

HALLIBURTON

Sperry Drilling Services

**SPERRY DRILLING SERVICES, M/LWD
SERVICE**

**EQUIPMENT FAILURE / SERVICE INTERRUPTS
REPORT**

For

Woodside Energy Ltd.

Ocean Patriot

Halladale-1 DW2

5th July 2005

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HALLIBURTON

1. Service Interrupt: Trip for Pulser Failure

FIELD FAILURE REPORT	AU-FE-3325468-1
DATE	12 th April 2005
JOB NUMBER	AU-FE-3325468
RIG	Ocean Patriot
WELL NAME	Halladale-1 DW2
LWD RUN	100
EQUIPMENT TYPE AND SERIAL NUMBER	Mk 8 Pulser 8301 (10494009)
NPT (Hrs)	TBC

REPORTED PROBLEM

While drilling the 8½” hole section on Halladale-1 DW2, the pulser stopped pulsing while attempting to clear a ‘balled’ bit. As per standard operating practice, the pumps were cycled and a mode switch was carried out in an attempt to reset the tool. As a final measure to ensure that the problem did not lay with the surface system, the standpipe pressure transducers were changed out, but to no avail. The decision was made to drill ahead into the Nullawarre before pulling out of hole to change out the failed LWD components.

RIG SITE INSPECTION

At surface the tools were read and a diagnostic parameter report was created. The report indicated that the pulser was supplying power to the LWD tool-string all the other components passed QC tests. The Pulser and Telemetry module were removed from the BHA and replaced with new components. The tool string was initialised and run in hole. As per standard operating procedures, the pulser was tested post run to confirm the electrical and hydraulic integrity. The pulser passed the electrical tests but failed the hydraulic tests. The pulser was returned to the Perth R&M facility for further investigation. A First Alert was raised and entered into the global failure database and a CPI (Correction, Prevention & Improvement) was generated.

R&M Analysis

On arrival at the Perth level one R&M facility, the Pulser underwent the standard incoming tests. These tests confirmed that the pulser had experienced a hydraulic failure as it would not pulse on the 1000 lbs bench test rig. On the instruction of the coordinator, the pulser was sent directly to the Global pulser maintenance manager for analysis in Tewkesbury (UK).

The incoming tests confirmed that a hydraulic failure had occurred. The teardown inspection revealed that the hydraulic oil showed signs of discolouration indicating contamination of the hydraulic system. The main hydraulic valve was jammed by debris causing the valve to be locked in the open position therefore causing the hydraulic system to fail. Further investigation revealed that the origin of the debris was from a tubular filter.

FINAL RESOLUTION

It has been identified that the current tubular filter design can be improved upon. This mode of failure has happened several times before and the Global R&D team are currently field testing a new filter design which will be more robust. Once this new design has been successfully field tested, the current pulser fleet can be upgraded within the routine pulser maintenance schedule.

2. Service Interrupt: No Responses from RLL

FIELD FAILURE REPORT	AU-FE-3325468-2-1
DATE	15 th April 2005
JOB NUMBER	AU-FE-3325468
RIG	Ocean Patriot
WELL NAME	Halladale-1 DW2
LWD RUN	200
EQUIPMENT TYPE AND SERIAL NUMBER	RLL (DM90069311XHWRGV6)
NPT (Hrs)	TBA

REPORTED PROBLEM

Halladale-1 DW2 was drilled to core point and the tool-string was pulled out of hole and racked back in the derrick. When the tools were brought above the rotary table, the radioactive sources were removed and the BAT tool was read. Once the read was complete, the RLL was plugged into and the memory data was retrieved. The engineers processed the data and generated a parameter diagnostic report. While the LWD tool-string was racked back, the engineer's analysed the post run diagnostic reports. The report indicated that the sensors below the resistivity tool (Gamma, Directional and Geo-Pilot) were experiencing communication problems, resulting in a series of "No Responses." Although this did not have an impact on the data quality or operations while the tool was drilling, as a precautionary measure, it was recommended to WEL that this tool should be laid out, as an intermittent problem could result in a down hole tool failure. The tool was laid out prior to running in hole after the coring run.

