REPORT OF SURVEY
Land Rig HUNT RIG 3

Prepared for
Stuart Petroleum Limited
Updated for GSLSM
Australia

By
MODUSPEC AUSTRALIA PTY LTD Perth

Dates: 7 – 13 August 2007
Status Update 11th – 15th December 2008
Project Title: HUNT RIG 3
Client Name: Stuart Petroleum Limited
Client Reference: Order No. PAU0196.1/PAU0275.2
Project Manager: Eric Adlard
Project Investigator: Not applicable
Report Author(s): Neal Waddell/Gerry Darnborough

**ABSTRACT**

This report has been written for Stuart Petroleum NL as a result of a survey conducted on the 7th to the 13th August 2007 and Status Update on the 11th to 15th December 2008 on the HUNT RIG 3, while the unit was working in Moomba South Australia and Status Update while the rig was in Tasmania. This report specifies what has been inspected/tested and in what manner. For the deficiencies noted a list of recommendations is provided. Where required, photos are provided to clarify the deficiencies noted. Bar graphs (ModuSpec Equipment Rating - MER) represent the condition of the unit in comparison with similar units in the same area.

**Keywords:** (e.g. industry category, study type)

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<th>Date of issue</th>
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<th>Approved by</th>
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<td>19th Dec 2008</td>
<td>GD/SG/EA</td>
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NOTE: The numbering system in this report corresponds with the ModuSpec survey programme and numbers which are omitted apply to equipment which was not reviewed during this survey.

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INTRODUCTION

2.1 Unit Data

Land rig: HUNT RIG 3
Owner: Hunt Energy
Built: 1981
Drilling depth: 6,000 ft
Location: Worrior 5, Moomba, South Australia
Status Update Location: Tasmania
Inspection dates: 5 - 13 August 2007
Status Update: 11 – 15 Dec 2008
ModuSpec references: NW/td/jp/ea – PAU0196.1
GD/sg/ea – PAU0275.2

2.2 Scope of Work

In accordance with the instructions received, we attended the land rig HUNT RIG 3 to complete a condition survey of the primary drilling equipment, mud system, well control equipment, power plant, electrical equipment, safety equipment, maintenance system and spare parts.

The purpose of this survey was to determine the general condition and state of maintenance of the equipment, in order to minimize downtime caused by mechanical breakdown during drilling operations and to ensure that the equipment is maintained in safe working order.

The survey was conducted in good faith, but the inspection of individual items of equipment was subjected to time and operational constraints imposed by rig operations at the time.

2.3 Applicable Standards and References

The criteria which have been used as reference during this survey are internationally recognized standards, local legislative requirements, client’s safety and operating standards, the original equipment manufacturer’s maintenance and operating specifications and accepted oilfield operating and safety practices.
2.4 ModuSpec Equipment Rating

The ModuSpec Equipment Rating (MER) is a unique system to:

- measure the condition of an individual rig,
- compare the inspection results of an individual rig with the industry average for this particular type of rig, worldwide or in a specific area,
- visualize the strengths and weaknesses of an individual rig,
- benchmark the safety and maintenance standards of an individual rig against other rigs or against the results of previous inspections,
- use as a risk analysis tool to proactively prevent accidents and downtime.

The added value of the MER system is that it visualizes and measures the present condition of a rig and its equipment. The MER allows a direct comparison of a rig with other rigs of the same type (jack-ups with jack-ups etc.) located in a predefined area or worldwide.

A series of bar charts representing the inspection results of the rig is included in the final inspection report. These bar charts are only applicable to the scope of work as stated in section 2.2.

The MER is presented as an average figure for the entire rig (chart 1) and for each individual section of the inspection programme (chart 3).

A low MER is an indication that steps must be taken, for instance:

1. address the recommendations made in the report,
2. effect structural improvements to the maintenance management system,
3. conduct a recheck after the recommendations made in the report have been addressed.

The following charts are included in the inspection report:

Chart 1: Rig Average Inspection Rating
In comparison with an industry average, this chart shows:

- the percentage of the ModuSpec inspection programme which was completed for the rig,
- the average MER for the entire rig.

Chart 2: Percentage Inspected
This chart shows the percentage inspected for each section of the rig in comparison with the average coverage during an inspection.

Chart 3: Detailed MER Results
This chart indicates how the rig is rated from a maintenance and safety-qualitative point of view, in comparison with an industry average for this type of rig for each individual section of the inspection.

Chart 4: Detailed Critical Rating
This chart shows the percentage of critical non-conformances identified for each section of the inspection programme in comparison with the industry average. This chart is an important indication of the risk to encounter a fatality or serious accident on the rig, and the possibility of environmental damage caused by the rig.
Chart 5: Detailed Major Rating
This chart shows the percentage of major non-conformances identified for each section of the inspection programme in comparison with the industry average. It is an important indication of the risk to encounter major equipment damage and/or operational downtime of the rig.

Chart 6: Detailed Minor Rating
This chart shows the percentage of minor non-conformances identified for each section of the inspection programme in comparison with the industry average. It is an important indication of the risk of lost-time incidents and it visualizes the overall safety and maintenance standards on the rig.

Note: Charts 4, 5 and 6 indicate the probability for the rig to encounter accidents and operational downtime measured against the industry average. These charts are very important indicators to establish whether or not the rig is capable of operating in a safe and reliable manner.

Validity of the MER
The MER is valid for the duration of one year after completion of the initial inspection.

If a recheck is conducted and completed within four months after the completion of the initial inspection, only the non-satisfactory and non-inspected items will be checked again. The MER is then valid for all equipment items which were inspected and found satisfactory during the initial inspection as well as during the recheck.

Revalidation of the MER must be completed within a year after completion of the initial inspection. An extension is possible for a maximum of three months after the expiry date so as to establish the revalidation of the MER, provided that:
- the inspection is completed within this three-month period,
- the inspection is requested prior to the initial expiry date.
### Rig Average Inspection Rating

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<td>83%</td>
<td>70%</td>
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<tr>
<td>Land Rigs Australia</td>
<td>60%</td>
<td>81%</td>
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2.4 ModuSpec Equipment Rating

### Percentage Inspected

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<td>88%</td>
<td>62%</td>
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<td>Mud System</td>
<td>89%</td>
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<tr>
<td>Well Control Equipment</td>
<td>52%</td>
<td>40%</td>
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<td>Power Plant</td>
<td>85%</td>
<td>72%</td>
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<td>Electrical</td>
<td>87%</td>
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<td>Safety</td>
<td>100%</td>
<td>74%</td>
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<td>Maintenance System</td>
<td>100%</td>
<td>89%</td>
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<tr>
<td>Spare Parts</td>
<td>93%</td>
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2.4 ModuSpec Equipment Rating

Detailed MER Results

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<td>Well Control Equipment</td>
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<td>Power Plant</td>
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<td>Electrical</td>
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<td>78%</td>
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<td>Safety</td>
<td>86%</td>
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<td>Spare Parts</td>
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<td>71%</td>
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2.4 ModuSpec Equipment Rating

Detailed Major Rating

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<td>6%</td>
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<td>29%</td>
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<td>Safety</td>
<td>14%</td>
<td>17%</td>
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<td>16%</td>
</tr>
<tr>
<td>Spare Parts</td>
<td>38%</td>
<td>0%</td>
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2.4 ModuSpec Equipment Rating

EXECUTIVE SUMMARY

3.1 Executive Summary

Land rig HUNT RIG 3 was inspected while it was being rigged up at the Worrior 5 location about 90 kilometres from Moomba in South Australia. We attended the rig from the 7th August 2007 until the 13th August 2007 to conduct a full condition survey on all equipment.

Our Workscope was to inspect the rig and give an independent analysis of all equipment so that our client, Stuart Petroleum Limited, would have a good idea of the condition of the rig for their upcoming drilling campaign. This survey included all safety critical equipment and systems and where possible equipment was opened up to enable measurements to be taken. The co-operation from the rig staff was excellent and we would like to thank them for their assistance and patience during what was a busy time.

The drawworks had recently undergone an overhaul where the main drum shaft and bearings had been replaced and the unit was seen to be functioning well with only minor issues noted in the report. The crown block sheaves were measured and three sheaves were seen to have groove depths larger than the maximum depth. These will need to be replaced as soon as replacements arrive on site. The mast was extensively inspected and seen to be in a reasonable condition. Several cracked, bent, and damaged bracings and tubulars were observed. The cracked tubular was repaired along with the damaged leg pad eye and crown jumper bar however a repair program should be implemented to address the rest of the bent and damaged bracings and spreaders. The swivel needs to be investigated as the main shaft clearance was measured as zero where there should be 0.003 inch to 0.006 inch clearance. There was also a concern where equipment that had been NDT inspected and marked as cracked was still going to be used. This equipment, as mentioned to the rig staff must be disposed of immediately or sent to town for repair.

The mud pumps and mud system were in a satisfactory condition with only a few items of concern. Number two pump’s left side pinion bearing was seen to have a large clearance and both pinion bearings would need replacing. There was also excessive clearance on two of the crosshead slides with one of these being badly scored as well. The mud tanks were seen to have some corrosion and would need ongoing repairs. The poorboy degasser was in a poor state and did not conform to any of the basic principals of how a degasser should work. However, a new poorboy degasser had arrived on site and was still to be fitted. All the Kelly, shock and coflex hoses around the rig were without any certification and it was impossible to determine the age of them or when any inspections had been performed on them. In particular the Kelly hose and number one mud pump shock hose were in a poor state and would need to be replaced as soon as operations permitted.

The diesel engines around the rig were in a reasonable condition with several items observed. None of the engine safeties had been tested and was a major concern, as a lack of engine oil in an engine could have catastrophic consequences. Injury to personnel, damage to equipment and down time could be the result. Another major concern was with the generators and their different frequencies. There was a mixture of 50Hz and 60 Hz alternators and motors on the rig. This was a concern as the equipment powered by these motors was rated for certain speeds. This speed would change, higher or lower, depending on which generator was running.
The BOP was unable to be pressure tested during this survey but was seen to be in a satisfactory condition. The BOP control unit would need some work to meet the minimum API 16D specification which included an independent backup power system and a loss to the system of more than 25% if an accumulator bank failed.

Certification and documentation records were very difficult to locate on the rig. Maintaining a filing system and following up on missing or lost documentation was important in keeping track of when equipment needed to be inspected or serviced. The planned maintenance system and how planned maintenance operated on the rig also needed to be reviewed and improved. We were, however, informed that the MEX planned maintenance system was going to be implemented soon.

3.2 Conclusion

Our detailed inspection of HUNT RIG 3 was conducted over a seven day period however due to the rigging up process not all equipment was inspected fully or run under full load. Generally, the rig was in a satisfactory operational condition having completed only 30 days since the last lost time injury. Morale at the rig site was low during the time of this survey and ModuSpec concluded it was because the staffs were being ‘pushed’ to get the rig working. Trying to rush or push staff can have detrimental effects, as we noted, on the crew and can lead to unsafe acts being committed.

Ultimately, the rig was able to drill a hole but the equipment was definitely showing signs of old age and lack of maintenance. When equipment is old, more time and money will need to be spent in keeping the equipment operating satisfactorily and up to industry standards. Preventative maintenance is also very important, when the MEX maintenance system is fully operational and being followed correctly breakdown repairs should be less frequent.

It was seen that a concerted effort was being made to keep all major equipment up to the API (American Petroleum Institute) standard with regard to testing and inspections. Therefore, if the ModuSpec recommendations are addressed; several of which have been completed already, and provided current standards were maintained, the rig should have little difficulty completing in its next drilling campaign successfully with minimal equipment failure.

The Hunt Energy Rig 3 was inspected with the previous ModuSpec survey of this rig used as a benchmark, and the previous ModuSpec recommendations reviewed to ascertain the level of improvements between the original survey and the present condition of the rig.

It was found that there was a marked improvement in the condition of the rig, which is to the credit of Hunt Energy, and their personnel, along with the use of the MEX planned maintenance program which Hunt Energy had implemented.

With the use of this system it was much easier to track vital documentation, and certification, as it was to obtain a complete continuous record of the improvements to the rig.
ModuSpec was able to establish through the MEX planned maintenance system that the majority of the recommendations made in the previous report to raise the general standard of the rig had been implemented.

The rig was still in the rig up stage during this inspection, so it was not possible to see the rig fully operational, but the level of improvement was obvious when compared with the previous report.

Various third party equipment inspection programs were now in operation to maintain the standard and the necessary certification and documentation for all the equipment on the rig to meet Australian standards and the relevant international standards.

During this inspection, two third party inspections were carried out, one to NDT various items of rig equipment such as pad eyes and including the rotary table bushings and the tools for pulling these bushings.

Bullivants were also on site carrying out a lifting register inspection on the slings and lifting equipment, including harnesses and fall arrestors.

ModuSpec would like to thank the Hunt Energy personnel for their assistance freely given during the survey.

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3.3 **End-of-Inspection Meeting Document**

<table>
<thead>
<tr>
<th>Date of meeting:</th>
<th>13 August 2007</th>
</tr>
</thead>
</table>
| **Client
Representative(s):** | Name | Title |
| | John Muir | Stuart Company Man |
| **Rig Staff:** | |
| | |
| **ModuSpec
Surveyor(s):** | Name | Title |
| | Neal Waddell | Surveyor |
| | **Gerry Darnborough** | **Surveyor** |

**Note:** The original signed end-of-inspection meeting document is kept on file in the applicable ModuSpec office and a copy can be provided upon request.

**Comment by the surveyor:** The end-of-inspection meeting was held on the 13th August 2007.
4.0 LIST OF RECOMMENDATIONS

The recommendations in this report are defined as follows:

**Critical recommendations**
Critical recommendations are based on shortcomings which may lead to loss of life, a serious injury or environmental damage as a result of inadequate use and/or failure of equipment.

**Major recommendations**
Major recommendations are based on shortcomings which may lead to damage to essential equipment or have a detrimental effect on the drilling operation as a result of inadequate use and/or failure of equipment.

**Minor recommendations**
Minor recommendations are based on shortcomings which may lead to a situation that contributes to an incident or to circumstances in which the required standards of operation are not met.

5.0 DRILLING EQUIPMENT

5.1.1.1 Critical
The breakout wire from the cathead was seen with several broken strands at the eye and would need to be replaced.

*Status: Closed*

*Comments:* This was replaced prior to spudding the well.

5.1.1.2 Major
Monitor the wear on the rotary drive sprocket on the drawworks side.

*Status: Closed*

*Comments:* Included in the MEX maintenance system and now included in drawworks pre-spud inspection.

5.1.1.3 Major
Repair the oil leak from the high clutch cover on the drawworks.

*Status: Closed*

*Comments:*

5.1.1.4 Major
Limit the amount of silicon applied when boxing up covers and flanges on the drawworks as the silicon can break off inside the drawworks and migrate to oil suction, galleries and nozzles and cause blockages.

*Status: Closed*

*Comments: This is used in conjunction with gasket material where possible. Other solutions / materials have been used where possible.*

5.1.1.5 Major
Repair the leak on the drawworks lubricating oil pump.

*Status: Closed*

*Comments: New pump installed*

5.1.1.6 Major
Replace the missing bolt on the drawworks low clutch.

*Status: Closed*
Comments:

5.1.1.7 Major Replace the worn friction pads for the Fawick hydromatic clutch on the drawworks.
Status: Closed
Comments: Spare clutch assembly held in rig stock. Further evaluation completed and the current clutch was deemed as acceptable for continued service.

5.1.1.8 Major Secure the rotary chain case as the securing bolt was missing and the chain case was loose.
Status: Closed
Comments: The chain case was assessed as an OEM faulted design and was modified/repaired earlier in the year. The integrity of the repairs/modifications were to be monitored during drilling operations.

5.1.1.9 Minor Replace the worn kickback roller on the driller's side of the drawworks.
Status: Closed
Comments:

Band Brake Recommendations:

5.1.1.1.1 Major Confirm whether the spare brake bands had also been NDT inspected and a report had been filed. Confirm that the brake bands were inspected around their full circumference.
Status: Open
Comments: The NDT inspection had not been conducted on the full circumference of the brake bands.

5.1.1.1.2 Major Perform NDT inspections on the brake bands and brake linkages as no records could be found for any previous inspections.
Status: Closed
Comments: NDT inspections had been completed

Rotary Table Recommendations:

5.2.1.1 Major Perform oil sample analysis on the rotary table oil and analyze the results.
Status: Closed
Comments: Sampling and analysis had commenced with the results to be included in MEX maintenance history.

Swivel Recommendations:

5.4.1.1 Critical Perform an inspection of the threaded connections on the swivel and check for cracks. Retain all records on the rig.
Status: Closed
Comments: The swivel has been replaced with a certified swivel.

5.4.1.2 Major Investigate why the quill shaft clearances were measured as zero and rectify.
Status: Closed
Comments: Unit shopped and rectified

5.4.1.3 Major Replace the ball pins on the swivel as the maximum allowable clearance is 0.040 inch and these were showing 0.068 inch.
Status: Closed
Comments: New bail pins installed.

5.4.1.4 Minor All records pertaining to inspections or tests carried out on the swivel must be stored on the rig.
Status: Closed
Comments: The swivel has been replaced with a certified swivel.

5.5.1.1 Critical Perform periodic inspections on the Kelly spinner required by API RP 8B
Status: Closed
Comments: Periodic kelly inspections now included in MEX maintenance system.

5.5.1.2 Major Replace the missing bolt on the Kelly spinner top cover plate.
Status: Closed
Comments:

Kelly Spinner Recommendations:

5.6.1.1 Major Ensure that the Kelly is regularly inspected and wear is continually monitored.
Status: Closed
Comments: Periodic kelly inspections now included in MEX maintenance system. The kelly was inspected prior to spud-in of Worrior 5. Repairwork was conducted under work order 1465.

5.6.1.2 Major Investigate the high roller clearances on the Kelly bushings and rectify.
Status: Closed
Comments: The kelly was inspected prior to spud-in of Worrior 5.

5.6.1.3 Major Perform a NDT inspection on the Kelly bushings as the last inspection was seen to have been completed over a year ago.
Status: Closed
Comments: Completed under Work Order 1465.

Kelly and Kelly Drive Bushing Recommendations:

5.7.1.1 Critical Replace the three sheaves on the crown block with the groove depths that are under size as per API 9B section 4.8.2.
Status: Closed
Comments: New sheaves installed under Work Order 1790.
5.7.1.2  Minor  Ensure records for all inspections and maintenance performed on the crown block are kept on the rig.  
**Status:** Closed  
**Comments:** Records of inspections and maintenance are now included in the MEX system.

5.10.1.1  Major  Ensure that the new anchor dies for the dead man anchor are fitted when they arrive on the rig.  
**Status:** Closed  
**Comments:** New anchor dies for the deadline anchor have been torqued to 310 ft-lbs. Work Order 844.

5.10.1.2  Major  Install an audible alarm at the driller’s console for low rig air pressure.  
**Status:** Closed  
**Comments:**

5.10.1.3  Major  Install an audible alarm at the driller’s console for low water day tank level.  
**Status:** Open  
**Comments:** Not completed.

5.11.1.1  Critical  Remove unsecured block of wood from the first frame below the crown as it has the potential to be a dropped object.  
**Status:** Completed  
**Comments:** This had been removed.

5.11.1.2  Critical  Remove loose piece of wood from the crown block safety timbers as it has the potential to be a dropped object.  
**Status:** Closed  
**Comments:**

5.11.1.3  Major  Repair cracked and bent tubular on the drillers side of the derrick near the crown and the badly damaged angle iron bracing on the top section directly above the wind wall and on the off driller’s side of the mast. The cracked and bent tubular has been repaired but the angle iron has not.

5.11.1.4  Major  Repair the cracked lighting frame in the mast on the driller’s side.  
**Status:** Closed  
**Comments:** Completed under Work Order 1618.

5.11.1.5  Major  Repair the cracked section of angle iron in the base of the mast on the off drillers side.  
**Status:** Closed  
**Comments:** Completed under Work Order 1618.

5.11.1.6  Major  Repair the cracked backup tong pin welded to the mast on both sides.  
**Status:** Completed  
**Comments:** This has been completed.
5.11.1.7  Major  Install a longer bolt in the mounting bracket on the off driller's side just above the windwall.

*Status: Closed
Comments: Completed under Work Order 1618.*

5.11.1.8  Major  Secure the electrical junction box with both bolts to the derrick just above where the lower mast attaches to the upper mast.

*Status: Closed
Comments: Completed under Work Order 1618.*

5.11.1.9  Major  Repair the broken welds to the windwall on the off driller's side.

*Status: Closed
Comments: Windwall has been removed.*

5.11.1.10  Major  Investigate the excessive clearance on the Kelly hose side bridal sheave.

*Status: Open
Comments: Not completed. Listed on Work Order 1618.*

5.11.1.11  Major  Produce certificates for the bridle line so the age of the wire could be determined.

*Status: Closed
Comments: Completed under Work Order 1618.*

5.11.1.12  Major  Provide a safer means of loading the tong hanger counterweights as they were full of junk that could fall out.

