SUBSEA MAINTENANCE PHILOSOPHY
FAMILY 400

"We will never take shortcuts, we will never cut corners, and we will never sacrifice anything in pursuit of expediency. You have managements full support to take the time to do it right the first time."
Steven Newman, Executive Vice President, Chief Operating Officer.

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1. PURPOSE

The purpose of this document is to define the Maintenance Philosophy for Subsea equipment. This will identify what maintenance is to be carried out and when. It will explain the need for the planning process and identify the key elements that make up the critical path. The document also identifies what standard documentation will be required to be completed throughout the process. The document then goes on to explain the role of corrective maintenance, component condition evaluation, function / pressure testing and how major overhauls are to be dealt with.

2. RESPONSIBILILTY

Prior to performing a task, managers, subsea supervisors, and individuals shall take responsibility for the task. However, before they can take responsibility for the task, they shall understand and have a clear agreement about the desired results, who is going to perform the task, how the task is going to be performed, and when the task is expected to be completed.

When a manager, subsea supervisor, or individual accepts responsibility for a task, they also accept accountability for the result or outcome, good or bad. If a person encounters a situation over which they have responsibility, but do not have authority, that person shall notify someone who does have the authority so that the task can be completed and the desired results achieved.

3. ACCOUNTABILITY

Accountability is the ownership of results and a personal willingness to answer for the results of behaviors and actions, regardless of how things turn out. If results are unsatisfactory, the reasons should be reviewed, root cause(s) identified and reported as such. Managers and subsea supervisors should avoid blame and act immediately to correct the problem and learn from the experience to prevent it from happening again.

In a team or group situation, people shall clearly understand their own responsibilities and be individually and jointly accountable. Subsea team leaders shall be identifiable and shall take responsibility and be accountable for the team's results.

4. SUBSEA PLANNED MAINTENANCE TASKS

Subsea planned maintenance tasks fall into three categories

PLANNED MAINTENANCE TASKS THAT CAN ONLY BE CARRIED OUT WHEN THE EQUIPMENT IS ACCESSIBLE ON THE SURFACE

ADDITIONAL TASKS FOLLOWING EXTRAORDINARY OPERATING CONDITIONS

PLANNED MAINTENANCE TASKS THAT ARE PERFORMED OUT OF THE CRITICAL PATH AND DO NOT REQUIRE THE STACK TO BE ON THE SURFACE

Between well maintenance tasks are to be carried out every time the stack is on the surface.

Additional mandatory maintenance tasks shall be required due to extraordinary operational events for example:

- Any well control situations where operations have taken a kick and the BOP and riser have been utilized to secure the well
- Milling operations have taken place
- Stripping through the annular or pipe rams when closed
- Weather, high cyclical loads, excessive pressures overloading, aggressive drilling, DP disconnect, abnormal BOP or control operating characteristics
- Time driven tasks
- Elapsed time since the BOP was last on surface

Tasks that do not require the stack to be on the surface shall be performed off the critical path such as the choke manifold, riser tensioners, etc.

5. PLANNING SUBSEA BETWEEN WELL MAINTENANCE

SUBSEA BETWEEN WELL MAINTENANCE SHALL BE PLANNED, DOCUMENTED, AND REVIEWED

The purpose of the planning process is to ensure consistency of subsea maintenance planning across the fleet. The plan shall identify all concurrent and sequential tasks, resources, and estimated duration in a time line format. It is imperative that the critical path is easily identifiable.

The key elements identified below shall provide the best opportunity to ensure that the stack will be deployed and operated without failure and shall be included in every rig move plan.

- Seabed function test prior to pulling the stack (within 14 days of pulling the stack)
- Clean & flush riser auxiliary lines prior to unlatching.
- Flush BOP bore internally prior to moving the BOP to the storage area
- Perform full function test on surface prior to any maintenance.
- Rig Move PM's
- 365, 1085 and 1825 day PM's these tasks are often due during this critical path and shall be accounted for in the plan, these need to be carefully considered and scheduled accordingly.
- Corrective Actions / Repairs / Alerts & Advisories
- Upgrades
- Client request for changes such as ram re-configurations etc.
- Pre-deployment full function / pressure test with completed and signed check list
- Post deployment report

5.1 PLAN SUBMISSION AND APPROVAL

APPROVAL OF THE PLAN SHALL FOLLOW A FORMAL PROCESS AND SIGN OFF

AFTER APPROVAL, THE RIG MANAGER IS RESPONSIBLE FOR THE CIRCULATION OF THE PLAN

Obtaining approvals for the rig move work scope will ensure the ultimate buy in and ownership of the plan by all levels of the organization. It will indicate acceptance of the requisite work load and ensure the plan is achievable.