R&M Analysis

Upon arriving at the Dampier R&M facility, a complete teardown inspection was carried out on the tool-string. The teardown inspection revealed that the compression between the two electrical connections, Box End Annular Connector (BEAC) and the Pin End Annular Connector (PEAC), was less than specifications (0.17"). The two connectors were removed from the sub assemblies and analysed. The detailed inspection showed that the BEAC was compressed. Both the BEAC and PEAC are designed to be compressed and are "sprung", however, the springs in the BEAC became packed with solids which would not allow the spring to expand. The result of the jammed BEAC meant that the connection could not function properly and the compression between the BEAC and the PEAC was less than specifications. Although there was still contact between the two connectors, the added vibration associated with drilling, would have caused intermittent "No Responses" from the sensors below the resistivity sensor (Gamma / Geo-Pilot).



Plate #1: Showing the difference in a fully extended BEAC and the failed BEAC which was compressed and packed with drilling solids.

ROOT CAUSE

Dried solids caused the BEAC to become jammed and therefore reducing the compression between the two electrical connectors. This was the first time that any of the technicians working in Australia had seen this problem. One possible procedure that they suggested was when a tool that has been run in a water-based mud system is going to be racked back for a period of time, the tool-string should be flushed with water before racking back to limit the amount of dried mud debris build up.

3. Service Interrupt: Delay in presenting recorded BAT Sonic data

DATE	15 th April 2005
JOB NUMBER	AU-FE-3325468
RIG	Ocean Patriot
WELL NAME	Halladale-1 DW2
LWD RUN	200
EQUIPMENT TYPE AND SERIAL NUMBER	BAT (DM90067023O6)
NPT (Hrs)	TBA

REPORTED PROBLEM

Halladale-1 DW2 was drilled to core point and the tool string was pulled out of hole and racked back in the derrick. When the tools were brought above the rotary table, the radioactive sources were removed and the BAT tool was read. Once the read was complete the BAT tool was disconnected and the RLL was plugged into and the memory data was retrieved. The engineers processed the data from the RLL before processing the BAT sonic data. When the data from the BAT tool was processed, a problem was identified by which time the BHA had been racked back in the derrick and the coring assembly was being handled, therefore making it impossible to plug into the BAT tool while it was racked back. Town was contacted and the problem relayed to the Houston R&D team. It was suggested that another read would rectify the problem. Due to the BHA being reconfigured (Report #4) the BAT tool was laid out on deck and read without a problem. All the recorded data was obtained from this tool and it was picked up on the subsequent run and initialised. All data was recovered from the tool at the end of the next bit run while it was racked back without a problem.

ROOT CAUSE

As the problem could not be replicated it is assumed that a grounding problem caused the tool to have an 'incomplete' read and the initial handshake between the tool and the surface computer was corrupted, therefore causing the surface computer to be unable to process the data.

FINAL RESOLUTION

To reduce the reoccurrence of this problem, the LWD engineers will be advised to process the BAT sonic data while the LWD tool is being read. If a problem does exist, they should be able to re-read the tool before it is racked back in the derrick.

4. Customer Impact: Improper tool-string configuration

DATE	14 th April 2005
JOB NUMBER	AU-FE-3325468
RIG	Ocean Patriot
WELL NAME	Halladale-1 DW2
EQUIPMENT TYPE AND SERIAL NUMBER	RLL (HWGRV6)

REPORTED PROBLEM

Due to the hole problems encountered on DW1 and the tool-string being jarred upon, a replacement tool was mobilised as a back up. This tool-string was assigned to the SANTOS drilling campaign which was scheduled to occur on the Ocean Patriot after the Halladale drilling campaign. Unfortunately the tool-string had been assembled and mobilised without a stabiliser on bottom which is required for all 8½" Geo-Pilot rotary steerable assemblies. A replacement tool was mobilised and "hot-shotted" to Portland.