*Status: Open
Comments: To be completed prior to spudding well. Listed on Work Order 1618.*

5.11.1.13  Major  Change the lifting lugs on the tong hanger counterweights to certified lifting eyes.

*Status: Open
Comments: To be completed prior to spudding well. Listed on Work Order 1618.*

5.11.1.14  Major  Remove all obsolete equipment like brackets and steel plates from the mast.

*Status: Closed
Comments: Completed under Work Order 1618.*

5.11.1.15  Major  Repair the damaged jumper bar weld for the fast line sheave at the crown. *This has been completed.*

5.11.1.16  Major  Repair the damaged lug for the base of the ‘A’ frame on the off driller’s side. Ensure the correct welding procedure is used whilst doing this work and have the repair MPI tested when work has been completed. *This has since been completed.*
<table>
<thead>
<tr>
<th>Code</th>
<th>Type</th>
<th>Description</th>
<th>Status</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.11.1.17</td>
<td>Major</td>
<td>Perform NDT inspections on the bridal line sheaves and their mountings.</td>
<td>Open</td>
<td>NDT testing was in progress during the ModuSpec inspection prior to spudding the well. Listed on Work Order 1618.</td>
</tr>
<tr>
<td>5.11.1.18</td>
<td>Major</td>
<td>Remove two-part shackles from in the mast and replace with four-part shackles.</td>
<td>Open</td>
<td>The two-part shackles from the tugger line on the rig floor were to be removed. Listed on Work Order 1618.</td>
</tr>
<tr>
<td>5.11.1.19</td>
<td>Major</td>
<td>All bent and damaged tubulars, bracings and cross members in the mast are to be repaired. The cracked tubing near the crown has been repaired.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.11.1.20</td>
<td>Major</td>
<td>Ensure that flame cut holes and pad eyes in the mast are removed.</td>
<td>Closed</td>
<td>Completed under Work Order 1618.</td>
</tr>
<tr>
<td>5.11.1.21</td>
<td>Major</td>
<td>Replace the mast base pad mounting studs as several of them are too short.</td>
<td>Open</td>
<td>To be completed prior to spudding the well. Listed on Work Order 1618.</td>
</tr>
<tr>
<td>5.11.1.22</td>
<td>Major</td>
<td>Repair the areas at the crown where the drilling line has started to wear into the foundations and crown platform.</td>
<td>Closed</td>
<td>Completed under Work Order 1618.</td>
</tr>
<tr>
<td>5.11.1.23</td>
<td>Major</td>
<td>Repair the cracked boxed sections at the base of the ‘A’ frame legs where they are attached to the mast legs.</td>
<td>Closed</td>
<td>Completed under Work Order 1618.</td>
</tr>
<tr>
<td>5.12.1.1</td>
<td>Critical</td>
<td>Casing Stabbing Board Recommendations:</td>
<td>Closed</td>
<td>Safety lines were installed prior to spudding the well.</td>
</tr>
<tr>
<td>5.13.1.1</td>
<td>Critical</td>
<td>Tuggers and Sheaves Recommendations:</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ensure both tuggers are fitted with spooling devices.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5.13.1.2 Critical Ensure that the yearly NDT inspections on the foundations for the Toku tugger are performed and change the mounting bolts as no records were seen when they were last changed.

*Status: Closed*

*Comments: NDT testing was in progress during the ModuSpec inspection prior to the spud-in of the well.*

5.13.1.3 Critical Install a drum guard to the 400kg Toku tugger.

*Status: Closed*

*Comments:*

5.13.1.4 Critical Ensure that the Toku 400kg winch is not used for man riding as no certification was found indicating that the Toku winch was capable on man riding. A certified man riding winch with two independent braking systems should replace the unit if man riding operations are to be performed.

*Status: Open*

*Comments: The Toku 400kg winch must never be used as a man-riding winch unless certified. It must have a clear notice on the winch to advise it must never be used as a man-riding winch.*

5.13.1.5 Major Lengthen the Toku winch foundation bolts as they are too short.

*Status: Closed*

*Comments:*

5.13.1.6 Major Determine if the weld repair on the 2,000kg tugger has affected the structural rating of the winch.

*Status: Closed*

*Comments:*

5.13.1.7 Major Install an exhaust air muffler for the Toku winch on the drill floor.

*Status: Closed*

*Comments:*

5.13.1.8 Major Free-up the control handle for the Toku air winch as it was quite stiff and did not return to the neutral position.

*Status: Closed*

*Comments:*

5.13.1.9 Minor Ensure the Toku tugger is marked with the safe working load that is readily visible.

*Status: Closed*

*Comments:*

5.15.1.1 Major Perform NDT inspections on the pipe spinning wrench as the last inspection report is over a year old.

*Status: Closed*

*Comments:*

Fingerboards Recommendations:
5.17.1.1.1 Critical Replace the bent tong hanger on the makeup tongs. This has since been completed.

5.17.1.1.2 Critical Ensure that the cracked jaws and lugs as indicated by Oilfield Inspections for the tongs are removed from service immediately. Status: Closed

Comments:

5.17.1.1.3 Critical Consider using mechanical aids for making up and breaking down pipe for example an iron roughneck. Status: Open

Comments: A new hydraulic power supply had been ordered and installed recently. There were no plans in place yet for new catheads. Hunt Energy would like to go forward with the implementation of automated handling equipment.

5.17.1.1.4 Critical Ensure that the counterweights and hanging wires are checked as part of the regular lifting gear inspection program. Refer to API RP 54 Section 9.6, RP 2D and RP 9B. Status: Closed

Comments: These items have been added to the lifting register inspection requirements.

5.17.1.1.5 Major Ensure that the tong dies retention pins are the OEM manufactured pins and not bolts. Status: Closed

Comments:

5.17.1.1.6 Major Repair the pin retaining nuts with the broken welds in several of the tong jaws. Status: Closed

Comments:

5.17.1.1.7 Major Monitor the wear of the tong jaw pins as some pins were showing signs of wear. Status: Open

Comments: Include the monitoring of the tong jaw pins in the MEX maintenance programme.

5.17.2.1.1 Minor Store the dog collars in an oil bath when not in use. Status: Open

Comments:

5.17.4.1.1 Critical Determine the original size of the elevator links and depending on the specification obtained the elevator links might need to be down rated. Status: Open

Comments: Measurements need to be confirmed.
Master Bushings Recommendations:

5.17.6.1.1 Major Confirm if the master bushings and bowl pullers are included in the lifting gear inspection program. Produce the documentation to show this.

*Status: Closed*

*Comments: The bushings and pullers have been included in the lifting register inspection requirements. NDT inspections were in progress during the ModuSpec inspection prior to spud-in of the well.*

Fingerboards Recommendations:

5.17.8.1.1 Critical Investigate why the Geronimo escape unit sheaves are seized and rectify.

*Status: Closed*

*Comments:*

5.17.6.1.2 Major Ensure that safety chains on the fingers are installed to the very end of the finger. This is to safeguard against a finger being broken half way along its length.

*Status: Open*

*Comments:*

5.17.6.1.3 Major Ensure that safety chains are installed onto the hinged gratings next to the derrickman’s work platform.

*Status: Closed*

*Comments:*

5.17.6.1.4 Major Ensure that safety chains are fitted to the two hinged gratings sliding pins.

*Status: Closed*

*Comments:*

5.17.6.1.5 Major Ensure that secondary retention chains are fitted to the gate on the one side of the monkeyboard.

*Status: Closed*

*Comments:*

5.17.6.1.6 Major Repair the poorly welded hand rail box sections and cracked areas.

*Status: Closed*

*Comments:*

Drill Floor Recommendations:

5.19.1.1 Major Ensure all flame cut and home made pad eyes are removed from in the substructure.

*Status: Closed*

*Comments:*

Drill String Recommendations:

5.20.1.1 Major Ensure that all scrapped drill pipe is removed from site and either repaired in town or disposed of.

*Status: Closed*

*Comments:*
<table>
<thead>
<tr>
<th>Section</th>
<th>Level</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
</table>
| 5.21.1.1 | Major | Drilling Subs Recommendations: | Ensure that all scrapped subs are removed from site and either repaired in town or disposed of. *Status: Closed*  
*Comments:* |
| 5.23.1.1 | Critical | Power Tong Recommendations: | Remove the two bolts being used for hanger pins in the casing tongs and replace with the correct manufacturer’s pins.  
*Status: Closed*  
*Comments:* |
| 5.23.1.2 | Major | Power Tong Recommendations: | Perform NDT inspections on the hydraulic casing tongs.  
*Status: Closed*  
*Comments:* |
| 6.0 | | MUD SYSTEM | |
| 6.1.1.1 | Critical | Mud Pumps Recommendations: | Investigate the reason why one of the units on the pulsation dampener for number one mud pump was not holding a pre-charge.  
*Status: Closed*  
*Comments: New pulsation dampener installed.* |
| 6.1.1.2 | Critical | Mud Pumps Recommendations: | Cut an access point in the roof of the container so as to get access to the top unit of the pulsation dampener for number one mud pump and check the pre-charge for that unit.  
*Status: Closed*  
*Comments:* |
| 6.1.1.3 | Major | Mud Pumps Recommendations: | Replace both mud pump drive belts as they are damaged, cracked and the belts have started separating from one another.  
*Status: Closed*  
*Comments:* |
| 6.1.1.4 | Major | Mud Pumps Recommendations: | Replace the spade and seat for number one mud pump isolation valve on the discharge line.  
*Status: Closed*  
*Comments:* |
| 6.1.1.5 | Major | Mud Pumps Recommendations: | Install clamps that are more rigid than the existing ones on the high pressure discharge lines. As per API RP 54 section 9.13.2.  
*Status: Closed*  
*Comments:* |
| 6.1.1.6 | Major | Mud Pumps Recommendations: | Ensure that no welding is performed on high pressure pipe lines as seen by the welding of lugs on the relief valve discharge line for the mud pumps.  
*Status: Closed* |
Comments: Standard procedures governing welding practices have been established.

6.1.1.7 Major Replace the short studs on the fluid end of number 1 mud pump. Studs are to be the same length as the studs on number 2 mud pump complete with nuts and locking nuts.

6.1.1.8 Major Repair or replace the damaged Demco valves on the top of the mud tank. Ensure that all valves operate correctly.

6.1.1.7 Major Change the short studs for longer ones on number two mud pump’s discharge module flange. Status: Open Comments: Not completed.

6.1.1.8 Major Investigate the scoring on the left hand crosshead slide for number one mud pump, looking from the power end, and rectify. Status: Open Comments: Not completed

6.1.1.9 Major Investigate and rectify the high crosshead clearances obtained on the left hand slide for number one pump and the right hand slide for number two pump. Status: Open Comments: Not completed

6.1.1.10 Major Replace the pinion bearings in number two mud pump as the left hand bearing had excessive clearance and pinion bearings should always be changed as a pair. Status: Closed Comments: New power end has been installed.

6.1.1.11 Major Screw the protective cap onto the Oteco pressure relief valve for number two mud pump. Status: Closed Comments:

6.1.1.12 Major Determine if the one ten inch suction line to both mud pumps is sufficient to supply both these pumps simultaneously when operating at maximum strokes per minute. Status: Open Comments: Rig has tested pump efficiencies with Halliburton during drilling, recorded as 97% efficient. This could be confirmed again during drilling of the next well.

6.1.1.13 Major Change the oil on number two mud pump and clean out the oily grit residue collecting in the dead spaces around the left hand crosshead. Status: Closed Comments: New power end has been installed.
6.1.1.14 Major Replace the pinion shaft oil seals on both mud pumps.  
**Status:** Open  
**Comments:** Only number 1 pump had been completed.

6.1.1.15 Major Investigate all the pony rods on both pumps for surface damage like pitting and scoring and replace the worst ones with the spares on hand.  
**Status:** Closed  
**Comments:**

6.1.1.16 Minor Install a valve handle to the cellar jet line valve on number one mud pump.  
**Status:** Closed  
**Comments:**

Shale Shakers (General) Recommendations:

6.2.1.1 Major Install earth bonding cables for both the shakers vibrator units.  
**Status:** Open  
**Comments:** Not complete.

Desiliter Recommendations:

6.4.1.1 Major Mount a pressure gauge on the inlet line to the desilter.  
**Status:** Open  
**Comments:**

6.4.1.2 Major Investigate why the several desilter cones were not working and rectify.  
**Status:** Open  
**Comments:** The desilter was not running at the time of the ModuSpec inspection.

6.4.1.3 Major Repair the leaking discharge box for the desilter.  
**Status:** Open  
**Comments:** The desilter was not running at the time of the ModuSpec inspection.

Desander Recommendations:

6.5.1.1 Major Mount a pressure gauge on the inlet line to the desander.  
**Status:** Open  
**Comments:** This task had not been completed at the time of the ModuSpec inspection.

6.5.1.2 Major Replace the missing valve handle on the desander inlet butterfly valve.  
**Status:** Open  
**Comments:** This task had not completed at the time of the ModuSpec inspection.

Centrifugal Pumps Recommendations:

6.7.1.1 Major Investigate the leaking shaft glands on both the centrifugal mix pumps and rectify.  
**Status:** Closed
Comments: New packing installed.

Mud Agitators Recommendations:

6.8.1.1 Major Investigate the excessive play in the shaft bearing for the agitator and rectify.
Status: Closed
Comments:

Mud-Mixing System Recommendations:

6.9.1.1 Critical Ensure the stock in the PPE locker in the hopper room is fully stocked with safety equipment such as eye protection, noise arresters, rubber gloves, apron, dust mask, etc.
Status: Closed
Comments:

6.9.1.2 Major Install a dust extractor to the hopper in the room at the end of the mud tanks.
Status: Open
Comments: Not completed.

6.9.1.3 Major Repair the suction line into the one mud mixing pump as there was a temporary repair on the line.
Status: Closed
Comments: Temporary repair still in place.

6.9.1.4 Major Fit a handle to the mud gun next to the shakers as the handle is missing.
Status: Open
Comments: Not completed.

6.9.1.5 Major Arrest the corrosion on the mud tank wall near the top of the tanks. Several areas were seen to be corroded through.
Status: Open
Comments: Ongoing.

6.9.1.6 Major Fully weld the poor penetration of the mud mixing lines to the mud tank.
Status: Closed
Comments: Ground out and rewelded.

6.9.1.7 Major Repair or replace all the valves in the mud system. The majority of the mud system valves could not be operated.

6.9.1.8 Major Remove the older type open bottom mud/gas separator from the mud tank and install the new independent unit now on the lease. The open bottom type separator is not acceptable as it may lose its mud seal if the tank level gets too low.

Flow Line System Recommendations:

6.9.2.1.1 Major Remove the home made flame cut pad eyes from the flowline and replace with machine cut certified pad eyes.
Perform a NDT inspection of all the welds newly fitted pad eyes.

**Status: Closed**

**Comments:**

6.9.2.1.2 Major Raise the height of the bell nipple outlet so that there is more of an angle in the flowline.

**Status: Open**

**Comments: Not completed.**

6.9.2.1.3 Major Increase the size of the flowline as it was the same size as the suction for both the mud pumps.

**Status: Open**

**Comments: Not completed.**

Standpipe Manifold and Rotary Hoses Recommendations:

6.10.1.1 Critical Replace the Kelly hose at the soonest opportunity as the outer rubber sheath has been extensively damaged revealing the wire reinforcing.

**Status: Closed**

**Comments:**

6.10.1.2 Critical Replace the shock hose from number one mud pump at the soonest opportunity as the outer rubber sheath has been deeply gouged and the reinforced wiring underneath was corroded and damaged.

**Status: Closed**

**Comments:**

6.10.1.3 Critical Remove from service the two under size sections of two inch pipe from the standpipe manifold as they are only 4.27mm and 4.97mm thick. Replace these two connections with the correctly scheduled pipe.

**Status: Open**

**Comments: No certification was sighted by ModuSpec.**

6.10.1.4 Critical Ensure that the safety chain for the Kelly hose at the top of the standpipe manifold is secured at the correct place and not the lifting eye. (API Spec 7K)

**Status: Closed**

**Comments:**

6.10.1.5 Critical Fabricate a certified section of pipe work for the cellar jetting line and remove from service the existing home made pipe work.

**Status: Closed**

**Comments: Wilden pump installed for the cellar.**

6.10.1.6 Critical Repair the gouges and abrasions on the external rubber sheath on number two mud pump shock hose.

**Status: Closed**

**Comments: New hose supplied.**

6.10.1.7 Major Implement a hose register where the Kelly and shock hoses are managed a maintenance system. This system
would give details on the interval and what type of inspections to perform.

**Status:** Open

**Comments:** Include the hose register in the records of the MEX programme.

### 6.10.1.8 Major

Ensure that all high pressure piping repairs are supplied with the correct documentation and certification at the end of the job.

**Status:** Open

**Comments:** Enter all high-pressure piping repair details and certification into the records of the MEX programme.

### 6.10.1.9 Major

Pressure test each individual valve and the standpipe manifold to its rated working pressure due to this test not being performed during the inspection.

**Status:** Open

**Comments:** Not witnessed by ModuSpec during the inspection. This must be done as part of BOP test prior to drilling out the shoe.

## 7.0 WELL CONTROL EQUIPMENT

### 7.1.1.1 Major

Produce the documentation and certification for the rental Cameron BOP and ensure it is retained on the rig.

**Status:** Closed

**Comments:** Not applicable - Shaffer BOP was deployed. Certification was held on rig for the Shaffer BOP.

### 7.1.1.2 Major

Ensure that a full pressure test rated at working pressure is performed on the BOP stack when it is fully assembled.

**Status:** Open

**Comments:** To be completed when the BOP stack is fully assembled.

### 7.1.5.1.1 Critical

Ensure that when pressure testing is taking place rig crews are alerted and only necessary personnel are to enter the pressure test area. The pressure test area should be barrier taped off.

**Status:** Open

**Comments:** To be completed when the BOP stack is fully assembled.

### 7.2.4.1.1 Minor

Grease should be put into the bolt holes while the unit is not being used and the BOP is in transit.

**Status:** Open

**Comments:** This task was to be added to the Rig Move manuals and JSA.
7.2.4.1.2 Major Produce a current certificate for the Hydril annular preventer. Retain a copy of the certificate at the rig site.

Gate Valves (BOP-Mounted) Recommendations:

7.3.1.1 Major Perform a full working pressure test on all valves in the well control system and document the results.
Status: Open
Comments: To be completed. The full complement of BOP gate valves was not mounted at the time of the ModuSpec inspection.

Choke Manifold Recommendations:

7.4.1.1 Major Replace the short studs for longer ones on two of the flanges on the choke manifold.
Status: Open
Comments: Not completed.

7.4.1.2 Major Perform a full working pressure test on all valves in the choke manifold and document the results.
Status: Closed
Comments: Test results and certification were reviewed.

Coflexip Hoses Recommendations:

7.4.1.1.1.1 Major Ensure that the coflex hoses are inspected according to the manufacturers specifications and at the intervals stated by the manufacturer. This is generally every three years as stated in API RP 53 section 17.10.3. Retain all documentation of any inspections performed on the rig.
Status: Open
Comments: The hoses mentioned were recent purchases within the past 18 months. Maintenance policies have been created and were entered into the MEX programme.

7.4.1.1.2 Major Produce documentation showing the date of installation of all coflex hoses in use on the rig.
Status: Closed
Comments: Purchase order sighted.

7.4.1.1.3 Major Produce a current test certificate for the Coflexip hoses installed on the BOP. Retain a copy of the certificates at the rig site.

7.4.2.1.1 Major Ensure that the old poorboy degasser is removed from service as soon as possible and replaced with the new one.
Status: Open
Comments: The old mud/gas separator has not been removed. The new unit was on the lease but not installed.
7.4.2.1.2 Major Obtain the relevant documentation and certification for the poorboy degasser.

*Status: Open*

*Comments: Documentation was not available.*

7.4.2.1.3 Major Ensure that the new poorboy degasser is fitted with a ‘U’ tube enabling the degasser to have a 10 foot mud seal.

*Status: Open*

*Comments: The new mud/gas separator was not installed at the time of the ModuSpec inspection.*

7.7.1.1 Critical Replace the discharge hose from the triplex pump of the BOP unit with hard piping as the hose is a single point failure.

*Status: Closed*

*Comments:*

7.7.1.2 Critical Ensure that at least two pumping systems, each having an independent dedicated power supply should be installed on the BOP control unit as per API Spec 16D section 5.1.2.1 (2005).

*Status: Closed*

*Comments:*

7.7.1.3 Critical Ensure that all the accumulator bottles for the BOP control unit are pre-charged to 1,000psi and the two bottles with 500psi and 750psi are charged as soon as nitrogen arrives on site. *This has since been completed.*

7.7.1.4 Critical Ensure that one remote panel is supplied and made accessible to the driller for the BOP control unit as stated in API Spec 16D section 4.3.3.1.

