PROCEEDINGS
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Economic and Operational Perspective of Rigless Offshore Well Services Using Scaffolding Pipes Structure in TBA Field, JOB Pertamina PetroChina Salawati

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Abstract

The inevitable marginal phase of offshore TBA field production was forthcoming while daily basis of producing it by using the artificial gas lift. The source for the gas lift was the associated gas, produced from the insitu wells. Making up the Gas Compressor Unit need an additional gas source due to the limited, as well as declining existing associated gas supply. The top layer of unproduced reservoir was the prime candidate to be perforated to increase the gas supply.

Several problems either in economic or operational area were mapped and classified. Considering the utilization of offshore rig and/or its alernative, the factor of limited space deck on tripod platform was the main concerned as well. An economic analysis decided that the offshore scaffolding pipes structure (Rigless) become the only option to complete the job with respect of operational feasibility and budgeting. This scheme will support the static lifting equipment to R/U all units and running all devices at the platform during well service activities such as perforation, bottom hole pressure survey and gas lift valve replacement.

Accomplishment by using this offshore scaffolding pipes structure (Rigless) with the steps procedure of installation and dismantle will be discussed in this paper. It was expected that the successful operational and low cost budget by using the offshore scaffolding for this subject will be a new breakthrough to make efficiency in the oil and gas industry.

Introduction

JOB Pertamina-PetroChina Salawati has a producing field in offshore area. The field called TBA with 2 production well. The production of TBA Field is 1100 BOPD. The production of TBA Field is using artificial lift (gas lift). The source of the gas lift is from the gas associate production from the wells itself. The wells is located in offshore area and produced with one tripod platform and then will be processed in Surface facilities (Floating Production Storage Offloading). The gas compressor is planted in FPSO to support the gas lift system cycle. There is only one compressor in the FPSO to support the gas lift system because of the field life with the Proved Reserves 800 MBO. The compressor has the schedule for the maintenance. If the compressor is under maintenance, so the well need to be shut in for a while before producing again because the well cannot flow without the gas lift.
When the gas lift compressor was being maintenance that took 18 hours in the end of 2017, the well was shut in for a while. After the maintenance, the well cannot be produced the gas because of lack of the gas from the wells after the maintenance of the compressor. From that cause, there is only one thing to make this wells produce again with the perforation of the wells so the gas lift compressor has enough gas to inject to the well to perform the gas lift.

Data and Method

To perform the perforation in the platform, the TBA platform has the disadvantage for the limited space for the main deck that only 12m²(Figure 1). So it is impossible to use the snubbing unit to perform the perforation. And usually the perforation can be done using the rig. But the rig cannot be performed because of the expensive daily rate that not fit with the field economic life. After the discussion between the engineers, so the option for the rigless perforation job is initiated.

The methodology to do the perforation is to use the offshore scaffolding pipes structure (Rigless). The limit of the platform area is

solved by installing this scaffolding. design of this scaffolding uses a 3: 1 ratio where the height of scaffolding is 16.5 M and 5.2 M area (Figure 1). The use of scaffolding can be adjusted to the shape of the main deck platform.

This scaffolding is also designed to be able to withstand a load of 2 tons. so the well services activities are expected to be able to be carried out because each equipment will not have a weight exceeding 2 tons. (Figure 2)
In its implementation, installation and de-installation activities will be carried out with the help of the lifting tool which will be explained in the next chapter. This alternate will be supporting as static lifting equipment to R/U all units and Running all devices at the platform during well service activities such as perforation, bottom hole pressure survey and gas lift valve replacement.

Before doing such a job, the extensive pre-job planning is executed such the operation, inspection the equipment, the lifting procedure and the safety.

1.Step of Scaffolding pipes structure

Risk Mitigation and Contingency Planning
Because of the challenges of this job, it is required to mitigate the risks and perform contingency to perform the job safely. So the JSA will be explained in the table 1. The risk that will be mitigated like:
- When Rig up
- Do pressure test
- Run dummy tool
- Bleed off
- Make up Tube Carrier of gun explosives
- RIH perforating Gun by E-line cable
- Remove Lubricator Assembly& wireline unit from platform