ROOT CAUSES

There are several root causes leading to this problem:

1. The EMS (Equipment Mobilisation Sheet) did not reflect the requirements for a stabiliser on bottom and hence was misinterpreted by the R&M technicians.
2. The Technicians where not aware of the Geo-Pilot system requirements

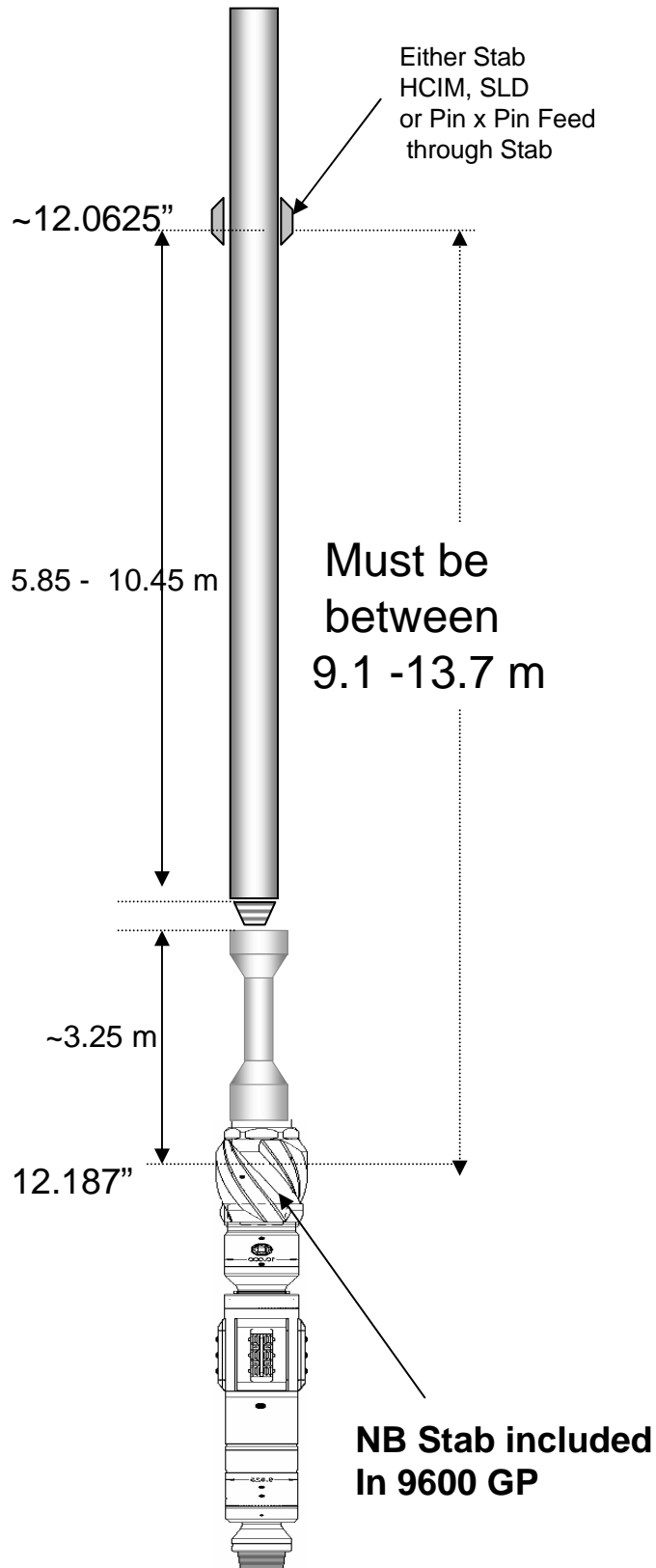
FINAL RESOLUTION

The root causes have been addressed in the following ways:

1. A review of the EMS form, which will now include the feed thru stabiliser on the RLL tool-string
2. A Geo-Pilot course has been conducted at the Perth office on the 14th & 15th April and all LWD coordinators attended this course.
3. A memo and drawings have been sent to all the R&M facilities indicating the stabiliser requirements for Geo-Pilot assemblies, (see Appendix).

APPENDIX

9600 Series GP 12¼" Hole Size



7600 Series GP 8½" Hole Sizes