*Status: Closed*

*Comments:*

7.7.1.5 Major A testing and re-certification program must be in place for the relief valve on the BOP control unit as per API RP 576 section 6.1.2.

*Status: Closed*

*Comments: Completed June 2008.*

7.7.1.6 Major Refit the pneumatic lines to the manifold regulators on top of the hydraulic BOP control unit tank.

*Status: Closed*

*Comments: Completed June 2008.*

7.7.1.7 Major Supply sufficient accumulator bottles on the individual banks of the BOP control unit so that a loss of an individual accumulator or bank will not result in more than a 25% loss of the total accumulator system capacity. (API Spec 16D section 5.1.3.2 2005)

*Status: Open*

*Comments: An equal number of bottles must be on each bank of the accumulator*
7.7.1.8  Major  Provide a protective guard on the sight glass for the oil tank on the BOP control unit.

*Status: Closed*

*Comments:*

7.7.1.9  Minor  Re-install the vent valve on the BOP control unit and mark it normally closed.

*Status: Open*

*Comments: Vent valve must be re-installed and must be marked normally closed.*

7.7.1.10 Minor  Number the accumulator bottles on the BOP control unit so that when maintenance is performed bottles are easily identified and also mark the maximum working pressure signs.

*Status: Open*

*Comments: Not completed at the time of the ModuSpec inspection.*

7.7.1.11 Minor  Mount signage that indicated the BOP hydraulic control unit may start at any time.

*Status: Open*

*Comments: Warning sign not posted.*

**9.0**

**POWER PLANT**

**9.1.1.1**  Critical  Modify the existing guarding for the rotating parts on number two drawworks engine as there is a large gap in it.

*Status: Closed*

*Comments:*

**9.1.1.2**  Major  Replace the exhaust expansion piece on number one drawworks engine.

*Status: Closed*

*Comments:*

**9.1.1.3**  Major  Stop the oil leaking from number two drawworks engine coupling cover after the torque converter.

*Status: Closed*

*Comments:*

**9.1.1.4**  Major  Investigate the oil leak emanating somewhere around the cylinder head and tappet cover on number one drawworks engine.

*Status: Closed*

*Comments:*

**9.1.1.5**  Major  Perform engine lubricating oil, high water temperature and overspeed trips as soon as possible to determine if they work and continue to perform this check on a regular basis.

*Status: Closed*

*Comments:*
9.1.1.6 Major Ensure that the overspeed device on the engines when activated trips the rig savers as this is not currently the case. Refer to API RP 54 section 9.15.2.

*Status: Closed*

*Comments:* 

9.1.1.7 Major Ensure that the exhaust system for all engines is completely protected by fire resistant lagging and this includes the turbo chargers.

*Status: Closed*

*Comments:* 

9.1.1.8 Major Perform oil sampling analysis on all the diesel engines and record the results.

*Status: Closed*

*Comments:* 

9.1.1.9 Major Investigate the oil leak from the turbocharger exhaust side on number two generator engine.

*Status: Closed*

*Comments:* 

9.1.1.10 Major Provide an emergency shut down device that will close off the combustion air for generator number two as per API RP 54 section 9.15.2.

*Status: Closed*

*Comments:* 

9.1.1.11 Major Adjust the frequency on the Pramac rental generator so that it is 50Hz.

*Status: Closed*

*Comments:* 

9.1.1.12 Major Remove the cupboard obstructing the walkway between number two generator and the fuel transfer pump switches and filters.

*Status: Closed*

*Comments:* 

9.1.2 Caterpillar Engines

9.1.2.1 Major Lag the expansion joint on the mud pump motor exhaust, which had not been lagged since the expansion joint was replaced.

9.1.2.2 Minor Various gauges on the engines were not functioning. Replace the defective gauges.

9.1.2.3 Minor Replace the polycarbonate bowls on the Donaldson pre-filters on the mud pump motors. The existing bowls have been painted.

9.1.2.4 Minor Clean the lens on the hours run meter on number 1 mud pump motor, which had been painted over, so that the hours can be read.
9.1.2.5 Major The main generators require new batteries for the starters on both engines to ensure both engines are ready to be started in an emergency situation. An emergency generator or cold start backup generator was not available.

9.1.2.1.5 Major Install correctly swaged fuel hoses with screwed fittings to the camp generator fuel system as they are currently had hoses with jubilee clamps fitted.

Status: Closed Comments:

9.3.1.1 Critical Replace the rotary screw compressor panels because when they are off they are exposing moving machinery and altering the machine’s cooling capacity.

Status: Closed Comments:

9.3.1.2 Major Clean out the rotary screw compressor cooling fins as they are clogged with insects.

Status: Closed Comments:

9.3.1.1.1 Minor Stencil the maximum safe working pressure on to the bottle of the two air receivers not yet marked.

Status: Closed Comments:

9.3.1.1.2 Major Produce a current test certificate for the air vessel on the rig floor. Retain a copy of the certification at the rig site.

10.0 ELECTRICAL EQUIPMENT

10.2.1.1 Major Clean the dust from the main alternators on both main generators.

Status: Closed Comments:

10.2.1.2 Major Two generators with the same frequencies should be used on the rig. Continually using generators with mixed frequencies could lead to premature equipment failure. Refer to API RP 14F section 7.2.3.

Status: Closed Comments:
10.2.1.3 Major Install the correct cover to number two generator alternator housing as there is a piece of cardboard there at the moment.  
**Status:** Open  
**Comments:** Not completed at the time of the ModuSpec inspection.

10.2.1.4 Major Replace the circuit breaker switch on number two generator.  
**Status:** Open  
**Comments:** Ordered MR-1967

10.2.1.5 Major Replace the missing guard on number 2 main generator to prevent the entry of foreign material and for the protection of personnel.

Main Transformer Recommendations:

10.3.1.1 Major Clean the dust from inside the transformer.  
**Status:** Closed  
**Comments:**

10.3.1.2 Major Remove the items of rubbish from the top of the transformer.  
**Status:** Closed  
**Comments:**

Main Switchboard Recommendations:

10.5.1.1 Minor Replace the two small rubber mats in the switchboard room with suitable mats that cover the whole floor in front of the board.  
**Status:** Open  
**Comments:** Not completed.

Emergency Switchboard Recommendations:

10.6.1.1 Major Correctly terminate wiring and secure breakers in the switchboard for the offices and rig site accommodation.  
**Status:** Closed  
**Comments:**

10.6.1.2 Major Clean out the switchboard box for the offices and rig site accommodation.  
**Status:** Closed  
**Comments:**

AC Motors Recommendations:

10.8.1.3 Major Replace the missing fan cover for the back of the agitator motor.  
**Status:** Closed  
**Comments:**

MCC Panels Recommendations:

10.9.1.1 Major Label the agitator start and stop buttons on the starter box near to the agitator on top of the mud pits.  
**Status:** Open  
**Comments:**
10.9.1.2 Major Label the BOP hydraulic unit start and stop box at the BOP control unit.

**Status:** Open

**Comments:**

10.9.1.3 Major Replace the missing bolts in the cover of the explosion-proof starter on the shale shaker to maintain its explosion-proof integrity.

10.9.1.4 Minor Repair or replace the control knob on the controller in the compressor room (missing knob on the selector switch).

**Lighting System (Main) Recommendations:**

10.10.1.1 Major Install the secondary retention cable to the spotlight above the compressor house.

**Status:** Open

**Comments:** Lighting was being installed at the time of the ModuSpec inspection.

**Lighting System (Emergency) Recommendations:**

10.11.1.1 Major Repair the battery pack to the emergency light on the hydraulic BOP unit. **This has been completed.**

10.11.1.2 Minor Ensure that all emergency lights are marked as such. This is a requirement under IEC 61892-6 Section 11.4.

**Status:** Open

**Comments:** Lighting was being installed at the time of the ModuSpec inspection.

10.11.1.3 Major Repair the engine room lighting by removing the paint from the polycarbonate lens on one fixture and restoring the other fixture to full operation. Convert one of these light fixtures to an emergency light fixture with battery backup.

10.11.1.4 Major Install an emergency light in the main switchboard room for black out situations.

10.11.1.5 Major Install an emergency light at the fluid end of each mud pump.

**Cables and Cable Trays Recommendations:**

10.13.1.1 Major Investigate the BOP control unit electrical cable as there was electrical tape wrapped around it in one place.

**Status:** Open

**Comments:**

10.13.1.2 Major Investigate the shaker motor cable in between the two motors as there was electrical tape wrapped around it in one place.

**Status:** Open

**Comments:**
10.13.1.3 Major Investigate the plug at the secondary switchboard by the office and accommodation block as there was electrical tape between the plug body and the cable.

**Status:** Open

**Comments:**

10.14.1.1 Critical Batteries, Battery Chargers and UPS Recommendations:

Ensure that danger signs such as “corrosive” and “hazardous area” are put up where batteries are to be located.

**Status:** Open

**Comments:** Not fully completed, signs were still being installed during the time of the ModuSpec inspection.

10.14.1.2 Major Provide a protective box with adequate ventilation for the generators starting batteries.

**Status:** Open

**Comments:** Inadequate boat type plastic battery covers were provided to protect these batteries.

10.16.1.1 Minor Install a five station communication system between the drill floor, shakers, mud loggers, Toolpusher’s office and the Company man’s office to enable more reliable communications.

**Status:** Open

**Comments:** Not completed.

10.17.1.1 Critical Electric Welding and Welding Distribution Recommendations:

Provide suitable guards around all the electrical connections and windings that are exposed on the Lincoln welder.

**Status:** Closed

**Comments:** Lincoln welder removed and replaced with an inverter.

10.18.1.1 Major Earthing and Earth Bonding Recommendations:

Ensure that both the shaker vibration motors are adequately earthed as per API RP 54 Section 9.14.11.

**Status:** Open

**Comments:** Not completed.

10.18.1.2 Major Ensure that the small compressor motor is adequately earthed as per API RP 54 Section 9.14.11. **This has since been completed.**

10.18.1.3 Major Ensure that both the mud mixing motors are adequately earthed as per API RP 54 Section 9.14.11.

**Status:** Open

**Comments:** Not completed.
10.18.1.4 Major
The earth bonding between the individual rig units had not been completed, this is particularly important on this lease where there can be no earth stakes because of the rocky terrain. There needs to be a direct ground fault earth path back to the source of power (the generator).

10.18.1.5 Major
Install grounding cables between the shale shaker motors and their mounting bases to ensure a continuous ground path in the event of motor failure.

Hazardous Areas Recommendations:

10.19.1.1 Major
Ensure that the terminal flame path on the agitator is cleaned of paint as per API RP 14FZ section 4.4.1. Status: Closed
Comments:

10.19.1.2 Major
Clean the paint off the identification plate on the agitator motor and confirm that the motor is suitable for operation in a zone one area. As per API RP 14FZ section 8.2.3.2.1 & API RP 7L section 1.4.2. This has been confirmed as suitable for a zone 1 area.

11.0 SAFETY EQUIPMENT

Automatic Fire Detection System Recommendations:

11.1.1.1.1 Critical
Ensure that all missing smoke detectors are installed in the accommodation and office containers at the rig site and in the accommodation and sleeping containers in the camp. Status: Closed
Comments: New smoke detectors installed.

11.1.1.1.2 Major
Regular checks and tests should be performed on these units and recorded in the planned maintenance system. Status: Open
Comments:

Portable Extinguishers and Fire-Fighting Equipment Recommendations:

11.1.4.1.1 Critical
Ensure that the portable fire extinguishers are regularly checked by rig staff and records for these checks entered into the maintenance system. Status: Open
Comments: Record the extinguisher inspection results in the MEX programme and "punch" the dates onto individual fire extinguisher labels.

11.1.4.1.2 Minor
All fire extinguishers located outside should be placed in fibre glass cabinets or at least be protected by plastic bags. Status: Open
Comments: Not completed at the time of the ModuSpec inspection.
Breathing-Apparatus Sets Recommendations:

11.2.1.1 Major Ensure that the annual inspection on the breathing apparatus is performed by a third party and that the report from this inspection is documented on the rig.

*Status: Open*

*Comments: In progress during the ModuSpec inspection.*

Drilling Facilities Safety Recommendations:

11.4.1.1 Critical Provide suitable guards around the piston compressor cooling fan and belts.

*Status: Closed*

*Comments:*

11.4.1.2 Critical Install the missing guard section from number two mud pump belt drive at the motor end.

*Status: Closed*

*Comments:*

11.4.1.3 Critical Repair and extend the guards on the back side of the two centrifugal mud pumps in the hopper room.

*Status: Closed*

*Comments:*

11.4.1.4 Critical Provide suitable guards for the engine belts on the Lincoln portable welder.

*Status: Closed*

*Comments: Lincoln portable welder has been replaced with an inverter.*

11.4.1.5 Critical Replace the missing eye wash station lid for the hopper room eye wash station.

*Status: Open*

*Comments:*

11.4.1.6 Critical Provide an emergency shower at the mixing hopper room.

*Status: Open*

*Comments:*

11.4.1.7 Major Ensure that JSA’s are an ongoing document and are kept regularly updated. Make out a JSA for mud tank entry.

*Status: Open*

*Comments: Draft JSA for mud tank and trip tank completed, awaiting final approval for entry into JSA register.*

11.4.1.8 Minor Ensure that updates are entered into the operations manual and a plan for the location of stored radioactive, explosive and hazardous substances is kept within the manual.

*Status: Open*

*Comments: Ongoing*

11.4.1.9 Major Repair the damaged steps on the stairway from the mud tank to the rig floor to eliminate a trip hazard.
### 11.4.1.10 Minor
Replace the two-part shackles on the rig floor with four-part shackles.

**First Aid and Hospital Recommendations:**

1. Mark the door in the camp with suitably sized letters to indicate that it was the first aid room.
   - **Status:** Open
   - **Comments:**

### 11.5.1.1 Minor
Mark the door in the camp with suitably sized letters to indicate that it was the first aid room.

### 11.6.1.1 Major
Provide a secondary horn located at the Toolpusher’s office in case the drill floor was inaccessible.

- **Status:** Open
- **Comments:** Not observed at the time of the ModuSpec inspection.

### 11.6.1.2 Minor
Ensure that the code of signals for the general alarm and the stand down alarm are posted at strategic locations around the rig.

- **Status:** Open
- **Comments:**

### 11.7.1.1 Major
Ensure that a third party lifting gear inspection is performed as it has been over a year since the last inspection.

- **Status:** Closed
- **Comments:**

### 11.7.1.2 Minor
Destroy the home made lifting beam clamp in the mud pump room.

- **Status:** Closed
- **Comments:**

### 11.7.1.3 Minor
Remove the flame cut pad eye from the chain sprocket tool and use certified pad eyes that have been welded and NDT inspected.

- **Status:** Closed
- **Comments:**

### 11.7.1.4 Minor
Remove the home made lifting nubbin screwed into the box end of the Kelly from site.

- **Status:** Closed
- **Comments:**
11.7.1.5  Minor  Remove the various flame cut and home made pad eyes around the rig.  
**Status: Closed**

**Comments:**

Housekeeping Recommendations:

11.10.1.1  Minor  Ensure that all rubbish and waste is thrown away and not left to clutter work areas and equipment containers.  
**Status: Open**

**Comments:**

Walkways and Stairs Recommendations:

11.10.2.1.1  Minor  Repair the stairs at the end of the catwalk as there was one step that was slightly damaged.  
**Status: Open**

**Comments:**

General Safety Items Recommendations:

11.11.1.1  Major  Reroute the fuel hose obstructing the walkway in between number two mud pump Caterpillar engine and the fuel buffer tank for that engine.  
**Status: Closed**

**Comments:**

11.11.1.2  Minor  Set up a suitable store where paint and other flammable materials can be kept.  
**Status: Open**

**Comments:**  Ongoing

11.11.1.3  Major  The eye wash station and shower need to be installed on the top of the mud tank. Provide an emergency shower for personnel mixing mud at the end of the mud tank.

11.11.1.4  Major  Place a sign on the air winch on the driller’s off-side of the drawworks to ensure that it is not used for man-riding by mistake. If this winch is to be used for man-riding, it must be limited to 150Kg and recertified for man-riding. Currently there is a stamped plate stating the winch is rated at 2400Kg, ModuSpec was informed the plate was incorrect.

Fuel Oil System Recommendations

11.11.1.1.1  Major  Repair the fuel leaking from the valves in the compressor room and the engine compartment.  
**Status: Closed**

**Comments:**

11.11.1.1.2  Major  Replace the jubilee hose clamps on all hoses in the fuel system with the correct clamps or swaged fitting.  
**Status: Closed**

**Comments:**
<table>
<thead>
<tr>
<th>Section</th>
<th>Priority</th>
<th>Description</th>
<th>Status</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.11.1.3</td>
<td>Major</td>
<td>Repair the broken fuel tank sight glass and install a protective cover over the sight glass to prevent future breakages.</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<td>11.11.1.4</td>
<td>Major</td>
<td>The small fuel buffer tanks in the pressurised fuel system are pressure vessels and need to be constructed as such with pressure relief valves and safe working pressures. Remove these ‘home made’ tanks and replace them with appropriately certified tanks.</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<td>11.11.1.5</td>
<td>Major</td>
<td>Replace the missing valve handle on the inlet valve to the rig’s fuel day tank.</td>
<td>Open</td>
<td></td>
</tr>
<tr>
<td>11.11.1.6</td>
<td>Minor</td>
<td>Install self closing sight glass valves on the fuel tank sight glass.</td>
<td>Open</td>
<td></td>
</tr>
<tr>
<td>11.11.2.1.1</td>
<td>Critical</td>
<td>Remove from site the 2,000psi accumulator bottle so as to avoid it being reused again in the wrong place.</td>
<td>Open</td>
<td>Accumulator bottle still at the rig site.</td>
</tr>
<tr>
<td>11.11.2.1.2</td>
<td>Major</td>
<td>If gas bottles are to be stored standing up they are to be adequately secured or alternatively laid down on their sides.</td>
<td>Closed</td>
<td>Transportation cages in use</td>
</tr>
<tr>
<td>11.11.2.1.3</td>
<td>Minor</td>
<td>Ensure that the oxygen and acetylene bottles are stored at least 20ft apart from each other as stated in API RP 54 Section 20.4.6.</td>
<td>Closed</td>
<td></td>
</tr>
</tbody>
</table>
| 11.12.1.1 | Critical | Gas Bottles Recommendations
The use of lock-out pad locks should also be used in conjunction with lock-out tags to further safe guard against isolated equipment being inadvertently started. | Open | Ordered on requisition MR-1966. The supplied padlocks were not suitable for the intended purpose; other lockout mechanisms were being sought. |
11.12.1.2 Major Ensure that permits are distributed to the relevant location on the rig and a copy is displayed at the work site.

**Status:** Open

**Comments:**

### 12.0 MAINTENANCE SYSTEM

#### Preventive Maintenance Recommendations:

12.1.1.1 Major Speed up the implementation of the MEX system.

**Status:** Open

**Comments:** Ongoing.

#### Maintenance Organization & Administration Recommendations:

12.2.1.1 Major Determine which maintenance manuals are needed for the equipment on the rig and get these manuals sent out to the rig. Ensure that these manual include detailed spares listings.

**Status:** Open

**Comments:**

#### Maintenance History & Analysis Recommendations:

12.5.1.1 Major Until the MEX system is up and running, work orders should be filed in their respective equipment files.

**Status:** Closed

**Comments:**

### 13.0 SPARE PARTS

#### Stock Keeping Recommendations:

13.3.1.1 Major Ensure that rubber goods are kept in an air conditioned storage area as exposure to heat reduces their life span.

**Status:** Open

**Comments:**
5.0 DRILLING EQUIPMENT

5.1 Drawworks

The drawworks was a single drum TSM Model 6000 rated at 450hp and a serial number 1018. The main drum was lebus grooved for 1 7/8 inch drilling line. Ton-mile records were checked and found up to date with the last slip and cut having being completed several months prior to the ModuSpec survey.

The drawworks was driven by two Caterpillar 3406DI engines. Both engines each drove two Allison TC475 torque converters. Output from the two torque converters drove a two speed gearbox with an inertia brake mounted. Two Twin Disc low / high drum clutches enabled high and low speeds of the drawworks main drum. Compound chains also operated the catheads and rotary table.

The makeup cathead was a Foster model 27S and the breakout cathead was 27B. There were four forward hoisting speeds and these were tested. No abnormal noises or vibrations were noted when running the blocks up the derrick in low-low, low-high, high-low and high-high. The inertia brake was also inspected during these gear changes and functioned satisfactorily.

There was a 22 inch McKinney Machinery hydromatic brake being used on the drawworks. This brake was operated by control valve on the driller's consol. A visual inspection of the hydromatic brake found that it was in good condition. The Fawick clutch and clutch pads for the hydromatic brake were inspected and the pads were observed to be worn.