2. Working Environment and Logistic

- Due to remote location offshore and the availability, the job will be not initiated until the equipment and the personnel available to perform the job.
- There are variety of specialized equipment to install the scaffolding and perform the jobs, including but not limited as a follow:

o A slickline unit to run the SBHP and gas lift valve change
o 1 crew boat to move the personnel from the FPSO to the platform
o 1 LCT as the base for the equipment like slickline, the perforation equipment and another.
o 1 LCT with the mobile crane to be the lifting unit to move equipment from LCT to Platform (Figure 4)

3.Scaffolding Design

- The scaffolding is design has been reviewed and certified before the job is executed

4. Result
The result of the program is done with the follow:
Preparation & Operating Procedure
1. Remove devices (Instrument Control Panel, Hand rail, fence, etc.) and cleaning area on main deck of TBA P/F (by Instrument + rigger).
2. The LCT+ Crawler Crane approaching to P/F. Tie Up the mooring lines. Utility boat bring out the offshore scaffolding materials. Perform to unloading and lift up onto P/F.
3. Install & R/U Scaffolding Offshore on wellhead area.
4. Lift up, R/U and set up Slickline Unit Accessories onto P/F.

4. Secure The Well

1. Close Connection Lines of TBA-03 (ESDV, and GLV Injection Line).
2. Closed lower Master, Upper Master / Actuator and Wing valves (Crown valve is open position). Check WHP and then release pressure thru needle valve.

5. Install Slickline Bop's And Lubricator Assembly (Rigless)
1. M/U BOP'S stack and Lubricator Assembly (include 2-1/8" dummy tool + Sinker bar) by hanging up to lifting beams of Offshore Scaffolding. Open the Cap of tree top 4-1/16" Adapter.
2. R/U BOP'S and lubricator assembly into wellhead.
3. Injection and function test BOP's stack+ Lubricator Assembly to 1,500 psi. If OK release pressure till 500psi. Then go to next step.

Dummy Run and FBHP & SBHP Program
1. Open Upper Master / Actuator, Lower Master Valve and Crown Valve.
2. RIH 2-1/8" dummy tool thru target depth MD (below 5" Seal Assembly). POOH.
3. Closed lower Master, Upper Master / Actuator and Crown Valves.
4. Release pressure inside BOP and Lubricator. Unscrew Lubricator assy.
5. L/D 2-1/8" dummy tool + Sinker bar.
6. M/ U Lubricator Assembly include 1" EMR tool, screw in to BOP's stack. Pressurize Lubricator up to 500 psi.
7. Repeat step secure well
8. RIH 1" EMR tool to target depth (above GLM). Record pressure for 1 hour. Then make gradient stop every 100 ft. starting from target depth MD and go down to 100 ft MD (on GLM position target depth MD).
9. Continue RIH and make gradient stop (5 minutes each) every 1,000 ft.
10. Then going thru target depth TVD (above GLM of Orifice). Record pressure for 5 minute. Then go down to 100 ft MD (on GLM position target depth TVD). Record pressure for 5 minute. Then go down to 100 ft MD (below GLM target depth TVD). Record pressure for 5 minute. OK. Then going thru target depth MD (above existing perforating zone # 2). Record pressure on bottom for 1 hour (shut-in condition) before start to record the flowing pressure.
11. Flow back TBA-3 by opening Wing Valve, ESDV and GLV Injection Lines (Coordination with Production Operation and PT Bull Teams). Waiting for flowing condition of well is stabilized (2-3 hours).
12. Pull up to surface and make for 5 times of gradient stop (5 minutes each) every 1,000 ft, afterward make gradient stop every 500 ft till to surface.
13. Close Wing Valve and Connection Lines of TBA-03 (ESDV, and GLV Injection Line).
14. L/D 1" EMR tool.

5. Install Wireline Bop's And Lubricator Assembly (Rigless)

1. Check WH Pressure, (if any, bleed off). Replace Existing 4-1/16" 5K Adapter Flange of Swab Cap TBA#3 with Wireline Adapter flange.
2. M/U BOP'S stack and Lubricator Assembly + Turn Around Sheave (include 1-11/16" dummy tool + Sinker bar) by hanging up to lifting beams of Offshore Scaffolding. Open the Cap of tree top 4-1/16" Adapter.
3. R/U BOP'S and lubricator assembly onto wellhead.
4. Injection and function test BOP's stack+ Lubricator Assembly to 1,500 psi. If OK release pressure till 500 psi. Then go to next step.
5. Open Crown Valve.
6. RIH 1-11/16" dummy tool + Sinker bar to target depth POOH.
7. Closed lower Master, and Upper Master / Actuator Valves. Release pressure on lubricator. Then closed Crown valve.
8. Unscrew lubricator assembly. L/D Tool Assy.