Subsea department supervisor will prepare the plan, and submit it to the Maintenance supervisor and OIM for their review, and draft approval. Once approved on the rig, the plan shall be sent for review by the onshore Subsea Superintendent and approval by the Rig Manager at least three weeks (or earliest opportunity) before the stack is due to be pulled.

Items submitted at the draft level shall not be deleted if they are not approved. Having a record of suggested work scope as opposed to approved work scope will add value down the road.

Any changes to the approved plan shall follow the process outlined above.

5.2 MAINTENANCE RECORDS

MAINTENANCE RECORDS SHALL BE MAINTAINED IN THE RIGS CMMS AND HARD COPIES WHERE APPROPRIATE

The CMMS is accessible to all authorized personnel throughout the company this allows access to what maintenance we are carrying out and their findings. It is of the utmost importance that complete and accurate information be entered in the work order notes. Determining an assets maintenance history in order to make technical and business decisions depends on clear and concise work orders notes. The planning document will be customized to each drilling unit and accessible upon request.

Hard copies of inspections, testing etc that cannot be incorporated in the CMMS are to be stored in the library.

5.3 SUBSEA EQUIPMENT PRE DEPLOYMENT SIGN OFF SHEET AND DOCUMENTATION

PRIOR TO EVERY DEPLOYMENT OF THE BOP, THE STANDARD PRE DEPLOYMENT SIGN OFF SHEET SHALL BE COMPLETED.

The BOP pre deployment sign off sheet will create shared responsibility for the work that was carried out (reference Appendix A).

The pre deployment documentation will include all items referenced on the BOP pre deployment sign off sheet.

Pre deployment documentation shall be filed in electronic and hard copy on the rig.

5.4 SUBSEA EQUIPMENT POST DEPLOYMENT DOCUMENTATION

POST DEPLOYMENT DOCUMENTATION SHALL BE COMPLETED FOLLOWING THE DEPLOYMENT OF THE BOP AND SHALL BE FILED IN ELECTRONIC AND HARD COPY ON THE RIG.

The post deployment documentation will be filled out detailing all relevant information for the BOP run. Information is to include the riser running sheet identifying information

for all joints deployed, pressure/function testing during riser deployment and after landing the BOP, over-pulls, connector lock pressure and gallon counts, etc.

6. CORRECTIVE MAINTENANCE

CORRECTIVE MAINTENANCE IDENTIFIES SHORTFALLS IN THE PREVENTATIVE MAINTENANCE PROGRAM OR EQUIPMENT DESIGN ISSUES

Corrective work orders are generated following a failure or as additional work generated during a planned preventative maintenance task. Corrective maintenance shall be correctly identified and recorded in the planning document. It is valuable and vital information for future critical path activity fleet wide and as such shall be recorded in order to facilitate input to the CMMS and to grow our knowledge sharing database. Any request for change to a standard PM task shall be submitted to the Maintenance department on the PM Change Request Form.

7. COMPONENT CONDITION EVALUATION

ALL COMPONENTS THAT REQUIRE INSPECTION, REPAIR OR REPLACEMENT SHALL BE SUBJECT TO A CONDITON EVALUATION USING THE APPROVED CONDITION EVALUATION FORM AND RECORDED IN ELECTRONIC FORMAT.

In order to develop mean time between failure and equipment normal wear rates it is necessary to evaluate components that are removed from service. All components removed, are required to be inspected and the data recorded on the Transocean condition evaluation form (reference Appendix B).

8. FUNCTION TESTING

PRIOR TO DEPLOYMENT, THE BOP SHALL BE FULLY FUNCTION TESTED. THE RESULTS SHALL BE RECORDED IN ELECTRONIC FORMAT.

All functions will be operated at the maximum rated control pressure. Any deviation from this shall be approved prior to deployment by the Subsea Superintendent. The maximum rated control pressure shall be clearly identified on the function test sheet for each component. The responsible party shall be fully aware of all pressure criteria for all equipment within their area of responsibility.

All functions shall be visually verified as correct. For example, if the Lower Inner Choke valve was functioned to the open position then a visual verification shall be done to ensure that the valve moved and in the correct direction.