ModuSpec was informed that during the month previous a new main drum shaft was installed, the brake rims were skimmed and new bearings and seals had been installed. The high / low clutch bearings were also said to have been changed. This work was performed in July 2007 however no documentation was viewed to confirm this work. Clearances were not taken for the drum shaft bearings as these were said to be new. Both clutches for the catheads were inspected and seen in a satisfactory condition. The kickback roller on the drillers side was seen to be quite worn. A fair amount of oil was observed collecting below the high clutch cover indicating that there was an oil leak, probably from the cover itself. Another oil leak was seen to be collecting in a half drum under the lubricating oil pump. This pump would have to be overhauled. On the low clutch there was a bolt that missing from the hub.

It was observed while chain covers were being boxed up that copious amounts of silicon were being used to try and seal the flanges. This silicon becomes a problem when it squeezes out on the inside of the drawworks and sets then breaks off and makes its way to oil galleries and suctions.

The blocks were lowered to the rotary and the number of wraps on the drum was thirteen. The crown saver was tested and performed satisfactorily.
5.1.1.1 Breakout wire with damaged strands.

5.1.1.2 Monitor wear on rotary drive sprocket.

5.1.1.5 Repair the leaking lubricating oil pump on the drawworks.
5.1.1.6 Replace missing bolt on the low drum clutch.

Drawworks Recommendations:

5.1.1.1 Critical The breakout wire from the cathead was seen with several broken strands at the eye and would need to be replaced.  
Status: Closed  
Comments: This was replaced prior to spudding the well.

5.1.1.2 Major Monitor the wear on the rotary drive sprocket on the drawworks side.  
Status: Closed  
Comments: Included in the MEX maintenance system and now included in drawworks pre-spud inspection.

5.1.1.3 Major Repair the oil leak from the high clutch cover on the drawworks.  
Status: Closed  
Comments:

5.1.1.4 Major Limit the amount of silicon applied when boxing up covers and flanges on the drawworks as the silicon can break off inside the drawworks and migrate to oil suctions, galleries and nozzles and cause blockages.  
Status: Closed  
Comments: This is used in conjunction with gasket material where possible. Other solutions / materials have been used where possible.

5.1.1.5 Major Repair the leak on the drawworks lubricating oil pump.  
Status: Closed  
Comments: New pump installed.

5.1.1.6 Major Replace the missing bolt on the drawworks low clutch.  
Status: Closed  
Comments:

5.1.1.7 Major Replace the worn friction pads for the Fawick hydromatic clutch on the drawworks.
5.1.1.8 Major Secure the rotary chain case as the securing bolt was missing and the chain case was loose.

Status: Closed
Comments: The chain case was assessed as an OEM faulted design and was modified/repaired earlier in the year. The integrity of the repairs/modifications were to be monitored during drilling operations.

5.1.1.9 Minor Replace the worn kickback roller on the driller’s side of the drawworks.

Status: Closed
Comments:

5.1.1 Band Brake (Conventional)

The brake system was inspected and seen to be in a good condition. The brake blocks were seen to be in a satisfactory condition with minimal wear. No records of any NDT inspections were seen for checks performed on the main and spare brake bands although a certificate for new brake bands was seen. It was unclear as to if the new brake bands were fitted on the drawworks or if it was the spare set.

Band Brake Recommendations:

5.1.1.1 Major Confirm whether the spare brake bands had also been NDT inspected and a report had been filed. Confirm that the brake bands were inspected around their full circumference.

Status: Open
Comments: The NDT inspection had not been conducted on the full circumference of the band brakes.

5.1.1.2 Major Perform NDT inspections on the brake bands and brake linkages as no records could be found for any previous inspections.

Status: Closed
Comments: NDT inspections had been completed
5.2 **Rotary Table**

The rig was fitted with a twister 175 17 ½ inch rotary table. The rotary table was tested in both high and low gear at full speed on both occasions. The rotary ran smoothly with no undue noises or vibrations noted. No records were seen for when the rotary was last overhauled. There were also no records for any oil samples having been taken from the rotary and sent off for analysis.

5.2.1.1 **Major**

**Rotary Table Recommendations:**

- Perform oil sample analysis on the rotary table oil and analyze the results.

**Status:** Closed  
**Comments:** Sampling and analysis had commenced with the results to be included in MEX maintenance history.

5.4 **Swivel**

The rig was equipped with a TSM 150 swivel with rating of 150 ton. Records were seen for a full disassembly inspection performed by Extreme Machinery in December 2006. A new quill was fitted however no reports were sighted on the rig.

Pin clearances were taken and seen to be 0.068 inch.

The Shaft bearing clearance was taken and a reading of zero was obtained on the dial indicator. There should be at least a 0.003 to 0.006 inch clearance on the bearing.

A wall thickness inspection of the gooseneck was performed during the ModuSpec survey. No inspection reports were seen for inspections performed on the threaded connections on the swivel.

5.4.1.1 **Critical**

**Swivel Recommendations:**

- Perform an inspection of the threaded connections on the swivel and check for cracks. Retain all records on the rig.  
  **Status:** Closed  
  **Comments:** The swivel has been replaced with a certified swivel.

5.4.1.2 **Major**

- Investigate why the quill shaft clearances were measured as zero and rectify.  
  **Status:** Closed  
  **Comments:** Unit shopped and rectified

5.4.1.3 **Major**

- Replace the bail pins on the swivel as the maximum allowable clearance is 0.040 inch and these were showing 0.068 inch.  
  **Status:** Closed  
  **Comments:** New bail pins installed.

5.4.1.4 **Minor**

- All records pertaining to inspections or tests carried out on the swivel must be stored on the rig.  
  **Status:** Closed  
  **Comments:** The swivel has been replaced with a certified swivel.
5.5  

**Kelly Spinner**

The hydraulic Kelly spinner was inspected and seen to be in a satisfactory condition. There was a bolt observed to be missing on the top plate of the Kelly spinner. No records to indicate that periodic inspections had been completed on the Kelly spinner were seen on the rig. Oilfield Inspection Services had not yet completed the NDT inspection of the Kelly spinner but it was due to be done during this rigging up period.

![Kelly Spinner](Image)

5.5.1.2 Bolt missing from the top cover of the kelly spinner.

**Kelly Spinner Recommendations:**

<table>
<thead>
<tr>
<th>Level</th>
<th>Action</th>
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| **Critical** | Kelly Spinner: Perform periodic inspections on the Kelly spinner required by API RP 8B  
*Status: Closed*  
*Comments: Periodic kelly inspections now included in MEX maintenance system.* |
| **Major** | Replace the missing bolt on the Kelly spinner top cover plate.  
*Status: Closed*  
*Comments:* |

5.6  

**Kelly and Kelly Drive Bushing**

The Kelly was a 41ft long 4 ¼ inch Varco square with a 6 5/8 inch REG LH box up and a 4 inch FH pin down. The Kelly was inspected by Oilfield Inspection Services during the time of this survey and no abnormalities were noted. There were no records of any rig maintenance or measurements having been done on the Kelly.

The Kelly bushing was a Varco 4 ¼ inch 4KRVS unit. Both the Kelly and Kelly drive bushing were inspected. The clearance between the top and bottom halves was 0.051 inch. Three of the Kelly bushing roller bearing clearances were measured and the four readings were 0.054, 0.090, 0.039 and 0.071.

Some of these clearances were observed to be on the high side and the pins and bushings for the rollers should be removed and overhauled. The clearance between the roller face and the side of the Kelly was unable to be measured due to time constraints. There was no spare Kelly on the rig.
A NDT inspection report performed in August 2006 was seen for the inspection performed on the Kelly bushings.

**Kelly and Kelly Drive Bushing Recommendations:**

5.6.1.1 Major Ensure that the Kelly is regularly inspected and wear is continually monitored.

*Status: Closed*

*Comments:* Periodic kelly inspections now included in MEX maintenance system. The kelly was inspected prior to spud-in of Worrior 5. Repairwork was conducted under work order 1465.

5.6.1.2 Major Investigate the high roller clearances on the Kelly bushings and rectify.

*Status: Closed*

*Comments:* The kelly was inspected prior to spud-in of Worrior 5.

5.6.1.3 Major Perform a NDT inspection on the Kelly bushings as the last inspection was seen to have been completed over a year ago.

*Status: Closed*

*Comments:* Completed under Work Order 1465.

5.7 **Crown Block**

The Troy crown block consisted of a four 36 inch sheave cluster with one 36 inch fast line. Records were viewed for a full disassembly inspection in August 2003. An NDT inspection of critical welds was performed by Oilfield Inspection Services in August 2007. The records however were not kept on the rig at the time before the survey and were brought up from Adelaide for the inspection. The sheaves were grooved for 1 1/8 inch drill line. A wobble test was performed on the sheaves and no abnormalities were noted. The sheaves were gauged and measured and two of the sheaves were observed to have excessive groove depths whilst a third was on the wear limit.

The measurement for the sheaves grooves were:
Maximum allowable is \(1.75 \times 1.125 = 50\text{mm}\)
Fast line 47mm
The sheave on sheave cluster closest to fast line was number one and then numbered outwardly:
1 54mm
2 53mm
3 50mm
4 47mm

**Crown Block Recommendations:**

5.7.1.1 Critical Replace the three sheaves on the crown block with the groove depths that are under size as per API 9B section 4.8.2.

*Status: Closed*

*Comments:* New sheaves installed under Work Order 1790.

5.7.1.2 Minor Ensure records for all inspections and maintenance performed on the crown block are kept on the rig.
5.8 **Travelling Block**

The rig was equipped with a Sowa 150 ton combination hook and travelling block. No serial numbers were found on the unit. The unit was inspected and seen to be in a satisfactory condition. A wobble test was performed on the sheaves and no abnormalities were noted. The sheaves were gauged and measured and while there was some wear it was nothing significant.

The measurements for the groove depth were listed below. The sheave on sheave cluster closest to fast line was number one and then numbered outwardly:
- 1 46mm
- 2 44mm
- 3 44mm
- 4 45mm

The maximum allowable clearance according to API 9B section 4.8.2 was 50mm for 1 1/8 inch wire rope.

5.9 **Hook**

See section 5.8 for the combination hook / block.

5.10 **Drilling Instrumentation**

The following drill floor instrumentation and indicators were observed:
- A Clipper type 1 1/8 inch 0 to 300,000lbs for 8 lines weight indicator.
- AOI 0 to 5,000psi pump pressure gauge.
- AOI 0 to 20,000lbs tong line pull gauge.
- A Totco 0 to 500psi rotary torque gauge
- Martin Decker Drilling recorder.
- AOI 0 to 300bbls Moore type total volume indicator.
- AOI Moore type 0 to 300bbls remote volume indicator.
- AOI Moore type 30bbls pit volume gain / loss indicator.
- AOI Moore type 0 to 100% mud flow indicator.
- AOI Moore type 0 to 30bbls trip tank indicator.

Records for the calibration of all the above drilling instrumentation were seen and this work was completed by Drilling Instrumentation Services in April 2007.

We were informed that there was no warning for the driller if the rig air pressure dropped too low. There was also observed to be no warning device for the driller if the water day tank level dropped below the suction of the pump. This could have severe consequences when using the hydromatic brake and there is no water pressure available.
The dead man anchor consisted of a drum welded to the frame of the mast. Three wraps were observed on the drum and the free end of the wire was clamped to a plate that was integral to the drum with two anchor dies. The dies were due to be replaced but the new set on the rig were a different size and were not fitted. The old set was refitted and we were informed that the new set of dies would be fitted when they arrived on the rig. Records show this unit was disassembled and all critical welds and mounts NDT inspected in August 2006.

The certification for the 1 1/8 inch drilling line that was purchased in November 2006 was viewed by ModuSpec and seen to be in order.

| 5.10.1.1 | Major | Drilling Instrumentation Recommendations: Ensure that the new anchor dies for the dead man anchor are fitted when they arrive on the rig. Status: Closed Comments: New anchor dies for the deadline anchor have been torqued to 310 ft–lbs. Work Order 844. |
| 5.10.1.2 | Major | Install an audible alarm at the driller's console for low rig air pressure. Status: Closed Comments: |
| 5.10.1.3 | Major | Install an audible alarm at the driller's console for low water day tank level. Status: Open Comments: Not completed. |

5.11 Derrick

The derrick was a Rudd & Hodgson Incorporated Adeco Cantilever mast with a serial number RHI 14 9920-11. The mast had a height of 105ft and with 8 lines it was rated to 280,000lbs while with 6 it was rated to 250,000lbs.

The mast was fully inspected and several items of concern were observed. The potential dropped objects in the mast were two pieces of wood, one wedged into one of the frames near the crown and the other on top of the crown saver timber. There were also obsolete items like old steel plates and angle iron that had been bent and cracked and should be removed from the mast. A cracked lighting frame was also observed and needed repairing. An electrical junction box next to the ladder just below the windwall needed to be fully bolted to the mast as one bolt was missing.

A bracket was seen on the off drillers side next to the windwall with a stud that was too short. The windwall itself needed some of the welds repaired as they were cracked. A wobble test was performed on the bridle line sheaves and the one on the Kelly hose side of the mast needed investigating as some clearance was observed. No certificates were seen for the bridals wires and would need to be produced. Records were seen for inspections performed on the bridals line and sheaves in July 2006.
Oilfield Inspection Services was performing an eddy current scan of all the welds in the mast and picked up an abnormality in one of the ‘A’ frame legs pad eyes.

The tong counterweights were containers running on rails with open tops and were filled with junk and scrap steel. As the tops were open and the hanging containers were full, the potential for a piece of scrap to be dislodged from the tong hanger was there. The tong hanger lugs were also steel bars bent into shape and welded into the tops of the containers. They were not certified pad eyes and no testing could be performed on them because they were inaccessible.

During the inspection in the mast two part and four part shackles were seen to be utilised in the mast. Safety dictates that only four part shackles should be used in the mast.

On the structure of the mast several bent and damaged bracings and tubulars were observed, one of these tubulars was significantly cracked. One of the angle iron bracings above the windwall on the off drillers side was also badly damaged. At the crown, one of the jumper bars for the fast line sheave was not fully welded and could have the potential to break off. Also at the crown the drilling line on the fast line sheave had started to wear through the foundation mounts of the crown block and the deck of the crown platform. On each leg the backup pins for the tongs were NDT tested and seen to be cracked. Also at each leg there were cracked box sections where the ‘A’ frame legs were attached to the legs of the mast. There was a section of angle iron in the base of the mast on the off drillers side that was cracked in three places and would need to be rectified. Some of the studs on the base pad for the derrick legs were seen to be too short and would need replacing.

Inspection reports were seen for a complete eddy current inspection of all the critical welds in the mast. The last rest was in August 2006 and at the time of writing the next mast inspection was in progress.

5.11.1.1 Section of crown timber loose and ready to fall.
5.11.1.2 Loose piece of wood in the derrick near crown.

5.11.1.3 Broken angle iron in derrick above wind wall.

5.11.1.4 Cracked section lighting frame in the derrick.
5.11.1.5 Cracked section of angle iron in the base of the mast.

5.11.1.7 Bolt too short on mounting at the top of the wind wall in the mast.
5.11.1.8 Secure with two bolts the electrical junction box in the mast.

5.11.1.9 One of the several broken welds on the wind wall in the mast.

5.11.1.13 Uncertified lifting points for tong hanging wires.
5.11.1.14 Obsolete pieces of steel cracked and should be removed.

5.11.1.18 Two part shackles in use in the mast.

5.11.1.19 Bent and damaged bracing in the mast.
5.11.1.19 Bent and damaged tubulars.

5.11.1.19 Cracked and bent tubular in the mast.

5.11.1.19 Cracked fixtures in the mast.
5.11.1.19 Cracks in the lighting fixtures in the mast.

5.11.1.21 Derrick base pad studs too short.

5.11.1.22 Drill line wearing into crown foundation.
5.11.1.22 Drill line wearing into crown platform.

Derrick Recommendations:

5.11.1  Critical  Remove unsecured block of wood from the first frame below the crown as it has the potential to be a dropped object.  This had been removed.

5.11.2  Critical  Remove loose piece of wood from the crown block safety timbers as it has the potential to be a dropped object.  Status: Closed

5.11.3  Major  Repair cracked and bent tubular on the drillers side of the derrick near the crown and the badly damaged angle iron bracing on the top section directly above the wind wall and on the off driller's side of the mast.  The cracked and bent tubular has been repaired but the angle iron has not.

5.11.4  Major  Repair the cracked lighting frame in the mast on the driller's side.  Status: Closed

5.11.5  Major  Repair the cracked section of angle iron in the base of the mast on the off drills side.  Status: Closed

5.11.6  Major  Repair the cracked backup tong pin welded to the mast on both sides.  This has been completed.
5.11.1.7 Major Install a longer bolt in the mounting bracket on the off driller’s side just above the windwall.
   Status: Closed
   Comments: Completed under Work Order 1618.

5.11.1.8 Major Secure the electrical junction box with both bolts to the derrick just above where the lower mast attaches to the upper mast.
   Status: Closed
   Comments: Completed under Work Order 1618.

5.11.1.9 Major Repair the broken welds to the windwall on the off driller’s side.
   Status: Closed
   Comments: Windwall has been removed.

5.11.1.10 Major Investigate the excessive clearance on the Kelly hose side bridlesheave.
   Status: Open
   Comments: Not completed. Listed on Work Order 1618.

5.11.1.11 Major Produce certificates for the bridle line so the age of the wire could be determined.
   Status: Closed
   Comments: Completed under Work Order 1618.

5.11.1.12 Major Provide a safer means of loading the tong hanger counterweights as they were full of junk that could fall out.
   Status: Open
   Comments: To be completed prior to spudding well. Listed on Work Order 1618.

5.11.1.13 Major Change the lifting lugs on the tong hanger counterweights to certified lifting eyes.
   Status: Open
   Comments: To be completed prior to spudding well. Listed on Work Order 1618.

5.11.1.14 Major Remove all obsolete equipment like brackets and steel plates from the mast.
   Status: Closed
   Comments: Completed under Work Order 1618.

5.11.1.15 Major Repair the damaged jumper bar weld for the fast line sheave at the crown. This has been completed.

5.11.1.16 Major Repair the damaged lug for the base of the ‘A’ frame on the off driller’s side. Ensure the correct welding procedure is used whilst doing this work and have the repair MPI tested when work has been completed. This has since been completed.
5.11.1.17 Major Perform NDT inspections on the bridal line sheaves and their mountings.  
**Status:** Open  
**Comments:** NDT testing was in progress during the ModuSpec inspection prior to spudding the well. Listed on Work Order 1618.

5.11.1.18 Major Remove two-part shackles from in the mast and replace with four-part shackles.  
**Status:** Open  
**Comments:** The two-part shackles from the tugger line on the rig floor were to be removed. Listed on Work Order 1618.

5.11.1.19 Major All bent and damaged tubulars, bracings and cross members in the mast are to be repaired. The cracked tubing near the crown has been repaired.

5.11.1.20 Major Ensure that flame cut holes and pad eyes in the mast are removed.  
**Status:** Closed  
**Comments:** Completed under Work Order 1618.

5.11.1.21 Major Replace the mast base pad mounting studs as several of them are too short.  
**Status:** Open  
**Comments:** To be completed prior to spudding the well. Listed on Work Order 1618.

5.11.1.22 Major Repair the areas at the crown where the drilling line has started to wear into the foundations and crown platform.  
**Status:** Closed  
**Comments:** Completed under Work Order 1618.

5.11.1.23 Major Repair the cracked boxed sections at the base of the ‘A’ frame legs where they are attached to the mast legs.  
**Status:** Closed  
**Comments:** Completed under Work Order 1618.
5.12  

**Casing Stabbing Board**

The casing stabbing basket for the rig consisted of a long frame with grating on top and four short legs. This frame or board was lifted and rested on horizontal angle iron bracings in the mast. The two wire slings that were fitted to the board were then attached to the mast for secondary retention. The board was not bolted so it had the potential to be an unstable platform as it was also quite narrow.

5.12.1.1 Narrow casing stabbing board.

Casing Stabbing Board Recommendations:

5.12.1.1 Critical  Provide a means of securing the casing stabbing board so that it makes for a more stable platform when resting on the angle iron bracings in the mast.

*Status: Closed*

*Comments: Safety lines were installed prior to spud-in of the well.*
5.13 **Tuggers and Sheaves**

A Pullmaster Model H7A hydraulic tugger was seen mounted on top of the drawworks next to the survey line unit. The tugger controls were mounted next to the driller’s consol. A guard was fitted to this tugger but no spooling device was seen for the unit. The brake drum cover for this winch seemed to have been broken at some stage as there was a long bead of weld traversing its full length. The utility winch wire was seen to be new with a date of test of May 2006.