7.Perforation Job

1. M/U 10 ft of explosives, 4 SPF of 1-11/16" Enerjet Perforate Gun + GR-CCL Tool + Sinker Bar (Run/Perforating#1).
2. R/U BOP'S and lubricator assembly (with 1-11/16" Enerjet perforating gun Assy. inside) onto wellhead.
3. Injection and function test BOP's stack+ Lubricator Assembly to 1,500 psi. If OK release pressure till 500 psi. Then go to next step.
4. Open Crown Valve.
5. RIH 1-11/16" Enerjet Perforating Gun Assy to proposed perforating depth around target depth (need to veryfy depth). Perform depth correlation (refer to CDN logs). POOH to surface.
6. Observe and record SIWHP and compare to the previous SIWHP before perforating.

Result and Conclusion

The successful by using the offshore scaffolding for this operation activity is a new breakthrough for the oil and gas industry. It is recommended for the field with limited space of platform to perform such as well services job. But always do the extensive pre-job planning such as:
a. Comprehensive review for the operation
b. Comprehensive inspection for the equipment before using.
c. Comprehensive lifting procedure for installation and DE installation for the job

d. Safety is 100% be the concern.If you want to display pictures or graphics, then assemble as it directed. Make a frame for your pictures or graphics, and make a brief description of it. See the example below:

