.

B. Updates from Onshore

- Manual gearbox, Monel tubing & 4 Nos sacrificial anodes all sailed out on Kenny Tide and expected on Bonga FPSO tomorrow 9th April 2017
- Nitrogen not coming Bonga on Kenny Tide. Confirm implications and other strategies with Offshore Operations
- A learning note from wrongly configured blowdown valves as shutdown valves during 2017 TAM was shared and will be kept in view

C. Look ahead

- Continue Procedures, ALARP, Approvals & PTWs readiness
- If weather permits; Moor, Dive, Unbolt and Lift the KLIV tomorrow (10th April 2017)
- AOS Orwell Rep (from Dubai) arrives Tuesday 11th April 2017
- AOS Orwell Local Rep arrives Monday 10th April 2017
- Working team set up to develop Overall Resolution Roadmap
- Asset Support Manager to discuss diving priority between SBM and Investigative KLIV activities with the Bonga OIM
- Carry out risk assessment workshops of running backup (spare) actuator and manual gearbox
- Next meeting slated for 3pm Monday 10th April 2017

ACTIONS TRACKER:

S/N	Action Description	Action Party	Target Date	Status / Outcome
Workstream 1: Inject methanol, test whether KLIV opens or whether there is a hydrate				
1.1	Provide volume calculations, valve open/close and methanol injection ports for mechanically confirm KLIV open/close condition	Isaac Ogazi	07 th April 2017	Completed.
1.2	Perform methanol injection on the KLIV loop as 1.1	Bonga OS	07 th April 2017	Completed. Injection carried out and results confirm that 16" KLIV is not opening
Workstream 2: Investigate whether there is a problem with the actuator and / or coupling to the valve				
2.1	Confirm ROV torque capacity (to turn open the KLIV)	Wade Tharp	08 th April 2017	Ongoing
2.2	Locate the manual worm gearbox at Onne SNEPCo yard and transfer to Kenny Tide	James Craib/ Olumide A./Norhuda M.	08 th April 2017	Gearbox located and transferred onto Kenny Tide. Currently sailed out and ETA tomorrow 9 th April - 8:30pm
2.3	Mobilize mobile HPU for offshore spare actuator Bonga deck function test (check with Lancelot and GE)	Olumide A.	07 th April 2017	Superseded. Bonga HPU Systems now lined up to carry out Spare actuator function test.

S/N	Action Description	Action Party	Target Date	Status / Outcome
2.4	Assign PA for KLIV removal/reinstallation	Emma/OIM	08 th April 2017	Ongoing. Completed. Emeka Kalu assigned as PA
2.5	Provide list of key skills required for KLIV to stay back on Bonga	Olumide A.	08 th April 2017	Completed.
2.6	Retain key skills on Bonga	Bala/Tunde	08 th April 2017	Completed.
2.7	Prepare and remove KLIV to deck	Emma C./David March /Diepreye A./Uche A.	09 th April 2017	Ongoing. Permits being raised and revalidated All PTWs completed at 7am 9 th April and all resources (i.e. Marine, Lifting, Crane, Rigging & Riggers, Dive Crew etc) available and on standby for weather to improve
2.8	Function test the removed KLIV on Bonga deck	Emma C./David March /Diepreye A./Uche A.	09 th April 2017	Awaiting removal of actuator.
2.9	Perform diver inspection on the valve stem	Emma/David March/David Mooney	09 th April 2017	Awaiting removal of actuator. Inspection procedure/SoW being created for review & Approval
2.10	Prepare dive procedure to install the spare gear box	David Mooney/Wade	08 th April 2017	Ongoing. Reviewed and approved by Casper De Wolf

S/N	Action Description	Action Party	Target Date	Status / Outcome
2.11	Mobilize Mark Majebe/Afolabi Owoeye, arrange flight and approval	Olumide/OIM/Heli-Admin	08 th April 2017	<p>Done – Afolabi confirmed and approved for first flight 09th April 2017</p> <p>Was on first flight but due to bad weather the flight had to turn back – Chopper awaiting improved weather</p>
2.12	Function test the spare actuator on Bonga deck	Emma/David March /Diepreye /Uche A	08 th April 2017	<p>Ongoing.</p> <p>3 hose connections to Spare Actuator being made up and deck work area being prepared</p>
2.13	Engage AOS to check availability of rep Joel or alternative	Emma C.	08 th April 2017	Ongoing.
2.14	Perform failure assessment of removed KLIV actuator – requires OEM rep for deeper dive	Emma C./David March /Diepreye A./Uche A./AOS rep	11 th April 2017	Activity will be carried out when OEM Rep arrives in-country ETA Tuesday 11 th April 2017
2.15	Get local rep of the OEM (AOS/Emerson) to Bonga, book flights immediately	Emma C.	08 th April 2017	<p>AOS/Emerson engaged and Local Rep will be available on Monday 10th April 2017</p> <p>Flight booked for Rep and Emerson rep's name to be sent to</p>