A small 400kg Toku air winch was seen to be mounted on the off drillers side of the drill floor. The unit was also inspected and the control lever was functioned but did not return to the neutral position. No spooling device or drum guard was seen mounted to this unit either. There was no exhaust air muffler fitted to the winch. Some of the winch mounting nuts were seen with no threads protruding from the nuts and one bolt was seen to be too short for the nut. There was no safe working load marking seen anywhere for the winch. Records were seen for NDT inspections performed on the foundation pedestal for the Toku winch on August 2006. The utility winch wire was seen to be new with a date of test of May 2006.

5.13.1.6 Weld repair on the drum of the tugger winch.

5.13.1.7 Install muffler for Toku winch on the drill floor.
Tuggers and Sheaves Recommendations:

5.13.1.1 Critical Ensure both tuggers are fitted with spooling devices.

Status: Closed

Comments:

5.13.1.2 Critical Ensure that the yearly NDT inspections on the foundations for the Toku tugger are performed and change the mounting bolts as no records were seen when they were last changed.

Status: Closed

Comments: NDT testing was in progress during the ModuSpec inspection prior to the spud-in of the well.

5.13.1.3 Critical Install a drum guard to the 400kg Toku tugger.

Status: Closed

Comments:

5.13.1.4 Critical Ensure that the Toku 400kg winch is not used for man riding as no certification was found indicating that the Toku winch was capable on man riding. A certified man riding winch with two independent braking systems should replace the unit if man riding operations are to be performed.

Status: Open

Comments: The Toku 400kg winch must never be used as a man-riding winch unless certified. It must have a clear notice on the winch to advise it must never be used as a man-riding winch.

5.13.1.5 Major Lengthen the Toku winch foundation bolts as they are too short.

Status: Closed

Comments:

5.13.1.6 Major Determine if the weld repair on the 2,000kg tugger has affected the structural rating of the winch.

Status: Closed

Comments:

5.13.1.7 Major Install an exhaust air muffler for the Toku winch on the drill floor.

Status: Closed

Comments:

5.13.1.8 Major Free-up the control handle for the Toku air winch as it was quite stiff and did not return to the neutral position.

Status: Closed

Comments:

5.13.1.9 Minor Ensure the Toku tugger is marked with the safe working load that is readily visible.

Status: Closed

Comments:
5.14 **Survey Line**

The Model 5 hydraulic wire line unit was located on top of the drawworks next to the tugger winch. The unit had a capacity for 0.092 inch by 10,000ft wire line. The unit was visually inspected and seen to be in a satisfactory condition.

5.15 **Pipe-Spinning Wrench**

The rig was equipped with a Greyspin hydraulic pipe spinner. The unit was visually inspected and seen to be in a satisfactory condition. We were not able to test the pipe spinner during this survey due to operational constraints. The spinning wrench was NDT inspected in August 2006 and ModuSpec viewed the inspection report. This spinning wrench would need to be NDT inspected now as one year had passed since the last inspection.

**Pipe-Spinning Wrench Recommendations:**

5.15.1.1 Major Perform NDT inspections on the pipe spinning wrench as the last inspection report is over a year old.  
**Status:** Closed

**Comments:**

5.17.1 **Tongs**

Two sets of BJ type B tongs were seen and had been stripped down for NDT inspection. On completion of the NDT two sets of lugs for the tongs were found to be cracked. On one of the tongs the tong hanger was seen to be bent quite badly and would need replacement. The tongs were seen to have different pins fitted in the jaws and lugs; some were just straight shanked pins while others were threaded at the ends. The pins that were threaded were screwed into nuts that were welded into the jaws and lugs. Most of the welds on these nuts were broken and would require repairing. The dies on the jaws were also observed to have bolts fitted instead of the OEM pins. When both the tongs were assembled there was excessive slack observed in the jaws and lugs and this should be addressed.

The operation of the rig tongs on the rig was viewed by ModuSpec as ‘an accident waiting to happen’. Due to the cramped conditions on the drill floor personnel had to get very close to the breakout tong line while the slack was taken up. The slack however was not taken up in a slow and smooth manner but the cathead had a tendency to make the tong swing round or jerk quite quickly. Only once the slack was taken up did the floor hand move out of the way and torque up took place. A safer way to makeup and breakout pipe should be employed to prevent possible injury to personnel.
5.17.1.1.1 Badly bent tong hanger.

5.17.1.1.2 Ensure cracked lugs for tongs are removed from service.

5.17.1.1.5 Non OEM pins being used for tong die retention.
5.17.1.1.7 Tong pins showing signs of wear.

5.17.1.1 Critical Replace the bent tong hanger on the makeup tongs. **This has since been completed.**

5.17.1.2 Critical Ensure that the cracked jaws and lugs as indicated by Oilfield Inspections for the tongs are removed from service immediately.  
**Status: Closed**  
**Comments:**

5.17.1.3 Critical Consider using mechanical aids for making up and breaking down pipe for example an iron roughneck.  
**Status: Open**  
**Comments: A new hydraulic power supply had been ordered and installed recently. There were no plans in place yet for new catheads. Hunt Energy would like to go forward with the implementation of automated handling equipment.**

5.17.1.4 Critical Ensure that the counterweights and hanging wires are checked as part of the regular lifting gear inspection program. Refer to API RP 54 Section 9.6, RP 2D and RP 9B.  
**Status: Closed**  
**Comments: These items have been added to the lifting register inspection requirements.**

5.17.1.5 Major Ensure that the tong dies retention pins are the OEM manufactured pins and not bolts.  
**Status: Closed**  
**Comments:**

5.17.1.6 Major Repair the pin retaining nuts with the broken welds in several of the tong jaws.  
**Status: Closed**  
**Comments:**

5.17.1.7 Major Monitor the wear of the tong jaw pins as some pins were showing signs of wear.
5.17.2  **Slips and Dog Collars**

Several sets of slips were visually inspected by ModuSpec and seen to be in a satisfactory condition. The slips were being prepared for a NDT inspection to be performed by Oilfield Inspection Services. The inspection revealed no abnormalities. One set of dog collars was seen on the Kelly. They were inspected and seen to be in a poor condition as they were not being protected from the elements. There were signs of corrosion and the dog collars should be kept in an oil bath when not in use.

**Slips and Dog Collars Recommendations:**

5.17.2.1.1  Minor  
Store the dog collars in an oil bath when not in use.  
*Status: Open*  
*Comments:*

5.17.4  **Elevator Links**

The elevator links were visibly inspected and seen to be in a reasonable condition. Some wear was seen on the end of the small eye. The measurements for the small eye were 2 3/8 inch for both links. We were unable to determine the original size and rating of the links but 2 ¾ inch was probably the original size. If it is determined that that 2 ¾ inch was the original size then the links would need to be down rated due to the wear on the eye.

**Elevator Links Recommendations:**

5.17.4.1.1  Critical  
Determine the original size of the elevator links and depending on the specification obtained the elevator links might need to be down rated.  
*Status: Open*  
*Comments: Measurements need to be confirmed.*

5.17.5  **Elevators**

Several of the elevators were inspected and were observed to be in a satisfactory condition. NDT inspections were being performed by Oilfield Inspection Services during the time of the ModuSpec survey and reports for the inspection were not yet available.
5.17.6  Master Bushings

The TSM split master bushings were inspected and seen to be in a satisfactory condition. No NDT inspection reports for the master bushings or lifting inspection documentation for the bowl pullers was seen on the rig.

5.17.6.1.1 Major  
Master Bushings Recommendations:
Confirm if the master bushings and bowl pullers are included in the lifting gear inspection program. Produce the documentation to show this.

Status: Closed
Comments: The bushings and pullers have been included in the lifting register inspection requirements. NDT inspections were in progress during the ModuSpec inspection prior to spud-in of the well.

5.17.8  Fingerboards

The fingerboards and monkeyboard were visually inspected and apart from several items of concern were in a satisfactory condition. The general issue was secondary retention chains that were not fitted to the hinged gratings, gate and sliding pin for one of the hinged gratings. The safety chains under the finger were seen not to run the full length of the finger and if a finger broke off at the middle then there would be a dropped object. On closer inspection of some of the welds on the hand rails it was observed that they were poorly welded and some welds were cracked.

Lastly the Geronimo escape unit was seen to have some seized sheaves and would require attention.

5.17.8.1.3 No safety chains on hinged platforms of fingerboards.
5.17.8.1.4 Safety chain not fixed to sliding pin at fingerboards.

5.17.8.1.6 Cracked welds on the fingerboard hand rails.

5.17.8.1.1 Critical Investigate why the Geronimo escape unit sheaves are seized and rectify.

**Status: Closed**

**Comments:**

5.17.6.1.2 Major Ensure that safety chains on the fingers are installed to the very end of the finger. This is to safeguard against a finger being broken half way along its length.

**Status: Open**

**Comments:**

5.17.6.1.3 Major Ensure that safety chains are installed onto the hinged gratings next to the derrickman’s work platform.

**Status: Closed**

**Comments:**

5.17.6.1.4 Major Ensure that safety chains are fitted to the two hinged gratings sliding pins.

**Status: Closed**

**Comments:**
5.17.6.1.5 Major Ensure that secondary retention chains are fitted to the gate on the one side of the monkeyboard.

*Status: Closed*

*Comments:*

5.17.6.1.6 Major Repair the poorly welded hand rail box sections and cracked areas.

*Status: Closed*

*Comments:*

5.17.9 **Mud Bucket (Remote-Operated)**

A small plastic 4 ½ inch Kelley mud bucket was seen in the dog house. The unit was new and in a good condition.

5.19.1 **Drill Floor**

The drill floor and substructure was inspected and seen to be in a satisfactory condition. The wooden setback area was seen to be in a good condition and walkways were clear and unobstructed. The rathole and mousehole penetrations were also inspected and seen to be in a satisfactory condition. The raised mat that fitted around the rotary table was observed to be in a satisfactory condition.

In the substructure several illegal pad eyes were seen and needed to be removed.

5.19.1.1 Flame cut pad eyes in the substructure.

5.19.1.1 **Drill Floor Recommendations:**

Major Ensure all flame cut and home made pad eyes are removed from in the substructure.

*Status: Closed*

*Comments:*

5.20 **Drill String**

The drill sting was being inspected to DS-1 CAT-3-5 specifications during the time of the ModuSpec survey. At the time of writing some drill pipe and collars were in town for repairs. Some more drill pipe was seen to be scrapped by Oilfield Inspection Services and should be disposed of as soon as possible.
Drill String Recommendations:

5.20.1.1 Major Ensure that all scrapped drill pipe is removed from site and either repaired in town or disposed of.

Status: Closed

Comments:

5.21

Drilling Subs

The drilling subs were being inspected to DS-1 CAT-3-5 specifications during the time of the ModuSpec survey. We performed a brief visual inspection of the subs and observed no abnormalities. Several of the saver subs were scrapped by Oilfield Inspection Services however these subs were seen to be used the following day.

Drilling Subs Recommendations:

5.21.1.1 Major Ensure that all scrapped subs are removed from site and either repaired in town or disposed of.

Status: Closed

Comments:

5.23

Power Tong

A set of hydraulic casing tongs was inspected at the rig site. The tongs were seen to be in a satisfactory condition but were not able to be tested during this survey due to operational constraints. It was observed that two bolts were being used as pins for the tong hanger. The casing tongs were NDT inspected in August 2006 and we viewed the inspection report. These tongs would need to be NDT inspected now as one year had passed since the last inspection.

Power Tong Recommendations:

5.23.1.1 Critical Remove the two bolts being used for hanger pins in the casing tongs and replace with the correct manufacturers pins.

Status: Closed

Comments:

5.23.1.2 Major Perform NDT inspections on the hydraulic casing tongs.

Status: Closed

Comments:
6.1 Mud Pumps

Mud pumps, general observations

Two Tri Service Machinery type TSM 500 duplex mud pumps were in service on the rig. Both mud pumps were inspected and the findings are listed below.

Both mud pumps were supplied with the same ten inch suction line and this could be an issue if the pumps were at full strokes per minute and number one pump might not receive the full volume of mud to its suction manifold. The pumps were fitted with Oteco pressure relief valves that were set at 1,750psi. The discharges from both these relief valves were suitably sloped however lugs had been welded to the pipes for securing the retaining chains. Welding to high pressure pipe work without the correct pre and post heat procedures was not acceptable.

Both pumps were belt driven and both belts were seen to be damaged and would need to be replaced. There was evidence that the pinion shaft seals on both pumps had been leaking and these seals would need to be investigated and changed. Also on both pumps the pony rod were seen to slightly pitted and scored. If left unchecked this could become a problem and start to damage packers.

On the whole both pumps were seen to be in a good condition. Both power ends were opened for inspection and the results of the clearances taken were recorded below. All of the suction and discharge valve caps were removed and the seats and cavities were inspected. These were all observed to be in a satisfactory condition and one new seat was seen to have been installed on number two mud pump.

The pulsation dampeners for number two pump were checked and seen to be satisfactory. However, number one dampener which was a triple piston type dampener was observed to have one of the three units leaking whilst trying to pre-charge. The top unit was unable to be pre-charged as the roof of the container was in the way. That meant that the pre-charge for that particular piston had never been checked. The final piston was seen to pre-charge to the correct 650psi.

Mud pump number one discharge valve was inspected whilst disassembled. It was seen that the spade was badly corroded and pitted and would never seal.

The high pressure pipe-work for both the pumps was a concern as the industry standard these days requires welded and not threaded connections. The fact that pressures on this rig are only generally 1,500 to 1,800psi would allay concerns at the moment. But it must be noted that if higher pressures are going to be the norm then consideration should be given to changing all threaded connections to welded ones.

All measurements below are in one thousandths of an inch.
Mud pump No. 1

<table>
<thead>
<tr>
<th></th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viewing from the power end.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crosshead Slipper Clearance Forward</td>
<td>0.033</td>
<td>0.014</td>
</tr>
<tr>
<td>Crosshead Slipper Clearance Back</td>
<td>0.033</td>
<td>0.019</td>
</tr>
<tr>
<td>Gear Backlash</td>
<td>0.020</td>
<td></td>
</tr>
<tr>
<td>Pinion Bearings</td>
<td>0.002</td>
<td>0.004</td>
</tr>
<tr>
<td>Eccentric Bearings</td>
<td>Not Measured</td>
<td>Not Measured</td>
</tr>
<tr>
<td>Main Bearings</td>
<td>0.006</td>
<td>0.005</td>
</tr>
</tbody>
</table>

As can be seen from the above clearances the bearings were all in good condition except the left hand crosshead clearances. It was the same left hand crosshead bearing that was deeply scored and would require further investigation. These would require attention as 0.025 inch was considered by most manufacturers to be the upper limit. The internal inspection of the power end revealed nothing untoward. The oil was in good condition with no metallic particles noted in it or the sump. All bolts were lock wired and checked for tightness. It was observed that oil sampling was not performed at frequent intervals on any of the pumps. Continued monitoring of the oil and sending some away for analysis would give the mechanics a good idea of the condition and wear of the pumps.

Mud pump No. 2

<table>
<thead>
<tr>
<th></th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viewing from the power end.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crosshead Slipper Clearance Forward</td>
<td>0.015</td>
<td>0.044</td>
</tr>
<tr>
<td>Crosshead Slipper Clearance Back</td>
<td>0.008</td>
<td>0.045</td>
</tr>
<tr>
<td>Gear Backlash</td>
<td>0.021</td>
<td></td>
</tr>
<tr>
<td>Pinion Bearings</td>
<td>0.016</td>
<td>0.003</td>
</tr>
<tr>
<td>Eccentric Bearings</td>
<td>Not Measured</td>
<td>Not Measured</td>
</tr>
<tr>
<td>Main Bearings</td>
<td>0.003</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Generally the bearing clearances for this pump were acceptable apart from the left hand pinion bearing and the right hand crosshead front and back. The right hand crosshead clearances were too high and should be investigated and rectified. The left hand pinion bearing needs to be scheduled for replacement as it was on the high side. Bearing manufacturers were vague about bearing clearances before replacement but the general industry standard was 0.014 inch to 0.016 inch and start to schedule replacement but at 0.017 inch replace the bearing immediately. One of the discharge flanges was observed to have very short studs and would need longer studs fitted. The Oteco pressure relief valve was seen without the protective cap screwed on properly.

The oil in number two pump was seen to be quite dirty and around the crosshead on the left hand side there was a fair amount of oily grit collecting in the dead spaces.
6.1.1.3 Damaged drive belts for both mud pumps.

6.1.1.4 Scrap discharge valve for mud pump 1.

6.1.1.5 More rigid clamps required for high pressure connections.
6.1.1.6 Welded lug on high pressure pipe work.

6.1.1.7 Short studs on mud pump 2 discharge flange.

6.1.1.8 Severe scoring on mud pump 1 crosshead slide.
6.1.1.11 Mud pump relief valve cap not fitted correctly.

6.1.1.15 An example of a pony rod with surface damage.

6.1.1 Mud Pumps Recommendations:

6.1.1.1 Critical
Investigate the reason why one of the units on the pulsation dampener for number one mud pump was not holding a pre-charge.

*Status: Closed*

*Comments: New pulsation dampener installed.*

6.1.1.2 Critical
Cut an access point in the roof of the container so as to get access to the top unit of the pulsation dampener for number one mud pump and check the pre-charge for that unit.

*Status: Closed*

*Comments:*
6.1.1.4 Major Replace the spade and seat for number one mud pump isolation valve on the discharge line.

*Status: Closed*

*Comments:*

6.1.1.5 Major Install clamps that are more rigid than the existing ones on the high pressure discharge lines. As per API RP 54 section 9.13.2.

*Status: Closed*

*Comments:*

6.1.1.6 Major Ensure that no welding is performed on high pressure pipe lines as seen by the welding of lugs on the relief valve discharge line for the mud pumps.

*Status: Closed*

*Comments: Standard procedures governing welding practices have been established.*

6.1.1.7 Major Replace the short studs on the fluid end of number 1 mud pump. Studs are to be the same length as the studs on number 2 mud pump complete with nuts and locking nuts.

6.1.1.8 Major Repair or replace the damaged Demco valves on the top of the mud tank. Ensure that all valves operate correctly.

6.1.1.7 Major Change the short studs for longer ones on number two mud pump's discharge module flange.

*Status: Open*

*Comments: Not completed.*

6.1.1.8 Major Investigate the scoring on the left hand crosshead slide for number one mud pump, looking from the power end, and rectify.

*Status: Open*

*Comments: Not completed*

6.1.1.9 Major Investigate and rectify the high crosshead clearances obtained on the left hand slide for number one pump and the right hand slide for number two pump.

*Status: Open*

*Comments: Not completed*

6.1.1.10 Major Replace the pinion bearings in number two mud pump as the left hand bearing had excessive clearance and pinion bearings should always be changed as a pair.

*Status: Closed*

*Comments: New power end has been installed.*

6.1.1.11 Major Screw the protective cap onto the Oteco pressure relief valve for number two mud pump.

*Status: Closed*

*Comments:*

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6.1.1.12 Major Determine if the one ten inch suction line to both mud pumps is sufficient to supply both these pumps simultaneously when operating at maximum strokes per minute.
Status: Open
Comments: Rig has tested pump efficiencies with Halliburton during drilling, recorded as 97% efficient. This could be confirmed again during drilling of the next well.

6.1.1.13 Major Change the oil on number two mud pump and clean out the oily grit residue collecting in the dead spaces around the left hand crosshead.
Status: Closed
Comments: New power end has been installed.

6.1.1.14 Major Replace the pinion shaft oil seals on both mud pumps.
Status: Open
Comments: Only number 1 pump had been completed.

6.1.1.15 Major Investigate all the pony rods on both pumps for surface damage like pitting and scoring and replace the worst ones with the spares on hand.
Status: Closed
Comments:

6.1.1.16 Minor Install a valve handle to the cellar jet line valve on number one mud pump.
Status: Closed
Comments:

6.2 Shale Shakers (General)
The rig was equipped with two Drilling Equipment linear motion DFE SCR-01 single bed three screen shakers. These shakers were rated for 500 gallons per minute. Both the shakers were visually inspected and observed to be in a good condition. No structural damage was seen and the springs were in a satisfactory condition. The shakers were test run and no abnormal noises were noted. The shakers were also observed in operation with mud being passed over them and they were seen to function adequately.

6.2.1.1 Major Shale Shakers (General) Recommendations:
Install earth bonding cables for both the shakers vibrator units.
Status: Open
Comments: Not complete.
6.4  

**Desilter**

The rig was equipped with a six cone 4 inch Tri-Flo desilter that was hard mounted to the mud system skid. The unit was inspected and seen to be in a good condition. There was no pressure gauge noted for the desilter inlet line. When in operation the desilter was seen not to be working well. Only one of the desilter cones was operating as it should have. The discharge box for the desilter was seen with several leaks from the welds where the cone discharge joined the discharge box.