Acknowledgement

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List of Figures

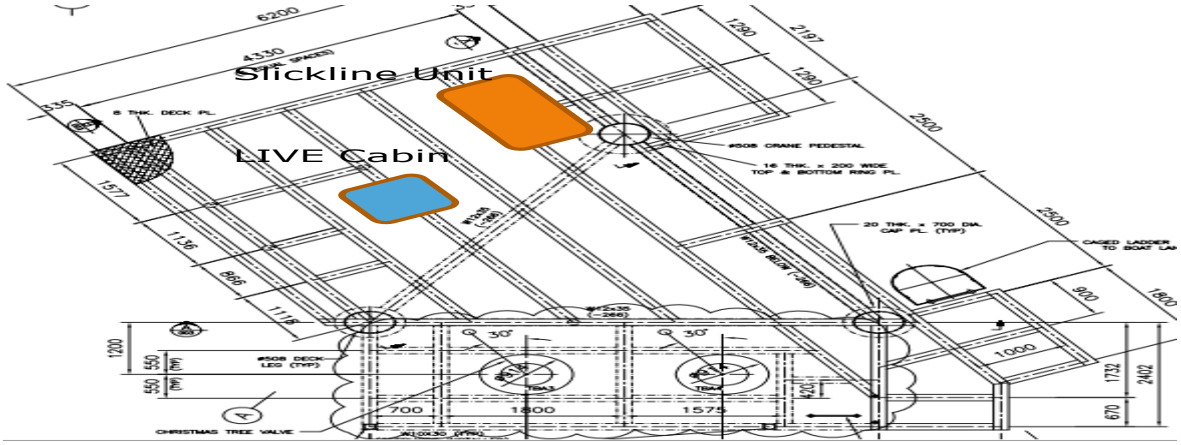

Figure 1. The Deck Space of The platform

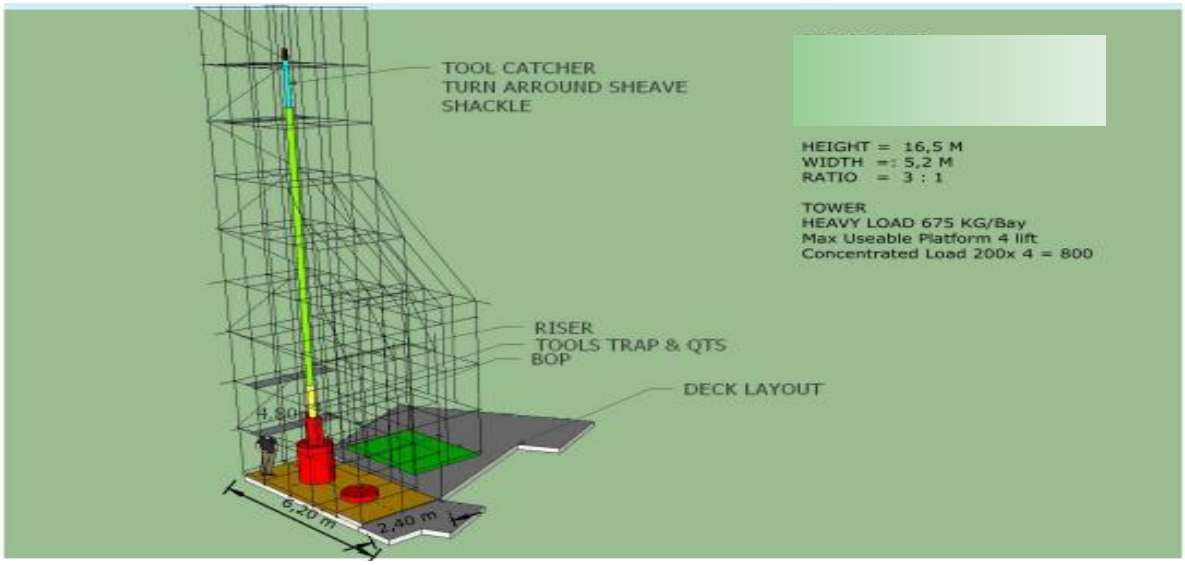

Figure 2. The Scaffolding Structure design on the Platform

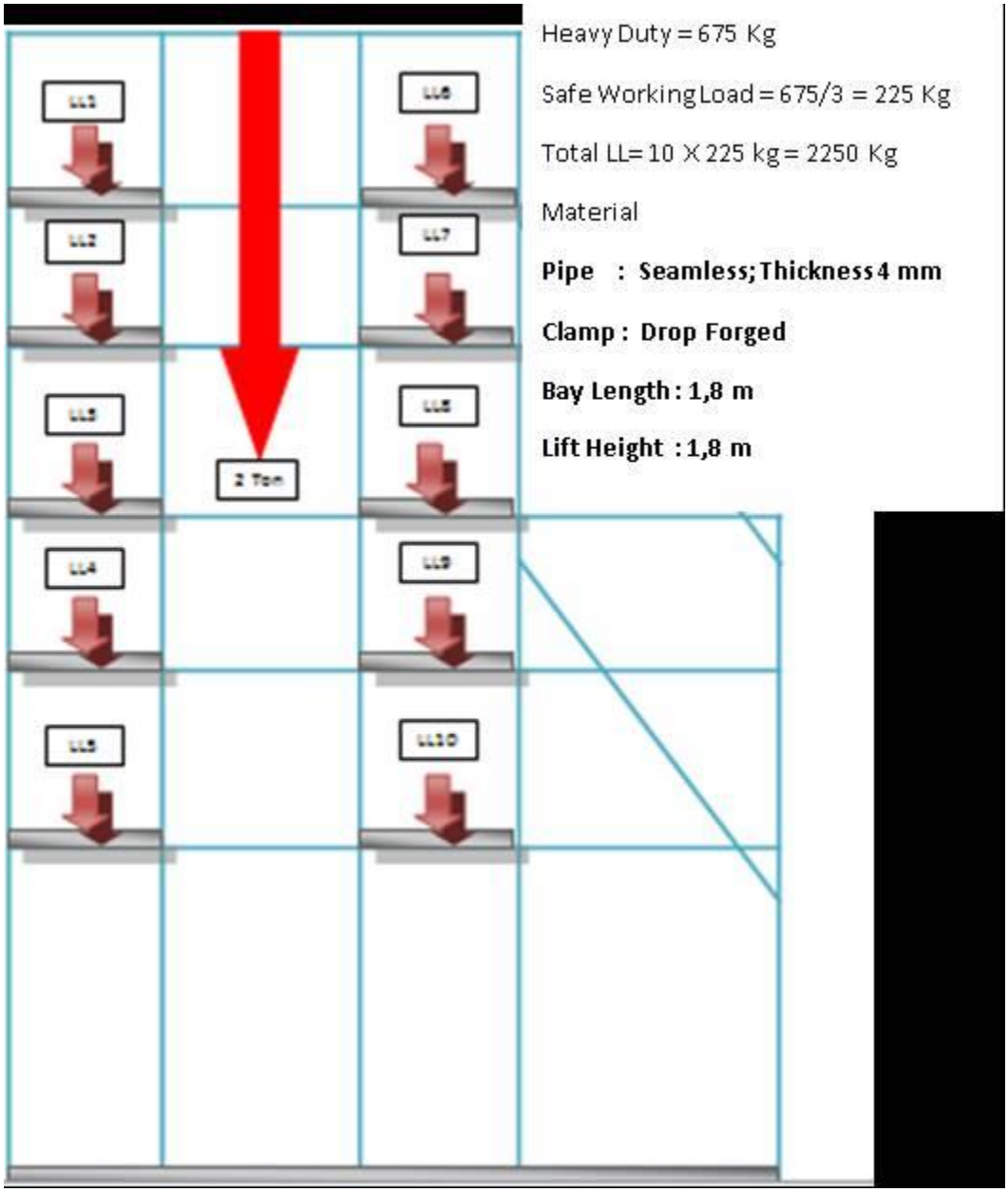

Figure 3. The design of Scaffolding

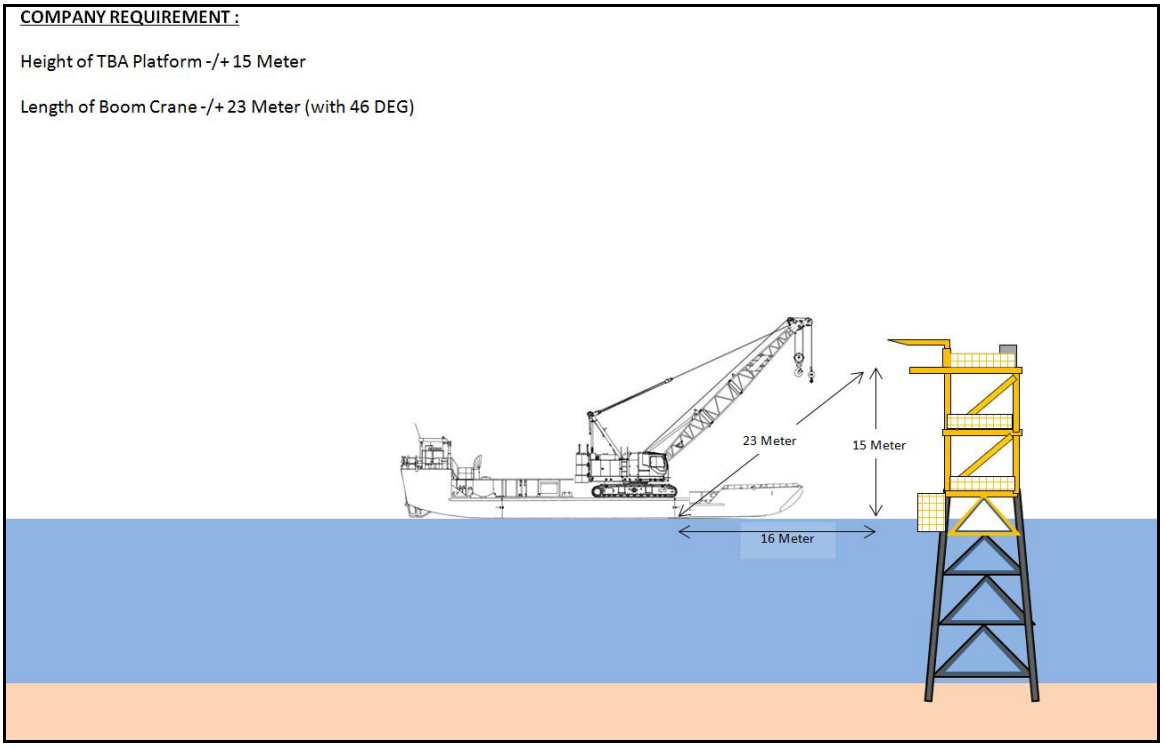

Figure 4. Lifting Support LCT with Mobile Crane

List of Tables

HSSE Risk elements			Initial risk		Risk improvement actions				Remaining Risk		Ref data
R - ID	Risk - (What)	Description - (Why)	Prob	Impact HSSE	Action - (How, Existing program and project)	Status	Responsible	Due date	Prob	Impact HSSE	
Rigging Up											
R 1-1	Personnel Injuries, hit by moving, Improper place of the equipment.	Rig Up	P3	I5	Tool Box meeting	Proposed	HSSE Officer	23.01.18	P2	I5	
					Don't stand near the swing or lifted equipment	Proposed	HSSE Officer	23.01.18			
					Good communication between foreman & crews and only one person that give command to lift up the equipment	Proposed	SLB Leader / Boat or Rigger crews	23.01.18			
					Asses & plan the workplace before move something	Proposed	SLB Leader / Boat or Rigger crews	23.01.18			
					Don't stand underneath during lifted equipment activities.	Proposed	HSSE Officer	23.01.18			
					Ensure shut the well in condition, All valves in close postion, Monitoring no pressure on CSG & TBG and bleeding down all rest of gas on wellhead.	Proposed	Production Supv. / HSSE Officer / SLB Leader	23.01.18			
Pressure Test											