As soon as the BOP / LMRP has been recovered for any reason a full function test shall be performed in order to identify problems and to flush clean BOP control fluid throughout the system.

9. PRESSURE TESTING

ANY TIME A WELL BORE PRESSURE CONNECTION IS BROKEN, THAT CONNECTION SHALL BE TESTED TO THE MAXIMUM REQUIRED WORKING PRESSURE.

BOLTED FLANGE TYPE OR CLAMP TYPE CONNECTIONS SHALL BE RE-TORQUED FOLLOWING THE INITIAL PRESSURE CYCLE BEFORE DEPLOYMENT.

If the BOP / LMRP / Riser String is in use when the full working pressure test is due then you shall perform the test at the first available opportunity.

10. 1825 DAY MAJOR OVERHAULS

ALL SUBSEA EQUIPMENT WILL BE SUBJECT TO AN APPROVED 1825 DAY TEST AND INSPECTION

MAJOR OVERHAUL REQUIREMENTS SHALL BE BASED ON THE RESULTS OF THE TEST AND INSPECTION

Often, equipment is within acceptable wear limits but is subjected to un-necessary expensive shop repair. While 1825 day overhauls are driven by regulatory requirements in some locations, this is not mandatory fleet wide.

A major survey shall include an inspection and condition evaluation with consideration to API recommendations. The condition of the equipment shall define the necessary repair work, if any. The required spare parts and potential machining requirements shall be planned for in advance. This information will provide an accurate high quality database of information which can be used to optimize future ongoing survey task requirements.

Field support shall be responsible and held accountable for arranging and overseeing all major overhauls conducted at third party facilities. Field support shall stipulate a repair specification with testing criteria that ensure quality results will be achieved.

11. CONTRIBUTING AUTHORS

The intent of this section is to identify all that share ownership of this document.

AMU: Mike Rogers, Geoff Boughton, Brad Rodger, Mike Fry, Craig McCormick, Simon Watson, Ewan Florence, Lee Reborse, Jim Farrell

EAU: Malcolm Allan, Phil Lobban, Jim Hume, Charlie Hill, Kenny Coutts

APU: J.P. Gimet, Dick Verhaagen, Patrick Guicheney, Frederic Alonso

HQS Subsea Performance Team: Scott McGrath, Jeff Jones, Brian Williams, Steve O'Leary, Dean Williams

HQS Engineering & Technical Support: Gary Leach, Steve Crichton, Richard Kyzar, Mark Weishaupt

HQS Maintenance: Leslie Smiles, Mike Rondeau, Ken Partain

12. TABLE OF REVISIONS

Revision	Effective Date	Description of Change	Author	Reviewer	Approver

BOP PRE-DEPLOYMENT SIGN OFF SHEET

Appendix A

Rig: _____

Well: _____

This sheet is to be signed off prior to running the BOP or LMRP (regardless of why it was pulled).

☐ Date: _____ The final agreed upon work list has been completed. The planning document has been kept updated to include any changes to the planned work during rig move.

☐ Date: _____ A full function test of the BOP Control system has been completed.

☐ Date: _____ BOP Pressure test completed and test charts reviewed by OIM.

☐ Date: _____ BOP Pre-Run checklist has been completed.

☐ Date: _____ All abnormalities have been reported to the OIM and to Technical Field Support.

☐ Date: _____ All required exemption(s) have been submitted and approved.

Subsea Supervisor: _____

Maintenance Supervisor: _____

ET/ Electrical Supervisor _____

OIM: _____

Rig Manager: _____ Date: _____

Component Condition Evaluation Form

Appendix B

Submit Completed Form to Field Support

Vessel	Date	Work Order number	Component	Task type	Planned Maintenance period
Condition evaluation	**Days in service**	**Status**	**PSS Code**	**OER #**	**Person Creating Report**
	Yes/No	**Notes**		**Yes/No**	**Notes**
Did the component fail in normal service conditions?			**Was component fit for continued service?**		
Did the component fail due to abnormal service conditions?			**Did component require parts to repair or maintain?**		
Did the component continue in service following a noted defect?			**Did component require unplanned maintenance before returning to service?**		
Did inspection require dimensional checks?			**Did inspection require NDT inspections?**		
Did the component show signs of abnormal wear, degradation or corrosion?			**Is PM task interval correct?**		

Use this component condition evaluation worksheet to record the condition of ALL critical system components removed for servicing, standard PM maintenance, Corrective Maintenance, and repairs and that develop as *extraordinary* maintenance not asked for in standard PM's.