![Image](image.jpg)

6.4.1.3 Leaking welds at the desilter discharge box.

**Desilter Recommendations:**

6.4.1.1  Major  
Mount a pressure gauge on the inlet line to the desilter.  
*Status: Open*  
*Comments:*  

6.4.1.2  Major  
Investigate why the several desilter cones were not working and rectify.  
*Status: Open*  
*Comments: The desilter was not running at the time of the ModuSpec inspection.*  

6.4.1.3  Major  
Repair the leaking discharge box for the desilter.  
*Status: Open*  
*Comments: The desilter was not running at the time of the ModuSpec inspection.*

6.5  

**Desander**

The rig was equipped with a four cone 160mm Chimo desander that was hard mounted to the mud system skid. The unit was inspected and seen to be in a good condition. There was no pressure gauge noted for the desander inlet line. The inlet butterfly valve to the desander was observed without a handle. The desander was seen to be operating well when drilling operation were under way.
Desander Recommendations:

6.5.1.1 Major Mount a pressure gauge on the inlet line to the desander.  
**Status: Open**  
**Comments:** This task had not been completed at the time of the ModuSpec inspection.

6.5.1.2 Major Replace the missing valve handle on the desander inlet butterfly valve.  
**Status: Open**  
**Comments:** This task had not been completed at the time of the ModuSpec inspection.

6.7 Centrifugal Pumps

The two belt driven Harrisburg 178 PED mud mix centrifugal pumps were located in a dedicated room on the end of the mud tanks. One of these pumps serviced the desander and desilter while the other one was the mud mix pump however there was a crossover line so either pump could be used for different operations. Both pumps were observed to have a cover over the gland which was an indication that the shaft glands were leaking.

Centrifugal Pumps Recommendations:

6.7.1.1 Major Investigate the leaking shaft glands on both the centrifugal mix pumps and rectify.  
**Status: Closed**  
**Comments:** New packing installed.

6.8 Mud Agitators

One Lightnin Model 72QZ.5 was mounted on top of the mud tanks. Oil levels were checked and found at the correct level. When the shaft was moved to check the bearing clearance excessive play was noted and would need to be investigated.

Mud Agitators Recommendations:

6.8.1.1 Major Investigate the excessive play in the shaft bearing for the agitator and rectify.  
**Status: Closed**  
**Comments:**

6.9 Mud-Mixing System

Low-pressure mud system

The mud mixing hopper was located at the end of the mud tanks in a dedicated room. The pipe work in this was in a reasonable condition and crossover valves allowed for various tasks to be performed simultaneously. The suction line into one of the mixing pump was seen to have a temporary repair. The two suction lines to the centrifugal pumps were seen to penetrate the bulkhead for the tank poorly and should be welded on both sides. There was no dust extraction system in use for this area and one should be installed.

There was a PPE locker that had very little in the way of safety equipment stored inside. This locker should always be kept full of the required PPE.
Mud pits

The Rudd & Hodgson one tank mud system consisted of six tanks with a total capacity of 450bbls. The slug pit capacity was 37bbls, the premix capacity was 56bbls, suction tank 84bbls, desander / desilter tank 69bbls, settling tank 51bbls and the sand trap 12bbls. Mud guns were also in use for these tanks and it was observed that the gun next to the shakers had no handle attached to it. The mud pits were visibly inspected internally and seen to be in a reasonable condition. Some corrosion was evident on the tank walls and mostly near the tops of the tanks and several areas were seen to be corroded through.

![Image of mud pit]

6.9.1.3 Repair suction line to the centrifugal mix pump in the hopper room.

6.9.1 Mud-Mixing System Recommendations:

6.9.1.1 Critical Ensure the stock in the PPE locker in the hopper room is fully stocked with safety equipment such as eye protection, noise arresters, rubber gloves, apron, dust mask, etc.

Status: Closed
Comments:

6.9.1.2 Major Install a dust extractor to the hopper in the room at the end of the mud tanks.

Status: Open
Comments: Not completed.

6.9.1.3 Major Repair the suction line into the one mud mixing pump as there was a temporary repair on the line.

Status: Closed
Comments: Temporary repair still in place.

6.9.1.4 Major Fit a handle to the mud gun next to the shakers as the handle is missing.

Status: Open
Comments: Not completed.

6.9.1.5 Major Arrest the corrosion on the mud tank wall near the top of the tanks. Several areas were seen to be corroded through.

Status: Open
Comments: Ongoing.

6.9.1.6  Major  Fully weld the poor penetration of the mud mixing lines to the mud tank.

Status: Closed

Comments: Ground out and rewelded.

6.9.1.7  Major  Repair or replace all the valves in the mud system. The majority of the mud system valves could not be operated.

6.9.1.8  Major  Remove the older type open bottom mud/gas separator from the mud tank and install the new independent unit now on the lease. The open bottom type separator is not acceptable as it may lose its mud seal if the tank level gets too low.

6.9.1  Trip Tank System

The 25bbl trip tank was located under the substructure. The trip tank was inspected internally while it was empty and was observed to be in a good condition. A mechanical and electrical level sensing device was mounted in the trip tank and the mechanical device pointer was easily seen by the driller on the drill floor. The trip tank pump was a 3 x 2 centrifugal pump located in the substructure. The pump was visually inspected and seen to be in a satisfactory condition.

6.9.2  Flow Line System

The flowline was inspected and was seen to have various sections with welded patches. This was a good indication that the rest of the flowline was corroded. Several home made pad eyes were observed fitted to the flow line. These should be removed and machine cut certified pad eyes should be fitted and then NDT inspected.

It was observed that the flowline was not able to cope with the mud flow from the bell nipple and was overflowing. The angle of the flow line needs to be increased by raising the height of the bell nipple another 10 inches. The size of the flowline also needs to be increased.
6.9.2.1.1 Flame cut lifting eyes on the flowline.

6.9.2.1.1 More home made lifting eyes on the bell nipple.

**Flow Line System Recommendations:**

6.9.2.1.1 Major
Remove the home made flame cut pad eyes from the flowline and replace with machine cut certified pad eyes. Perform a NDT inspection of all the welds newly fitted pad eyes.

*Status: Closed*

*Comments:*

6.9.2.1.2 Major
Raise the height of the bell nipple outlet so that there is more of an angle in the flowline.

*Status: Open*

*Comments: Not completed.*

6.9.2.1.3 Major
Increase the size of the flowline as it was the same size as the suction for both the mud pumps.

*Status: Open*

*Comments: Not completed.*
6.10 **Standpipe Manifold and Rotary Hoses**

The standpipe manifold and high pressure piping were inspected and seen to be in a satisfactory condition. A wall thickness survey was being conducted at the time of survey and wall thicknesses on the discharges from both mud pumps indicated a thickness of only 4.77mm and 5.3mm on some straight sections of pipe. These sections of pipe work were removed and sent to Moomba for repair.

The standpipe manifold which consisted of a Demco gate valve with two 2 inch outlets before the gate valve. One of these was plugged and the other open for a pressure gauge. The wall thicknesses for these two small sections of pipe were seen to be 4.27mm and 4.95mm. These two sections of pipe seem to be schedule 80 and not the correct schedule as per the pressure rating of the rest of the system. Some other sections of high pressure pipe work that were non compliant were seen on the cellar jetting system. There were sections of pipe that were welded onto threaded fittings and generally the whole section of pipe was a poorly fabricated concoction.

The Kelly hose was inspected and seen to be in a poor condition. There were large sections of the outer rubber sheath that had been completely removed and was exposing the steel reinforcing below. This Kelly hose should be replaced immediately as it was impossible to determine the state of corrosion below the steel reinforcing. The Kelly hose was also seen to have the secondary retention chain secured to the hose at the lifting point. This was the wrong place to secure the hose and it should be clamped a few feet down the hose around the rubber sheath.

The jumper / shock hoses used between both mud pumps and the standpipe line were also seen to be in a poor condition. The hose for number two pump was seen to have several gouges and abrasions that should be repaired immediately. The shock hose for number one mud pump should be replaced immediately as there was a large gouge in the hose and the reinforced wiring underneath was corroded and damaged.

There was no hose register in place on the rig where the integrity of the Kelly and shock hoses could be verified. A hose register would go a long way in ensuring that hoses are correctly looked after. There were no records as to the age of these hoses and as a guide Phoenix Beattie, a common manufacturer of hoses, states that the normal expected life time cycle of a rotary / jumper hose should be approximately 5-10 years. Provided the hoses were maintained to the manufacturer’s recommendations.

Due to time constraints pressure testing of all the components in the standpipe was unable to be completed at this time. ModuSpec strongly recommends that a full pressure test be performed before spudding in as the state of the valves in the system left a lot to be desired.
6.10.1.1 Kelly hose damaged and revealing reinforcing.

6.10.1.2 Two gouges with corroded reinforcing exposed on number one mud pump shock hose.

6.10.1.5 Poorly made cellar jetting line.
Standpipe Manifold and Rotary Hoses Recommendations:

6.10.1.1 Critical Replace the Kelly hose at the soonest opportunity as the outer rubber sheath has been extensively damaged revealing the wire reinforcing.
Status: Closed
Comments:

6.10.1.2 Critical Replace the shock hose from number one mud pump at the soonest opportunity as the outer rubber sheath has been deeply gouged and the reinforced wiring underneath was corroded and damaged.
Status: Closed
Comments:

6.10.1.3 Critical Remove from service the two under size sections of two inch pipe from the standpipe manifold as they are only 4.27mm and 4.97mm thick. Replace these two connections with the correctly scheduled pipe.
Status: Open
Comments: No certification was sighted by ModuSpec.

6.10.1.4 Critical Ensure that the safety chain for the Kelly hose at the top of the standpipe manifold is secured at the correct place and not the lifting eye. (API Spec 7K)
Status: Closed
Comments:

6.10.1.5 Critical Fabricate a certified section of pipe work for the cellar jetting line and remove from service the existing homemade pipe work.
Status: Closed
Comments: Wilden pump installed for the cellar.

6.10.1.6 Critical Repair the gouges and abrasions on the external rubber sheath on number two mud pump shock hose.
Status: Closed
Comments: New hose supplied.

6.10.1.7 Major Implement a hose register where the Kelly and shock hoses are managed a maintenance system. This system would give details on the interval and what type of inspections to perform.
Status: Open
Comments: Include the hose register in the records of the MEX programme.

6.10.1.8 Major Ensure that all high pressure piping repairs are supplied with the correct documentation and certification at the end of the job.
Status: Open
Comments: Enter all high-pressure piping repair details and certification into the records of the MEX programme.
6.10.1.9 Major Pressure test each individual valve and the standpipe manifold to its rated working pressure due to this test not being performed during the inspection.

**Status: Open**

**Comments:** Not witnessed by ModuSpec during the inspection. This must be done as part of BOP test prior to drilling out the shoe.
7.0 WELL CONTROL EQUIPMENT

7.1 Ram-Type Preventers

Two single Shaffer 11 inch 3,000psi LWS blow out preventers were normally installed on the rig. At the time of the survey however, the two single BOPs were being sent into town for a full disassembly overhaul and inspection. To replace these BOPs a rental set was sent to the rig. The rental BOP was a Cameron SS double with a 3,000psi working pressure. The certification and documentation for the rental BOPs was not available at the rig site during the time of the survey however we were informed that documentation would be sent to the rig soon.

Due to time constraints we were unable to pressure test the BOP during this survey.

7.1.1.1 Major Ram-Type Preventers Recommendations:
Produce the documentation and certification for the rental Cameron BOP and ensure it is retained on the rig.

Status: Closed
Comments: Not applicable - Shaffer BOP was deployed. Certification was held on rig for the Shaffer BOP.

7.1.1.2 Major Ensure that a full pressure test rated at working pressure is performed on the BOP stack when it is fully assembled.

Status: Open
Comments: To be completed when the BOP stack is fully assembled.

7.1.5 Pressure Testing

Pressure testing was conducted using a trailer mounted pump and Nearwich Ltd chart recorder. No pressure tests were performed during the time of this inspection.

7.1.5.1.1 Critical Pressure Testing Recommendations:
Ensure that when pressure testing is taking place rig crews are alerted and only necessary personnel are to enter the pressure test area. The pressure test area should be barrier taped off.

Status: Open
Comments: To be completed when the BOP stack is fully assembled.

7.2 Annular-Type Preventers

A 13 5/8 inch Hydril GK-12-900, serial number 30729L annular BOP was being used on the rig. The unit was visually inspected internally without being dismantled and also visually inspected externally. Nothing untoward was observed. Mud and grit was seen to be blocking some of the threaded holes on top of the BOP. The packer was inspected from the top of the annular and seen to be in a reasonable condition.
Annular-Type Preventers Recommendations:

7.2.4.1.1 Minor Grease should be put into the bolt holes while the unit is not being used and the BOP is in transit.

Status: Open

Comments: This task was to be added to the Rig Move manuals and JSA.

7.2.4.1.2 Major Produce a current certificate for the Hydril annular preventer. Retain a copy of the certificate at the rig site.

7.3 Gate Valves (BOP-Mounted)

The choke side valves for the BOP consisted of one Cameron type F 3 inch 3,000psi gate valve and one hydraulically controlled 2 1/8 inch Jinhu Machinery Plant 5,000psi valve.

The kill side valves for the BOP consisted of one Cameron type F 3 inch 3,000psi gate valve, an unidentified non return valve and one 2 1/16 WKM 5,000psi gate valve.

All these valves were inspected and seen to be in a satisfactory condition. Due to time constraints we were unable to pressure test the BOP and side valves during this survey.

Gate Valves (BOP-Mounted) Recommendations:

7.3.1.1 Major Perform a full working pressure test on all valves in the well control system and document the results.

Status: Open

Comments: To be completed. The full complement of BOP gate valves was not mounted at the time of the ModuSpec inspection.

7.4 Choke Manifold

The Woodgroup 3,000psi choke manifold was seen to be in a reasonable condition. All valves were operated with no abnormalities noted. One of the valves was disassembled for inspection and seen to be in a good condition. There were two flanges on the manifold that had studs too short for the nuts and would need to be replaced. The flanges with the short studs were one of the target flanges and one of the valves flanges. Due to time constraints we were unable to pressure test the BOP, choke manifold and BOP side valves during this survey.
7.4.1.1 Studs too short on some of the flanges on the choke manifold.
Choke Manifold Recommendations:

7.4.1.1 Major Replace the short studs for longer ones on two of the flanges on the choke manifold.

Status: Open
Comments: Not completed.

7.4.1.2 Major Perform a full working pressure test on all valves in the choke manifold and document the results.

Status: Closed
Comments: Test results and certification were reviewed.

Coflexip Hoses

There were several Coflex hoses in use on the rig. There were ten 1 inch by 23ft 5,000psi BOP control hoses. These were inspected and seen to be in a satisfactory condition. One 3 ½ inch by 16ft 5,000ft kill line hose was inspected and seen to be in a satisfactory condition. The last hose was a 2 inch by 12ft 5,000psi choke and kill hose which was also inspected and seen to be in a satisfactory condition. There was no documentation for how old these hoses were or when they had last been inspected.

Coflexip Hoses Recommendations:

7.4.1.1.1 Major Ensure that the coflex hoses are inspected according to the manufacturers specifications and at the intervals stated by the manufacturer. This is generally every three years as stated in API RP 53 section 17.10.3. Retain all documentation of any inspections performed on the rig.

Status: Open
Comments: The hoses mentioned were recent purchases within the past 18 months. Maintenance policies have been created and were entered into the MEX programme.

7.4.1.1.2 Major Produce documentation showing the date of installation of all coflex hoses in use on the rig.

Status: Closed
Comments: Purchase order sighted.

7.4.1.1.3 Major Produce a current test certificate for the Coflexip hoses installed on the BOP. Retain a copy of the certificates at the rig site.
7.4.2 Mud/Gas Separator

There was a small poorboy degasser mounted in the mud tank next to one of the shakers. This unit was seen to be unacceptable as a degasser. There was only a mud seal as high as the level in the tank at the time, and this could only be about five feet maximum. The unit was small and seen to be quite corroded inside. ModuSpec recommends that this unit

During the time of the survey a new poorboy arrived on site. There was no documentation to indicate how the degasser was to be set up. No ‘U’ tube that would make the mud seal was seen to come with the degasser. There was also no skid made up for mounting the degasser.

7.4.2.1 Mud/Gas Separator Recommendations:

7.4.2.1.1 Major Ensure that the old poorboy degasser is removed from service as soon as possible and replaced with the new one.  
*Status: Open*  
*Comments: The old mud/gas separator has not been removed. The new unit was on the lease but not installed.*

7.4.2.1.2 Major Obtain the relevant documentation and certification for the poorboy degasser.  
*Status: Open*  
*Comments: Documentation was not available.*

7.4.2.1.3 Major Ensure that the new poorboy degasser is fitted with a ‘U’ tube enabling the degasser to have a 10 foot mud seal.  
*Status: Open*  
*Comments: The new mud/gas separator was not installed at the time of the ModuSpec inspection.*

7.6 BOP-Handling Equipment

Two BOP handling slings certification dated January 2005 were observed by ModuSpec to be in a good condition. These slings were used for rigging the BOP into place under the substructure.

7.7 Surface Hydraulic BOP Control Unit

A Ross Hill 180 gallon BOP control unit was in use on the rig. There was a capacity for twelve accumulator bottles fitted to four separate banks. However there were only eight bottles fitted and if one accumulator bank were to be lost there would be more than a 25% loss on the whole accumulator system capacity.

One main electrical triplex pump was the primary pump and two small pneumatically operated Haskell pumps were the secondary pumps. Oil was being used as the control fluid and the tank, when opened up was seen to be in a good condition. Pre-charge pressures were tested and several bottles needed recharging.
The unit was inspected and observed to be in a good condition apart from several abnormalities.

The bottles were not individually marked to identify them for planned maintenance although the pre charge pressures which were 1,000psi were written on to them. The discharge line from the triplex pump was a rubber hose and was considered a single point failure if it had to burst. Hard piping should be installed in the piping from the triplex pump to the accumulators. No tags indicating testing date and relief pressure were seen fitted to the relief valve. There was no vent valve on the top of the unit to drain off system pressure; it seems that it had been removed. On top of the tank all the pneumatic lines were seen to be disconnected from the pneumatically controlled regulators and would need repairing. The tank level was observed to be at the correct level but there was no guard protecting the sight glass or self closing valves. There were not two independent pumping systems on the unit. The electrical power to the electric pump was the same supply that fed the compressor which supplied air and drove the air pumps.

The accumulator volume test was not completed during this survey due to time constraints and lack of man power.

7.7.1.6 Pneumatic regulators need to be repaired on BOP control unit.

7.7.1.7 BOP accumulator bottles not compliant with API 16D.
7.7.1.8 No protection for BOP control unit tank sight glass.

**Surface Hydraulic BOP Control Unit Recommendations:**

7.7.1.1 Critical Replace the discharge hose from the triplex pump of the BOP unit with hard piping as the hose is a single point failure.

*Status: Closed*  
*Comments:*  

7.7.1.2 Critical Ensure that at least two pumping systems, each having an independent dedicated power supply should be installed on the BOP control unit as per API Spec 16D section 5.1.2.1 (2005).

*Status: Closed*  
*Comments:*  

7.7.1.3 Critical Ensure that all the accumulator bottles for the BOP control unit are pre-charged to 1,000psi and the two bottles with 500psi and 750psi are charged as soon as nitrogen arrives on site. **This has since been completed.**

7.7.1.4 Critical Ensure that one remote panel is supplied and made accessible to the driller for the BOP control unit as stated in API Spec 16D section 4.3.3.1.

*Status: Closed*  
*Comments:*  

7.7.1.5 Major A testing and re-certification program must be in place for the relief valve on the BOP control unit as per API RP 576 section 6.1.2.

*Status: Closed*  
*Comments: Completed June 2008.*
7.7.1.6 Major Refit the pneumatic lines to the manifold regulators on top of the hydraulic BOP control unit tank. 
Status: Closed
Comments: Completed June 2008.

7.7.1.7 Major Supply sufficient accumulator bottles on the individual banks of the BOP control unit so that a loss of an individual accumulator or bank will not result in more than a 25% loss of the total accumulator system capacity. (API Spec 16D section 5.1.3.2 2005)
Status: Open
Comments: An equal number of bottles must be on each bank of the accumulator

7.7.1.8 Major Provide a protective guard on the sight glass for the oil tank on the BOP control unit. 
Status: Closed
Comments: 

7.7.1.9 Minor Re-install the vent valve on the BOP control unit and mark it normally closed. 
Status: Open
Comments: Vent valve must be re-installed and must be marked normally closed

7.7.1.10 Minor Number the accumulator bottles on the BOP control unit so that when maintenance is performed bottles are easily identified and also mark the maximum working pressure signs. 
Status: Open
Comments: Not completed at the time of the Moduspec inspection.