R 2-1	Pressure leak, Equipment failure (Asset loss & personnel Injuries)	Pressure Test	P3	I5	Make sure Lubricator lines connection already have tight connected	Proposed	SLB Leaderman	23.01.18	P2	I5	
					Check all critical component regarding on the operation of the compressor	Proposed	SLB Leaderman	23.01.18			
					Function test Wireline Dual Hydraulic BOP & lubricator lines.	Proposed	SLB Leaderman	23.01.18			
Run Dummy Tool											
R 3-1	Tool failure and left in hole (Asset loss)	Run Dummy Tool	P2	I4	Check all the restriction in the well and clean out the strings by gauge cutter.	Proposed	SLB Leaderman	24.01.18	P1	I4	
					Recover back by fishing tools.	Proposed	SLB Leaderman	24.01.18			
Bleed Off											
R 4-1	Poisoning, fatality, environtment	Bleed Off	P3	I4	Put barricade near wellhead area during bleed off gas pressure and ensure no one work around the area.	Proposed	SLB Leaderman	24.01.18	P1	I4	
					Make sure connection was tightened & check no leaking on the line of bleeding.	Proposed	SLB Leaderman	24.01.18			
					Oil dispersant must ready in location	Proposed	HSSE Officer	24.01.18			
					Follow rules and procedure	Proposed	SLB Leaderman / Production Supv.	24.01.18			
Preparation Perforating Job											
R 5-1	(Asset loss & personnel Injuries)	Make Up Tube Carrier of Gun with Explosives	P3	I5	Prepare Permit To Work prior performing the job	Proposed	HSSE Officer / SLB Leaderman	26.01.18	P2	I5	
					Stop all communication with radio and Signal of cell phone to avoid premature explosion.	Proposed	HSSE Officer	26.01.18			