S/N	Action Description	Action Party	Target Date	Status / Outcome
				Bala for 10th April chopper booking Done
2.16	Arrange for retrofit spare anodes for the spare actuator	Olumide A.	08 th April 2017	Done. Currently on the same Kenny Tide manifest with the manual gear
2.17	Perform RA for installing spare actuator without protection shroud	Emma Collins/David March /Diepreye A. /Uche A /Sam Awonusi	09 th April 2017	Ongoing Staff needed from OPS busy with start-up...Documents prepared to facilitate Risk Assessment
2.18	Prepare dive crew for KLIV removal/reinstallation and revise demob plan – plan to keep on board till	Ron Edwards/David Mooney	07 th April 2017	Completed. Dive crew on standby and will remain onboard
2.19	Uche Azuike to travel offshore in the first flight on Saturday 8th April	Uche A. /OIM /Heli-Admin	08 th April 2017	Flight approved 07 April 2017. Uche Currently airborne.
2.20	Source permitting authority & craft skills	Olumide A.	08 th April 2017	Ongoing. List generated and forwarded to TAM coordinator. Done – All resources confirmed available
2.21	Engage AOS/Emerson for online support for the local rep on board Bonga	Emma C.	08 th April 2017	Ongoing.
2.22	Prepare SoW for diver inspection on the valve stem inspection	Emma C.	08 th April 2017	Ongoing.
2.23	Obtain and deliver 4 packs of AAA batteries to Bonga (via first flight on Sunday 9 th April 2017) as spares for the Load Cell to be	Afolabi O.	09 th April 2017	Ongoing.

S/N	Action Description	Action Party	Target Date	Status / Outcome
	used as part of static rigging for Actuator removal on Sunday 9 th April 2017.			
2.24	Perform RA needed for deviation for the use of spare Actuator	David March	10 th April 2017	Ongoing.
2.25	Call OEM rep in Dubai to check and fast track mobilization	Naren	08 th April 2017	Ongoing.
2.26	Share presentation on different failure scenarios; and those applicable.	Emma Collins/David March	08 th April 2017	Ongoing.
2.27	Develop a mid to long term plan for next few days and possible scenarios	Emma Collins/David March	08 th April 2017	Ongoing.
2.28	Obtain Emerson permission to remove inspection hatch on Drive Module (Gearbox Inspection Point), while not nullifying the warranty	Naren	09 th April 2017	Ongoing.
2.29	Set up a connect for 3pm tomorrow	Naren	08 th April 2017	Done.
2.30	Weight of Manual Override Gearbox (Cameron) which is an input to the permit being prepared. To be sourced from documentation onshore (not recorded in Stolt Installation Manual BON-SSA-001-K-11614)	Naren	10 th April 2017	Ongoing.
2.31	Send 2013 contingent surface hose configuration drawing to David March	M. Majebe	09 th April 2017	Done.
2.32	Underwater video of square drive will be sent to onshore team on Monday	D. March	09 th April 2017	Ongoing.
2.33	DM, Naren, Emeka N., G. Adebayo to work out sequence of activities to capture all possible response to failure mode	D. March/Naren/Emeka N./G. Adebayo	09 th April 2017	Ongoing.
2.34	DM will send his investigative strategy document to all (and for alignment with other work streams)	D. March	09 th April 2017	Ongoing.
2.35	Copy installation Dive log will be sent to All	D. March/Diving AP	10 th April 2017	Ongoing.
2.36	Capacity of actuator shaft to be confirmed by OEM	Emma c.	11 th April 2017	Ongoing.
Workstream 3: Procedure for changing spare coupling between actuator and valve				
3.1	Prepare a procedure for this change	Wade Tharp / David Mooney	08 th April 2017	Ongoing. Coupling procedure reviewed and

S/N	Action Description	Action Party	Target Date	Status / Outcome
				approved...D. Mooney working on Diving section
3.2	Caspar to be engaged for review/approval of the ALARP document	David Mooney	08 th April 2017	Casper De Wolf engaged and his comments received. Review updates ongoing. ALARP doc supported by Casper & Chidozie. Updates to comments received ongoing will be sent this afternoon
3.3	Engage TA-2 HSE for review/approval of the ALARP document	Uche N./Chidozie	08 th April 2017	Ongoing.
3.4	Send updated ALARP document for review/approval/signatures	David March/Martin Spahl	08 th April 2017	ALARP document sent. Review and approvals ongoing.
3.5	Do we have the tools to carry out a coupling change? Make a list of all tools and equipment	Uche Azuike	09 th April 2017	
3.6	Looking ½-inch grub screw – Onshore All fasteners for manual drive confirmed and available	Olumide A.	10 th April 2017	
Workstream 4: Start working worst case scenario of changing the valve				
4.1	Locate spare subsea 16" valve	Cesar Guzman	10 th April 2017	Ongoing.
4.2	Perform assessment for removal and replacement of 16" valve	Cesar Guzman/ Gbenga Adebayo	10 th April 2017	Ongoing
4.3	Prepare specification for the replacement of the 16" Valve	Gbenga/Sayo	10 th April 2017	Done – Existing specification located. Located MRB doc isn't comprehensive.

S/N	Action Description	Action Party	Target Date	Status / Outcome
				<p>OEM contacted and will received feedback on Monday 10th April.</p> <p>4Nos 1500lbs recovered to be assessed (e.g Interface on drive stem maybe different and needs to be checked)</p>
4.4	Prepare procedures for replacement of the 16" Valve in liaison with Richard S. and Emeka N. based on the flexjoint procedures	Cesar Guzman	10 th April 2017	Ongoing