7.7.1.11 Minor Mount signage that indicated the BOP hydraulic control unit may start at any time. 
Status: Open
Comments: Warning sign not posted.
9.0 **POWER PLANT**

9.1 **Diesel Engines**

All the engines on the rig were Caterpillars. The general state of all the engines was that they were in need of maintenance. There seemed to be the attitude of only changing filters and not worrying about other things like oil leaks. The engines should be degreased so that oil leaks could be spotted and repaired. There was no pro-active maintenance but only reactive, in other words when the engine broke down it had to be fixed. This further enforced the need for the planned maintenance system to be implemented.

Emergency engine stops that shut down the engines from either the drill floor or outside the Toolpusher’s office were tested and all functioned satisfactorily apart from generator number two as there was no rig saver fitted to that engine yet.

Some abnormalities that affected all the engines were their lack of lagging around the exhausts and turbos. This was a major issue in that all of the exhausts and turbos were at a height were personnel could be injured from their hot surfaces. The other point was the possibility of oil or fuel from a burst line spraying onto the hot surfaces and igniting.

Another major issue was that none of the engine lubricating oil, high water temperature or overspeed shutdowns had ever been tested. This would be one of the most important tests to perform on an engine. Engines that fail due to a low oil pressure for example have serious implications to the operation. Injury to personnel, equipment damage and lost or down time could be the result. The overspeed shutdown for the engines should trip the rig savers however this was not the case with all the engines on site. The rig savers were only tripped by the emergency stops as discussed previously.

No records were seen for any lubricating oil analysis tests that had been performed on any of the engines. There were also no service records seen for any of the Caterpillar engines as the planned maintenance system had not yet been implemented.

**Drawworks drive engines:**
Both drawworks engines were Caterpillar 3306DI engines. The serial number for number one engine was 85Z02557 but for number two the serial number was not on the engine.

Number one engine was inspected and seen to be in a reasonable condition for its age. The engine was test run and no abnormal noises or vibrations were noted. Oil and fuel pressure gauges were both operational however the tachometer was not working. The exhaust bellows / expansion piece after the turbo on number one engine was observed to be temporarily repaired and would need replacing.

Engine number two was inspected and seen to be in a reasonable condition for its age. The engine was test run and no abnormal noises or vibrations were noted. Oil and fuel pressure gauges were both operational however the tachometer was not working. There was oil around the cylinder head and tappet covers thus indicating a possible leak in the tappet cover. Oil was also seen leaking from the coupling cover after the torque converter. The engine guard on number two engine needed to be modified as there was a large gap at the top of it where personnel might put their hand while manoeuvring between the two engines.
Mud pump engines:
The mud pump engines were Caterpillar 3412 producing 595hp at 1500rpm. Number one engines serial number was 38S09201 while number two’s serial number was not located.

These engines were test run and ran well with no oil leaks and no undue vibrations noted.

Generators:
The generators were driven by two Caterpillar engines, number one a 3406 and number two a 3306. The serial number for number one engine was 90U13256 and number two 1CZ01247. Both units were run and inspected and they were both seen to run satisfactorily. No problems were noted and oil consumption was found to be normal.

Number two engine was seen to be a relatively newer engine that we were informed had only recently been installed. This engine had no rig saver fitted to the air inlet to enable shutting off the combustion air in an emergency. Evidence of an oil leak at the turbo could be a leaking oil seal in the turbo and should be investigated. Number two engine was seen to be mounted in a way that was hardly any room to get past the engine to the fuel transfer pump switch and filters.

Office and rig accommodation generator:
A Pramac GSW60 rental generator was utilised as the power supply to the offices and rig accommodation. This unit was inspected and seen to be running well with no leaks of any sort noted. The frequency was observed to be slightly low at 47Hz and would need to be adjusted.

9.1.1.2 Homemade repair to exhaust bellows on number one drawworks engine.
9.1.1.3 Oil leaks on number two drawworks engine.

9.1.1.4 Oil leak on number two drawworks engine tappet cover.

9.1.1.7 Unprotected exhaust system on all engines.
9.1.1.9 Oil leak from number two generator turbo.

9.1.1.12 Cupboard obstructing the way between number two engine and fuel transfer pump switch and filters.

**9.1.1** Critical

**Diesel Engines Recommendations:**
Modify the existing guarding for the rotating parts on number two drawworks engine as there is a large gap in it.

*Status: Closed*

*Comments:*

**9.1.2** Major

Replace the exhaust expansion piece on number one drawworks engine.

*Status: Closed*

*Comments:*
9.1.1.3 Major Stop the oil leaking from number two drawworks engine coupling cover after the torque converter.

Status: Closed
Comments:

9.1.1.4 Major Investigate the oil leak emanating somewhere around the cylinder head and tappet cover on number one drawworks engine.

Status: Closed
Comments:

9.1.1.5 Major Perform engine lubricating oil, high water temperature and overspeed trips as soon as possible to determine if they work and continue to perform this check on a regular basis.

Status: Closed
Comments:

9.1.1.6 Major Ensure that the overspeed device on the engines when activated trips the rig savers as this is not currently the case. Refer to API RP 54 section 9.15.2.

Status: Closed
Comments:

9.1.1.7 Major Ensure that the exhaust system for all engines is completely protected by fire resistant lagging and this includes the turbo chargers.

Status: Closed
Comments:

9.1.1.8 Major Perform oil sampling analysis on all the diesel engines and record the results.

Status: Closed
Comments:

9.1.1.9 Major Investigate the oil leak from the turbocharger exhaust side on number two generator engine.

Status: Closed
Comments:

9.1.1.10 Major Provide an emergency shut down device that will close off the combustion air for generator number two as per API RP 54 section 9.15.2.

Status: Closed
Comments:

9.1.1.11 Major Adjust the frequency on the Pramac rental generator so that it is 50Hz.

Status: Closed
Comments:
9.1.1.12 Major Remove the cupboard obstructing the walkway between number two generator and the fuel transfer pump switches and filters.

Status: Closed

Comments:

9.1.2 Caterpillar Engines

9.1.2.1 Major Lag the expansion joint on the mud pump motor exhaust, which had not been lagged since the expansion joint was replaced.

9.1.2.2 Minor Various gauges on the engines were not functioning. Replace the defective gauges.

9.1.2.3 Minor Replace the polycarbonate bowls on the Donaldson pre-filters on the mud pump motors. The existing bowls have been painted.

9.1.2.4 Minor Clean the lens on the hours run meter on number 1 mud pump motor, which had been painted over, so that the hours can be read.

9.1.2.5 Major The main generators require new batteries for the starters on both engines to ensure both engines are ready to be started in an emergency situation. An emergency generator or cold start backup generator was not available.

9.1.3 Engines for Camp Power

The camp power was generated by two Cummins 6CT engines producing 181kW at 1,500rpm. The serial number for engine A was 21247693 with the engine hours 1663 and B was 21245025 with engine hours 38215. Both engines were inspected and seen to be in a good condition. The fuel hoses to the fuel pump from the filters were seen to be fitted with hose clamps.

9.1.2.1.5 Major Engines for Camp Power Recommendations: Install correctly swaged fuel hoses with screwed fittings to the camp generator fuel system as they are currently had hoses with jubilee clamps fitted.

Status: Closed

Comments:

9.1.4 Portable Engines

There was a Lincoln welder that was driven by a Perkins diesel as well as a high pressure water blaster driven by a Honda petrol engine. All these engines were briefly inspected and seen to be in a satisfactory condition.
9.2  **Emergency Generator Set**
There was no emergency generator set for this rig.

9.3  **Air Compressors**

There were two air compressors located in the compressor room. The smaller belt driven piston compressor was a Clisby TC 600. This compressor was inspected and seen to be in a satisfactory condition, the oil level was good and the belts correctly tensioned.

The second compressor was a Compare 6050 with a serial number F0790141. This compressor had a maximum working pressure of 8bar. The unit was visually inspected and seen to be in a satisfactory condition. The covers that had been removed need to be replaced as they present a trip hazard in the room and also they guard the moving machinery in the compressor unit box. The cooling fins were also seen to be slightly clogged up with dead insects and would need washing out.

Maintenance history records were not seen as the planned maintenance system had not been implemented yet.

![Rotary screw compressor air cooler clogged with insects.](image)

**Air Compressors Recommendations:**

9.3.1.1 Critical
Replace the rotary screw compressor panels because when they are off they are exposing moving machinery and altering the machine’s cooling capacity.

*Status: Closed*

*Comments:*

9.3.1.2 Major
Clean out the rotary screw compressor cooling fins as they are clogged with insects.

*Status: Closed*

*Comments:*
9.3.1 **Air Receivers**

There were three air receivers on the rig. The one located in the compressor room was inspected and seen to have been manufactured in 2006. The working pressure for the receiver was stated as being 1150kPa and the relief valve was set at 140psi.

The second air receiver was located on the drill floor behind the drawworks and was a smaller vessel than in the compressor room. The identification plate for this air receiver was painted over so no details could be obtained. The third air receiver was located under the drawworks in the substructure. This vessel was seen to be marked with the safe working pressure.

The rig air pressure supplied was seen to be 120psi. The safe working pressures for both these air receivers was not seen marked

<table>
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<tr>
<th>9.3.1.1.1</th>
<th>Minor</th>
<th>Stencil the maximum safe working pressure on to the bottle of the two air receivers not yet marked.</th>
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<td></td>
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<tr>
<td><strong>Comments:</strong></td>
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</tbody>
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9.3.1.1.2 **Major** | Produce a current test certificate for the air vessel on the rig floor. Retain a copy of the certification at the rig site.

**Refrigerating and Air-Conditioning**

There were cassette type air conditioners fitted into all of the office and accommodation containers.

The chiller room and freezer for the camp was a stand alone reefer container and the temperature was seen to be -21 degrees Centigrade with the chiller room at +5 degrees Centigrade.
10.0  ELECTRICAL EQUIPMENT

10.2  Main Generator

Two rig generators were powered by 3306 and 3406 Caterpillar diesel engines.

There was an issue with the frequency of the two generators. Number one generator set was a BBC Model 523K with a serial number C26-M618-001 and a 175kW at 60Hz and a rated voltage 480 / 260V. Number two generator set was a Caterpillar Model 250F with a serial number 8NS02032 and a 225 KVA, 180kW at 50Hz and the rated voltage of 480 / 230V.

The mixed frequencies of the two generators were a concern as most equipment on the rig, that is the shakers, mud mixing pumps and agitator were rated for 60Hz. This meant that the equipment would run at a slower than their rated speed and there could be issues with motors running hotter that normal if the 50Hz generator was running at the time. However, with the 60Hz generator running, it would be the other way round, as there were also 50Hz motors driving equipment. The rotary screw compressor which ModuSpec was informed was purchased in Australia would have a 50Hz motor (this was unable to be verified as the plate was illegible) driving it. When the 60Hz generator was running this compressor would run at a much faster speed than the manufacturer recommended. It was true that ‘everything was running well at the moment’ however continued use of running equipment rated for certain frequencies at different frequencies could lead to premature equipment failure. Plus slower pumping speeds with the mud mixing and desander / desilter pumps meant that lower pressures would be evident. API RP 14F states that the supply voltage should be as near the name plate rating as practical and should not deviate more that 5% in frequency above or below rating.

Both alternators were inspected internally through the back covers. All connections were inspected and seen to be in a satisfactory condition albeit quite dusty.

There was some cardboard being used for a cover on number two alternator. Also on number two alternator the main circuit breaker switch was see to be broken.
10.2.1.3 Cardboard as a cover for the alternator on number two generator.

10.2.1.4 Replace broken circuit breaker switch on number two generator.

**Main Generator Recommendations:**

- **10.2.1.1** Major
  - Clean the dust from the main alternators on both main generators.
  - **Status:** Closed
  - **Comments:**

- **10.2.1.2** Major
  - Two generators with the same frequencies should be used on the rig. Continually using generators with mixed frequencies could lead to premature equipment failure.
  - Refer to API RP 14F section 7.2.3.
  - **Status:** Closed
  - **Comments:**
10.2.1.3 Major Install the correct cover to number two generator alternator housing as there is a piece of cardboard there at the moment.

**Status: Open**

**Comments: Not completed at the time of the ModuSpec inspection.**

10.2.1.4 Major Replace the circuit breaker switch on number two generator.

**Status: Open**

**Comments: Ordered MR-1967.**

10.2.1.5 Major Replace the missing guard on number 2 main generator to prevent the entry of foreign material and for the protection of personnel.

10.3 Main Transformer (3-Phase)

There was a small transformer that converted 460V down to 110V. This transformer was located in the compressor room and was seen to be in a satisfactory condition albeit a little dusty inside.

10.3.1.1 Major Clean the dust from inside the transformer.

**Status: Closed**

**Comments:**

10.3.1.2 Major Remove the items of rubbish from the top of the transformer.

**Status: Closed**

**Comments:**

10.5 Main Switchboard

The main switchboard was a B.E. Switchcraft 415V, 50Hz, 14 KA for 1 second and conformed to AS 1136 FORM 2 IP56. The switchboard was seen to be in good condition with all breakers clearly marked. There were two small rubber mats in the switchboard room however these were inadequate and would need to be replaced.

10.5.1.1 Minor Replace the two small rubber mats in the switchboard room with suitable mats that cover the whole floor in front of the board.

**Status: Open**

**Comments: Not completed.**

10.6 Emergency Switchboard

There was no emergency switchboard for this rig as there was no emergency generator. However there was a smaller switchboard for the portable rental generator. This switchboard fed the offices and accommodation at the rig site. The switchboard was inspected internally and seen to be in a poor state with wires not correctly terminated and circuit breakers not adequately secured. The switchboard was in need of a clean as there was a layer of dried mud at the bottom of the box.
10.6.1.1 Rig offices and accommodation switchboard in poor condition.

**Emergency Switchboard Recommendations:**
Correctly terminate wiring and secure breakers in the switchboard for the offices and rig site accommodation.

**Status: Closed**

**Comments:**

10.6.1.2 Major Clean out the switchboard box for the offices and rig site accommodation.

**Status: Closed**

**Comments:**

10.8 **AC Motors**

All the electrical motors were visually inspected on the rig and were seen to be in a satisfactory condition. The agitator motor on the top of the mud tanks was seen to have the fan cover missing and the identification plate was missing.

10.8.1.3 Fan cover missing from agitator motor.

**AC Motors Recommendations:**
Replace the missing fan cover for the back of the agitator motor.

**Status: Closed**

**Comments:**
10.8.1  **AC Motors Insulation Test**

All of the electric motors on the rig had been megger tested in August 2007, and their readings were viewed by ModuSpec and seen to be acceptable.

10.9  **MCC Panels**

This section refers to remote starters and junction boxes. All of these were inspected on the rig site and seen to be in an acceptable condition apart several that require attention. The motor start button on the BOP hydraulic unit was seen to be unlabelled and it was unknown as to the functions of the buttons on the starter box. The agitator start and stop buttons on the starter box near to the agitator need to be labelled as to their function.

10.9.1.1 No labels on agitator starter box.

10.9.1.2 No labels on BOP control unit starter box.

**MCC Panels Recommendations:**

10.9.1.1 Major  Label the agitator start and stop buttons on the starter box near to the agitator on top of the mud pits.
10.9.1.2  Major  Label the BOP hydraulic unit start and stop box at the BOP control unit.

10.9.1.3  Major  Replace the missing bolts in the cover of the explosion-proof starter on the shale shaker to maintain its explosion-proof integrity.

10.9.1.4  Minor  Repair or replace the control knob on the controller in the compressor room (missing knob on the selector switch).

10.10  Lighting System (Main)

The main lighting for the rig site was provided with several 240V high pressure sodium spotlights along with fluorescent strip lights. There were also several 110V fluorescent strip lights at various locations around the rig. All spotlights and fluorescent strip lights were seen to have secondary retention cables fitted except one above the compressor house.

10.10.1.1  Major  Install the secondary retention cable to the spotlight above the compressor house.

10.11  Lighting System (Emergency)

Several of the fluorescent strip lights around the rig were fitted with battery packs and these were the emergency lights. They were generally located at the entrances to stairways. One of the emergency lights was seen to have a broken battery pack on the hydraulic BOP unit. None of the emergency lights were seen to be marked as such.
10.11.1.1 Battery pack needs to be repaired on the hydraulic BOP unit.

**Lighting System (Emergency) Recommendations:**

10.11.1 Major

Repair the battery pack to the emergency light on the hydraulic BOP unit. **This has been completed.**

10.11.2 Minor

Ensure that all emergency lights are marked as such. This is a requirement under IEC 61892-6 Section 11.4.

**Status:** Open

**Comments:** Lighting was being installed at the time of the ModuSpec inspection.

10.11.3 Major

Repair the engine room lighting by removing the paint from the polycarbonate lens on one fixture and restoring the other fixture to full operation. Convert one of these light fixtures to an emergency light fixture with battery backup.

10.11.4 Major

Install an emergency light in the main switchboard room for black out situations.

10.11.5 Major

Install an emergency light at the fluid end of each mud pump.

10.12 **Electrical Outlets and Portable Equipment**

All the electrical socket outlets on the rig were equipped with residual current circuit breakers and these were all set at 30mA for 30m.sec. All electrical socket outlets were inspected and seen to be in a good condition.

10.13 **Cables and Cable Trays**

Cables were seen to be routed in cable trays in the generator shack and from all the plugs in the switchboard room the cables passed to the various skids in dedicated cable holders. All cables were kept off the ground while being routed between the different equipment skids. Some cables were seen with electrical tape wrapped around them. One of these was on the BOP hydraulic control unit power supply cable. Another was on the cable between two of the shaker motors. There was a plug with electrical tape seen near the penetration to the plug body, in the secondary switchboard at the office and accommodation.
10.13.1.1 BOP control unit electrical cable with tape around it.

10.13.1.2 Shaker motor cables with electrical tape.

10.13.1.3 Suspect cable termination at the
Cables and Cable Trays Recommendations:

10.13.1.1 Major
Investigate the BOP control unit electrical cable as there was electrical tape wrapped around it in one place.

Status: Open
Comments:

10.13.1.2 Major
Investigate the shaker motor cable in between the two motors as there was electrical tape wrapped around it in one place.

Status: Open
Comments:

10.13.1.3 Major
Investigate the plug at the secondary switchboard by the office and accommodation block as there was electrical tape between the plug body and the cable.

Status: Open
Comments:

Batteries, Battery Chargers and UPS

Two battery banks were seen for the two generators. These batteries were seen not to be housed in protective enclosures. There was no signage indicating the dangers associated with batteries for example “corrosive” and “hazardous”


Batteries, Battery Chargers and UPS Recommendations:

10.14.1.1 Critical
Ensure that danger signs such as “corrosive” and “hazardous area” are put up where batteries are to be located.

Status: Open
Comments: Not fully completed, signs were still being installed during the time of the ModuSpec inspection.
10.14.1.2 Major Provide a protective box with adequate ventilation for the generators starting batteries.  
*Status: Open*

*Comments: Inadequate boat type plastic battery covers were provided to protect these batteries.*

10.15 **Alarm Systems: Fire, Gas and General**

There were no electrical alarm signals for the rig.

10.16 **Communication: Telephone and PA System**

Communications for the rig consisted of internet phones and a satellite phone in the Toolpusher's office. There was no communications between the rig floor and the Toolpusher's office or the Company Man except hand held radios which were not very reliable. Two way radio communications was maintained between the camp and the rig.
Communication: Telephone and PA System

Recommendations:

10.16.1.1 Minor Install a five station communication system between the drill floor, shakers, mud loggers, Toolpusher’s office and the Company man’s office to enable more reliable communications.

Status: Open
Comments: Not completed.

10.17

Electric Welding and Welding Distribution

The rig was equipped with two welders, a Miller model SRH-333 electric welder and a Lincoln AS 400-50 diesel welder. The electric welder was seen to be in a satisfactory condition however the diesel welder was seen to be in a poor condition. None of the electrical windings, armature or connections and wiring was seen to be protected or guarded when the side flaps for the welder were opened.

10.17.1.1 Unprotected winding and wiring on the Lincoln electric welder.
Electric Welding and Welding Distribution
Recommendations:

10.17.1.1 Critical Provide suitable guards around all the electrical connections and windings that are exposed on the Lincoln welder.

Status: Closed
Comments: Lincoln welder removed and replaced with an inverter.

10.18 Earthing and Earth Bonding

All skids and containers were fitted with a continuously earthed system that was attached to a stake in the ground. Several pump motors were seen to have no earth straps attached and would need earthing. One of these was the small compressor in the compressor house. Both the mud mixing pump motors and both the shaker vibration motors were also not grounded.

Earthing and Earth Bonding Recommendations:

10.18.1.1 Major Ensure that both the shaker vibration motors are adequately earthed as per API RP 54 Section 9.14.11.

Status: Open
Comments: Not completed.

10.18.1.2 Major Ensure that the small compressor motor is adequately earthed as per API RP 54 Section 9.14.11. This has since been completed.

10.18.1.3 Major Ensure that both the mud mixing motors are adequately earthed as per API RP 54 Section 9.14.11.

Status: Open
Comments: Not completed.