					Inform all crew to do radio silence and turn off frequency on cellphone, TV, etc.	Proposed	HSSE Officer	26.01.18			
					No loading gun activities when rainy or bad weather	Proposed	HSSE Officer / SLB Leaderman	26.01.18			
RIH & POH E-line cable											
R 6-1	Tool failure and left in hole (Asset loss), Struck by E-line cable, Personnel Injuries	RIH Perforating Gun by E-line cable	P2	I4	Conducting PJSM	Proposed	HSSE Officer	26.01.18	P1	I5	
					Prepare Permit To Work prior performing the job	Proposed	HSSE Officer / SLB Leaderman	26.01.18			
					Barricade possible access route to walk pass cable	Proposed	HSSE Officer / SLB Leaderman	26.01.18			
					Stop all communication with radio and Signal of cell phone to avoid premature explosion on surface.	Proposed	HSSE Officer / SLB Leaderman / Production Supv.	26.01.18			
					Ensure condition of sheaving wheel, connection & wireline cable in good condition	Proposed	SLB Leaderman	26.01.18			
Ringging Down											
R 7-1	High Pressure release, Struck by lubricator, Pinched, Finger Injury, fall down	Remove Lubricator Assembly & Wireline unit from TBA Platform	P3	I5	Bleed off the rest of pressure on wellhead prior N/D lubricator Assembly	Proposed	SLB Leaderman	29.01.18	P2	I5	
					Ensure all personnel in proper and safe working position	Proposed	SLB Leaderman	29.01.18			
					Always check condition of lifting gear before used	Proposed	SLB Leaderman	29.01.18			
					Make sure no personnel underneath during loading - offloading materials onto Supply Boat	Proposed	SLB Leaderman	29.01.18			

Table 1. Safety Risk Assessment