10.18.1.4 Major The earth bonding between the individual rig units had not been completed, this is particularly important on this lease where there can be no earth stakes because of the rocky terrain. There needs to be a direct ground fault earth path back to the source of power (the generator).

10.18.1.5 Install grounding cables between the shale shaker motors and their mounting bases to ensure a continuous ground path in the event of motor failure.

10.19 Hazardous Areas

All electrical equipment in the hazardous area was inspected and seen to be in an satisfactory condition. All motors had labels that identified them as suitable for being used in hazardous areas. The only abnormalities were third party junction boxes on top of the mud pits that had several bolts missing from the covers. The agitator motor terminal box had the flame path painted over and would need to be opened and cleaned off and special grease applied to it before resealing. The agitator motor also had the identification plate painted over so we were unable to confirm if the motor was suitable for a zone one area.
10.19.1.1 Painted flame path for agitator motor and painted ID label.

Hazardous Areas Recommendations:

10.19.1.1 Major Ensure that the terminal flame path on the agitator is cleaned of paint as per API RP 14FZ section 4.4.1.  
Status: Closed  
Comments:

10.19.1.2 Major Clean the paint off the identification plate on the agitator motor and confirm that the motor is suitable for operation in a zone one area. As per API RP 14FZ section 8.2.3.2.1 & API RP 7L section 1.4.2. This has been confirmed as suitable for a zone 1 area.  
Status: Closed  
Comments:

10.20 Miscellaneous Items

Two Caterpillar front end loaders were being used as forklift on the rig site. Both unit were visually inspected and seen to be in a satisfactory condition.
SAFETY EQUIPMENT

11.1.1 Automatic Fire Detection System

The only fire detection for HUNT RIG 3 was the smoke detectors fitted in all the cabins, offices and mess room. A quick inspection of the accommodation block revealed several smoke detectors that had batteries missing from them and had been tampered with.

11.1.1.1 Critical

**Automatic Fire Detection System Recommendations:**
Ensure that all missing smoke detectors are installed in the accommodation and office containers at the rig site and in the accommodation and sleeping containers in the camp.

- **Status:** Closed
- **Comments:** New smoke detectors installed.

11.1.1.2 Major

Regular checks and tests should be performed on these units and recorded in the planned maintenance system.

- **Status:** Open

11.1.4 Portable Extinguishers and Fire-Fighting Equipment

Portable fire extinguishers were the rig’s primary means of fighting fires. The rig and the camp were equipped with four types of portable extinguishers. These were water, CO2, foam and dry chemical. The extinguishers were scattered around the rig at various strategic locations. All the fire extinguishers were last checked by Roma Fire Fighting Equipment in August 2007. The extinguishers located outdoors had no protection for them. If extinguishers are to be kept outdoors plastic protective covers offered some protection from the environment and liquid spills. No records were seen for any weekly or monthly inspections performed by rig staff.

**Portable Extinguishers and Fire-Fighting Equipment Recommendations:**

11.1.4.1 Critical

Ensure that the portable fire extinguishers are regularly checked by rig staff and records for these checks entered into the maintenance system.

- **Status:** Open
- **Comments:** Record the extinguisher inspection results in the MEX programme and “punch” the dates onto individual fire extinguisher labels.

11.1.4.1.2 Minor

All fire extinguishers located outside should be placed in fibre glass cabinets or at least be protected by plastic bags.

- **Status:** Open
- **Comments:** Not completed at the time of the ModuSpec inspection.
11.2.4 **Breathing-Apparatus Sets**

Two MSA AUER SCBA breathing apparatus sets were stored in the Toolpusher’s office. An inspection of both breathing apparatus sets revealed no abnormalities apart that they were overdue for an inspection.

**Breathing-Apparatus Sets Recommendations:**

11.2.1.1 Major

Ensure that the annual inspection on the breathing apparatus is performed by a third party and that the report from this inspection is documented on the rig.

*Status: Open*

*Comments: In progress during the ModuSpec inspection.*

11.3 **Flammable-Gas Detection**

One MSA Orion Multigas detector was in use on the rig and was stored in the Toolpusher’s office. The unit was seen to have been calibrated in August 2007.

11.4 **Drilling Facilities Safety**

Safety equipment was seen to be readily available on the rig. Pre tour meeting were held before the start of work and safety drills were held weekly. When work was performed that was out of the ordinary for example moving the BOPs or raising the mast, pre-job meetings were held to discuss the work. JSA’s (Job Safety Analysis) were also in use on the rig. The file containing all the JSA’s for HUNT RIG 3 was viewed in the coffee shack. A brief look at some of these JSA’s showed that some of the critical JSA’s such as mud pit entry had not yet been written.

Safety showers and eye wash stations were located around the rig. The eye wash station in the mixing hopper room was seen to have the lid missing and was taped up. There was no emergency shower located at the mixing hopper room.

The operations manual was viewed however no records of any updates were seen to be documented. The operations manual did not have a rig specific layout for radioactive, hazardous and explosive substances.

There were several guards missing or broken from various equipment. The small compressor in the compressor room had inadequate guards installed around the fan and belts. Number two mud pump had a small section of guard missing from the belt housing. The two mud centrifugal pumps in the hopper room had guards that needed extending at the back and repairing at the front. The Lincoln portable welder was also seen with no guards around the fan and belts.
11.4.1.1 Small compressor fan and belts unsuitably guarded.

11.4.1.2 Missing guard from mud pump 2 belt housing.

11.4.1.3 Broken guards for mud mix centrifugal pumps.
### Drilling Facilities Safety Recommendations:

<table>
<thead>
<tr>
<th>ID</th>
<th>Priority</th>
<th>Description</th>
<th>Status</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.4.1.1</td>
<td>Critical</td>
<td>Provide suitable guards around the piston compressor cooling fan and belts.</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Status:</strong> Closed.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td><strong>Comments:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.4.1.2</td>
<td>Critical</td>
<td>Install the missing guard section from number two mud pump belt drive at the motor end.</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Status:</strong> Closed.</td>
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<tr>
<td></td>
<td></td>
<td><strong>Comments:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.4.1.3</td>
<td>Critical</td>
<td>Repair and extend the guards on the back side of the two centrifugal mud pumps in the hopper room.</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Status:</strong> Closed.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td><strong>Comments:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.4.1.4</td>
<td>Critical</td>
<td>Provide suitable guards for the engine belts on the Lincoln portable welder.</td>
<td>Closed</td>
<td>Lincoln portable welder has been replaced with an inverter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Status:</strong> Closed.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td><strong>Comments:</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
11.4.1.5 Critical Replace the missing eye wash station lid for the hopper room eye wash station.  
Status: Open  
Comments:

11.4.1.6 Critical Provide an emergency shower at the mixing hopper room.  
Status: Open  
Comments:

11.4.1.7 Major Ensure that JSA’s are an ongoing document and are kept regularly updated. Make out a JSA for mud tank entry.  
Status: Open  
Comments: Draft JSA for mud tank and trip tank completed, awaiting final approval for entry into JSA register.

11.4.1.8 Minor Ensure that updates are entered into the operations manual and a plan for the location of stored radioactive, explosive and hazardous substances is kept within the manual.  
Status: Open  
Comments: Ongoing

11.4.1.9 Major Repair the damaged steps on the stairway from the mud tank to the rig floor to eliminate a trip hazard.

11.4.1.10 Minor Replace the two-part shackles on the rig floor with four-part shackles.

11.5 First Aid and Hospital

First Aid and Hospital Recommendations:

11.5.1.1 Minor Mark the door in the camp with suitably sized letters to indicate that it was the first aid room.  
Status: Open  
Comments:
11.6  

**Emergency Procedures Manual**

The emergency procedures and response manual were located in the Toolpusher’s office. We were informed that one long blast on the horn acted as the general alarm for all scenarios however this long blast was initiated from the drill floor by the driller and if the drill floor was inaccessible there was no secondary means of raising the alarm. There should be another horn at the Toolpusher’s office. It was also observed that the code of signals for the general alarm and stand down were not posted anywhere on the rig.

11.6.1.1  Major  
Emergency Procedures Manual Recommendations:  
Provide a secondary horn located at the Toolpusher’s office in case the drill floor was inaccessible.  
**Status: Open**  
**Comments: Not observed at the time of the ModuSpec inspection.**

11.6.1.2  Minor  
Ensure that the code of signals for the general alarm and the stand down alarm are posted at strategic locations around the rig.  
**Status: Open**  
**Comments:**

11.7  

**Lifting and Handling**

All lifting equipment on the rig was inspected by Bullivants in July 2006 and was due for another inspection.

There were some irregular lifting devices being used on the rig as discussed below. The chain sprocket tool for drilling mouse holes and rat holes was seen to have a piece of flat bar with a hole cut into it welded to it as the lifting point. Lifting lugs should be certified and machine cut then a NDT inspection of the welds once welded in place should be performed.

In the mud pump room there was a ‘homemade’ beam clamp which must be scrapped immediately. On the Kelly, a home made lifting nubbin was observed screwed into the box. Also, it was concerning to seen that a lot of equipment like the flow line and bell nipple had home made flame cut pad eyes fitted.

11.7.1.2  Homemade beam clamp in mud pump container.
11.7.1.3 Homemade lifting gear on chain drive sprocket for rat hole and mouse hole.

11.7.1.4 More homemade lifting gear.

11.7.1.5 Flame cut padeyes on monkeyboard.

**Lifting and Handling Recommendations:**
Ensure that a third party lifting gear inspection is performed as it has been over a year since the last inspection.

*Status: Closed*
Comments:

11.7.1.2 Minor Destroy the home made lifting beam clamp in the mud pump room.
Status: Closed

11.7.1.3 Minor Remove the flame cut pad eye from the chain sprocket tool and use certified pad eyes that have been welded and NDT inspected.
Status: Closed

11.7.1.4 Minor Remove the home made lifting nubbin screwed into the box end of the Kelly from site.
Status: Closed

11.7.1.5 Minor Remove the various flame cut and home made pad eyes around the rig.
Status: Closed

11.8 Accommodation

The accommodation at the camp and at the rig site was seen to be in a satisfactory condition. Rooms were clean considering the environment and the ablution block was kept in an orderly condition. All grounding wires were seen to be in place and staked into the ground at a suitable point. Safety plans were seen located at various points around the rig.

11.9 Pollution Control

Every effort was seen to be made to prevent polluting the local environment with the containment of the fuels and lubricants within bunded areas lined with PVC film to prevent leakage into the ground. Oil spill pads were seen store in red wheelie bins and these could be used to absorb spilt liquids in the machinery containers.

11.10 Housekeeping

General housekeeping was of a reasonable standard. There were several items of waste and rubbish seen around the rig and in some of the containers but it should also be remembered that the rig was not fully operational at the time of writing this report. The state of the housekeeping at the camp was seen to be of good standard with the ablutions and sleeping cabins being kept in a clean condition.
11.10.1.1 Housekeeping on top of the transformer.

11.10.1.1 Housekeeping in the switchboard room.

11.10.1

**Housekeeping Recommendations:**

| Minor | Ensure that all rubbish and waste is thrown away and not left to clutter work areas and equipment containers. |

**Status:** Open

**Comments:**

11.10.1

**Walkways and Railings**

Walkways and railings were seen to be of an adequate standard. All walkways were used during the time of the survey to see if there were any hazardous and none were found.

11.10.2

**Walkways and Stairs**

The stairways on the rig were inspected and seen to be in a satisfactory condition. There was some minor damage to the stairs at the end of the pipe rack.
11.10.2.1.1 Some minor damage to one step on the catwalk stairs.

11.10.2.1.1 Minor Repair the stairs at the end of the catwalk as there was one step that was slightly damaged.

Status: Open

Comments:

11.11 General Safety Items

All personnel were required to wear full PPE on site that included long sleeved coveralls, steel capped boots, hard hat and eye protection. All personnel were observed to be adhering to the company policy with regards to PPE. On arrival at site an induction was given and this was in the form a page with tick boxes and the safety representative discussed all the relevant safety procedures.

We were informed that the dedicated paint locker had been replaced with a hydraulic pump and had been removed from the container. Therefore there was no place for paint and other flammable materials to be stored.

One of the fuel hoses from the buffer tank to number two mud pump engine was observed to be obstructing the walkway.

11.11.1.1 Fuel hose for number two mud pump obstructing walkway.

General Safety Items Recommendations:
11.11.1.1 Major Reroute the fuel hose obstructing the walkway in between number two mud pump Caterpillar engine and the fuel buffer tank for that engine.

Status: Closed
Comments:

11.11.1.2 Minor Set up a suitable store where paint and other flammable materials can be kept.

Status: Open
Comments: Ongoing

11.11.1.3 Major The eye wash station and shower need to be installed on the top of the mud tank. Provide an emergency shower for personnel mixing mud at the end of the mud tank.

11.11.1.4 Major Place a sign on the air winch on the driller’s off-side of the drawworks to ensure that it is not used for man-riding by mistake. If this winch is to be used for man-riding, it must be limited to 150Kg and recertified for man-riding. Currently there is a stamped plate stating the winch is rated at 2400Kg, ModuSpec was informed the plate was incorrect.
11.11.1 **Fuel Oil System**

The fuel system for the rig consisted of a tanker trailer that was parked in its own bunded off area. The fuel transfer system was well documented and instructions were posted on the side of the container where the fuel valve into the rig’s day tank was located. The fuel inlet valve into the rig’s day tank was seen with a valve handle missing. From the fuel tanker the fuel was gravitated into the rig’s fuel tank. Fuel from the rig’s day tank was then pumped by one of two pumps to the various engines. However, at each engine there was a tank of sorts which was always kept at system pressure of 15psi by the fuel pump. In effect all these tanks were pressure vessels and none of them were rated as such in fact they were all ‘home made’. If this system was going to be continually employed then dedicated pressure vessels would need to be made to install into the system.

Several fuel leaks were observed in the fuel system. Inside the compressor room one of the fuel lines was leaking at the fuel valve threads and in the engine compartment one of the valves was leaking from the gland. The rig fuel tank sight glass was seen to be broken off at the top and not protected which was exactly the reason for protecting the sight glass in the first place. The fuel sight glass had no self closing valves installed on them.

11.11.1.1.1 Repair leaking fuel valve in compressor room.
11.11.1.1.2 Fuel hoses in the fuel system with jubilee clamps being used.

11.11.1.1.2 More examples of fuel hoses with hose clamps.

11.11.1.1.4 Certified pressure vessels to be installed in the fuel system.
11.11.1.1.6 Install self closing valves on the fuel tank sight glass.

**Fuel Oil System Recommendations**

11.11.1.1 Major Repair the fuel leaking from the valves in the compressor room and the engine compartment.

*Status: Closed*

*Comments:*

11.11.1.2 Major Replace the jubilee hose clamps on all hoses in the fuel system with the correct clamps or swaged fitting.

*Status: Closed*

*Comments:*

11.11.1.3 Major Repair the broken fuel tank sight glass and install a protective cover over the sight glass to prevent future breakages.

*Status: Closed*

*Comments:*

11.11.1.4 Major The small fuel buffer tanks in the pressurised fuel system are pressure vessels and need to be constructed as such with pressure relief valves and safe working pressures. Remove these ‘home made’ tanks and replace them with appropriately certified tanks.

*Status: Closed*

*Comments:*

11.11.1.5 Major Replace the missing valve handle on the inlet valve to the rig’s fuel day tank.

*Status: Open*

*Comments:*

11.11.1.6 Minor Install self-closing sight glass valves on the fuel tank sight glass.

*Status: Open*

*Comments:*
11.11.2 **Gas Bottles**

There was a pair of gas bottles, oxygen and acetylene, standing unsecured next to a container. The other oxygen and acetylene bottles were seen to be stored next to each other. Flammable gas containers are to be stored at least 20ft apart from oxygen bottles. Two nitrogen bottles were also seen to be free-standing next to the compressor shack. Inside the stores container there was a 2,000psi accumulator bottle that had come off the BOP control unit because it was rated for 2,000psi and not 3,000psi. This bottle should be disposed of because one day somebody will use it for the BOP control unit again.

11.11.2.1.1 Remove 2,000psi accumulator bottle from site.

11.11.2.1.1 Remove from site 2,000psi accumulator bottle.
11.11.2.1.2 Oxygen and acetylene bottles free standing and unsecured.

11.11.2.1.3 Oxygen and acetylene bottles stored next to each other.
11.11.2.1.1 Critical Gas Bottles Recommendations
Remove from site the 2,000psi accumulator bottle so as to avoid it being reused again in the wrong place.

*Status: Open*

*Comments: Accumulator bottle still at the rig site.*

11.11.2.1.2 Major If gas bottles are to be stored standing up they are to be adequately secured or alternatively laid down on their sides.

*Status: Closed*

*Comments: Transportation cages in use*

11.11.2.1.3 Minor Ensure that the oxygen and acetylene bottles are stored at least 20ft apart from each other as stated in API RP 54 Section 20.4.6.

*Status: Closed*

*Comments:*

11.12 Permit-To-Work System

A permit to work system was in use at the rig site however it was not being used correctly. The different copies were not being distributed to the correct locations on the rig that. Generally a copy would go to the worksite and the original to the permit board. Lock-out and tag-out of equipment was by way of an out of service page. These were affixed to the equipment being locked-out and at the power source for the equipment being locked-out. We recommend that a pad lock system be implemented to further safe guard against isolated equipment being inadvertently started.

11.12.1.1 Critical Permit-To-Work System Recommendations:
The use of lock-out pad locks should also be used in conjunction with lock-out tags to further safe guard against isolated equipment being inadvertently started.

*Status: Open*

*Comments: Ordered on requisition MR-1966. The supplied padlocks were not suitable for the intended purpose; other lockout mechanisms were being sought.*

11.12.1.2 Major Ensure that permits are distributed to the relevant location on the rig and a copy is displayed at the work site.

*Status: Open*

*Comments:*


12.0 MAINTENANCE SYSTEM

12.1 Preventive Maintenance

We were informed that a MEX planned maintenance system was being set up but at the moment maintenance tasks were being sent from the office to the rig for execution. Generally the maintenance system on the rig was of a poor standard, with the tradesmen on site left to maintain the equipment as best they could. Maintenance was seen to be reactive and not proactive. It was determined that everybody was basically responsible to themselves for carrying out planned maintenance. ModuSpec recommends that all maintenance tasks are controlled from the rig site. When the MEX system is up and running the responsible person at the rig should generate work orders for the week or month and issue them to the relevant departments. The relevant department then completes the work and returns the closed out or possibly unfinished work orders back to the responsible person who enters them into the MEX system.

Preventive Maintenance Recommendations:

12.1.1.1 Major Speed up the implementation of the MEX system.

Status: Open
Comments: Ongoing

12.2 Maintenance Organization & Administration

It was observed that some maintenance manuals were kept in the rig office, however these manuals were mainly for newer equipment. An example of the poor maintenance organisation was when the new sprocket was made for the drawworks, there were no detailed manuals on the size of the bore to be cut and when the sprocket arrived on the rig ready for installation, it was the wrong size.

Maintenance Organization & Administration Recommendations:

12.2.1.1 Major Determine which maintenance manuals are needed for the equipment on the rig and get these manuals sent out to the rig. Ensure that these manuals include detailed spares listings.

Status: Open
Comments:

12.3 Maintenance Planning & Scheduling

Work orders were generated on the day that the work was to be performed and no planning or scheduling took place.

12.4 Maintenance Execution

A mechanical workshop, welding workshop and electrical workshop was provided with well stocked tools. The personnel performing the maintenance tasks were competent and willing in their work.
12.5 Maintenance History & Analysis

Records for equipment history were non-existent. The paper trail history for maintenance only went back a few months so it was difficult to monitor trends in equipment. The only way to monitor history on an item was to go through past work orders and even these were not filed under their respective equipment headings.

12.5.1.1 Major

Maintenance History & Analysis Recommendations:
Until the MEX system is up and running, work orders should be filed in their respective equipment files.

Status: Closed

Comments:

12.6 Spare Parts Inventory

Discussed in section 13.
13.0 SPARE PARTS

13.1 Stock Control Philosophy

Spares were kept in various locations around the rig but generally in the white house, which was a container. Stock records were seen to be kept on the computer and these were updated daily manually. All items in the stock list operated on the minimum / maximum theory, however as it was a manual system, the user had to add the stocks that were below the minimum required on the rig, to the order list.

13.2 Stock Ordering Process

ModuSpec was informed that spare parts generally delivered every fortnight. There was an urgent delivery but that required one of the office personnel or rig staff to bring the part to the rig or a hotshot courier service.

13.3 Stock Keeping

The store was seen to be in a satisfactory condition however the rubber goods were not stored in an air conditioned area.

13.3.1.1 Major

Stock Keeping Recommendations:
Ensure that rubber goods are kept in an air conditioned storage area as exposure to heat reduces their life span.

Status: Open

Comments: