FINAL JOB REPORT

MÆRSK OIL & GAS
HBB-01

SEALMAKER CRS
9-5/8" CASING LEAK REPAIR

Date: 28.09.09
Prepared By:

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1.0 GENERAL INFORMATION

This report documents the tubing leak repair activities by Namtvedt SealMaker Services on Well No. HBB-01 on the Halfdan B Platform from the Energy Endeavour rig in the Danish sector, North Sea

A leak(s) was confirmed to exist in the 9-5/8" x 5-1/2" production annulus

Initial repair operations were performed from 13-Aug-09 through 15-Aug-09, secondary operations were performed on 8-Sep-09 and were completed on 11-Sept-09

Diagnostics during the procedure generated an estimated leak location based on N^2 Injection into the C annulus while measuring total volume returned from the B Annulus indicating a leak between 75'-146', possibly a connection leak at both points but inconclusive from the data collected during those procedures

Two sealant operations were required to obtain a completed seal and a subsequent 3000psig pressure test; both are documented in detail in the following report

The C casing annulus was shut in with 2996psig and left to remain on the wellhead as per recommendation by Namtvedt Sealmaker Services and in agreement with Maersk Oil & Gas until the stimulation was ready to be performed on HBB01 to allow additional curing time with sealant remaining positioned across the leak point(s)

2.0 OBJECTIVE

The objective of the operation was to repair the casing connection leak on **HBB-01** utilizing SEALMAKER International Limited's (Namtvedt Sealmaker Services: NSS) ***SEALMAKER CRS*** sealants and restoring integrity to 3000psig and confirmed with a subsequent Mechanical Integrity Pressure Test (MIPT) for 15 minutes duration upon completion.

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3.0 JOB SUMMARY

Possible multiple leaks were determined to exist in the 9-5/8" x 5-1/2" production annulus during diagnostics and chemical application while conducting the sealant operation. Initial Diagnostics generated a calculated leak location based on N^2 Injection into the C Annulus. Nitrogen was displaced into the C annulus to a maximum pressure of 1100 psig on 13/08/09 and The volume returned was collected at the B annulus. At approximately 250 gallons returned volume from B, slight N^2 returns were seen. The collar depth and calculated annulus volumes are as follows:

COLLAR DEPTH	VOLUME BBLS	VOLUME GALS	VOLUME LITERS
55.9'	2.45	102.9	389
101.2'	4.43	186.1	703
145.8'	6.39	268.4	1014
191.0'	8.37	351.5	1329

Based on the initial diagnostics it is inferred that a primary leak exists in the proximity of the third collar at 145.8' however calculated leak point is approximately 135.9' based on approximate return volume and the difficulty with the return fluid being drilling mud to accurately gauge the volume precisely. Both B and C annuli were then bled to zero and C was loaded with brine to verify volume displacement. The hole was loaded with 910 Liters (based on Seawell flow meter) and N^2 was bled off with an ending volume of 1080 Liters, including surface volume. Average volume being 995 Liters correlates with the collar location of 145.8' that requires 1014 Liters annular volume. Pressurization volume was then measured from 0-1000psig with seawater and required 380 Liters.

Sealant was then pumped into the leak building pressure to 4000psig; initial leak-off rate was 700#/5min (140psig/min), then as pressure decreased the leak rate fell to 53psig/min at 1950psig. The remaining chemical in the annulus was then displaced through the leak to measure response with 440L (116 gallons) seawater. The pressure built up to 3000psig during the displacement. The well C annulus was shut-in and the pressure drop from 3000psig to 1250psig was 35psig/min indicating a substantial reduction from the initial leak rate from 53psig/min to 35psig/min.

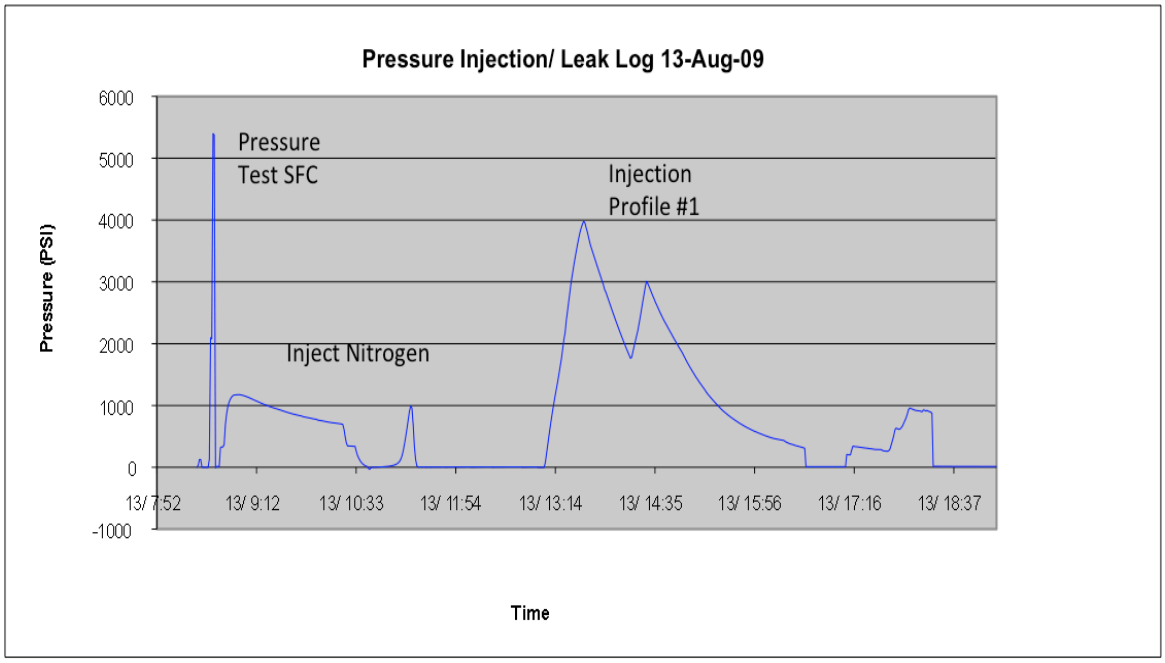
A second treatment of 40 gallons of chemical was injected via the injection pump, and then pumping had to be discontinued due to mechanical reasons. N2 was applied at the wellhead to displace the annulus. N^2 injection pressure built up significantly higher (1850psig in contrast to 1100psig maximum during initial diagnostics) and return volume at B changed to approximately 150 gallons before N^2 was seen at B. The secondary nitrogen displacement now indicating a possible second leak depth of 75' as had been originally suspected in the preliminary diagnostics performed by Mearsk. The C annulus fell to1250psig from 1850psig over the next two hours. The inert gas was then bled off and the second treatment was loaded into the annulus at low pressure. After the chemical was loaded N^2 pressure was applied to squeeze the chemical into the leak. As pressure was increased incrementally to 1249psig, the leak rate began to slow and B annulus returns began to diminish indicating a seal was forming across

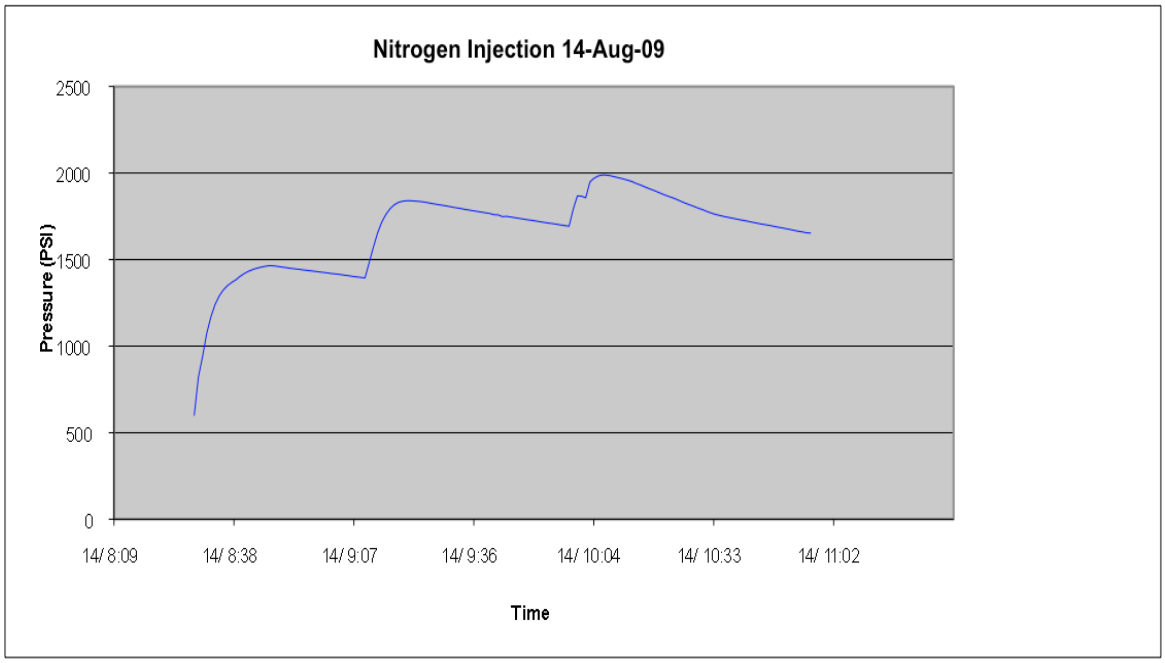
the leak site. The well was shut-in for 12 hours at 1249psig with zero pressure loss. The C annulus pressure was then raised to 1500psig with N^2 and the B annulus was opened with no communication from C to B. Halliburton was then rigged up onto the line and the C annulus was incrementally stepped up from 1500psig to 3000psig in 500psig increments holding solid with zero pressure loss. The C annulus was then raised to 3500psig and shut-in. The C annulus held steady for 15 minutes with zero loss, before beginning a gradual decline. The well was then bled to zero and re-pressured incrementally holding stable to 2700psig. The pressure was then raised back to 3500psig and began leaking at 25psig/min. remaining chemical onboard was then pumped into the C annulus and displaced to 75' and shut in with no indication of improvement. The chemical was then displaced to 146' and monitored. Final leak rate achieved was 20psig/min@3000psig falling to 7psig/min@2400psig. Failure of the original seal that was achieved was due to the ballooning effect on the 9-5/8" annulus while raising the pressure. The volume of fluid required to pressurize the casing/ tubing annulus to 3000psig is greater than the casing/ tubing volume thus pushing the chemical beyond the leak point as the pressure was increased. As the system pressure reached 2500-3000psig only water was covering the leak point. As the leak was not fully cured at that pressure, seawater began to infiltrate and ultimately broke the seal down.

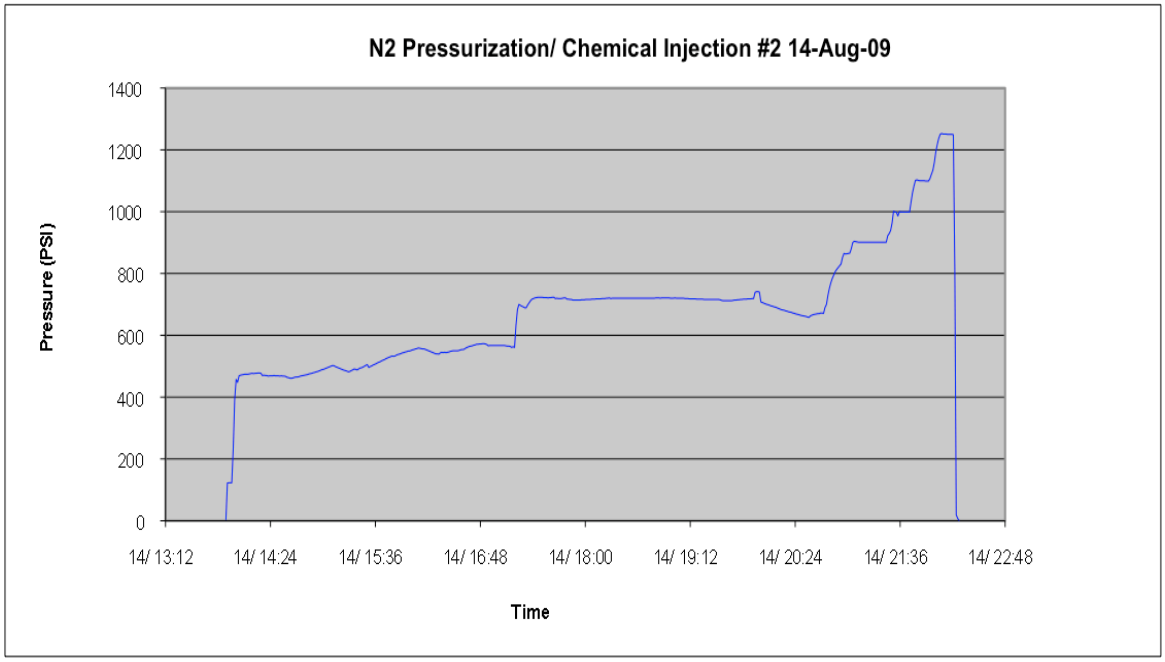
The well was re-entered on 09-Sept-09 and equipment was rigged up to pump chemical through the Halliburton cement unit. The treatment was redesigned to continuously inject chemical throughout the entire pressurization cycle to ensure that active sealant was always covering the leak point. As it was inconclusive from earlier diagnostics and treatment, the treatment was set up for two possible leak point, the first at 75' the second at 145'. Due to ballooning both leak points were designed to have chemical both above and below as annulus flow is in the negative direction as the leak allows fluid to escape. Nitrogen was again used to displace the annulus to gas while taking returns at the B annulus. The 9-5/8' was pressurized with nitrogen to 2000psig with slight communication to the 13-3/8" casing. Pressure build up rate was 20psig per hour into B and annular returns were inconsistent as gas circulated with only minimal fluid returns. The annulus was then loaded and pressurized to 3070 psig with 7.4 bbls *SEALMAKER CRS* treatment set up in 4 sequences spotting the lead at 166' or 20' below the lowest possible leak point. Initial leak-off rate was 20 psig/min to 1910 psig. 1.5 Bbls additional chemical was pumped and the pressure was raised to 2880psig. Pressure leak-off had been slowed to 10psig/min. Nitrogen was then set to feed to achieve a low pressure set at 1500psig. Setting was achieved at 1524psig with an estimated 1-2 ft^3 of gas consumed. The well remained stable overnight with no pressure build-up into the B annulus. The gas cushion was bled off and additional chemical was injected as the system pressure was raised incrementally to 3000psig over 4 hours. The well was shut-in at 2997psig for 15 hours with zero pressure loss and zero communication into the B annulus. The wing valves were then closed and equipment rigged down and demobilized. The pressure was allowed to remain on the well to allow the seal to cure fully.

4.0 APENDIXES

4.1 OPERATIONAL DETAILS/CHARTS






N2 Pressurization/ Chemical Injection #2 14-Aug-09
Pressure (PSI)
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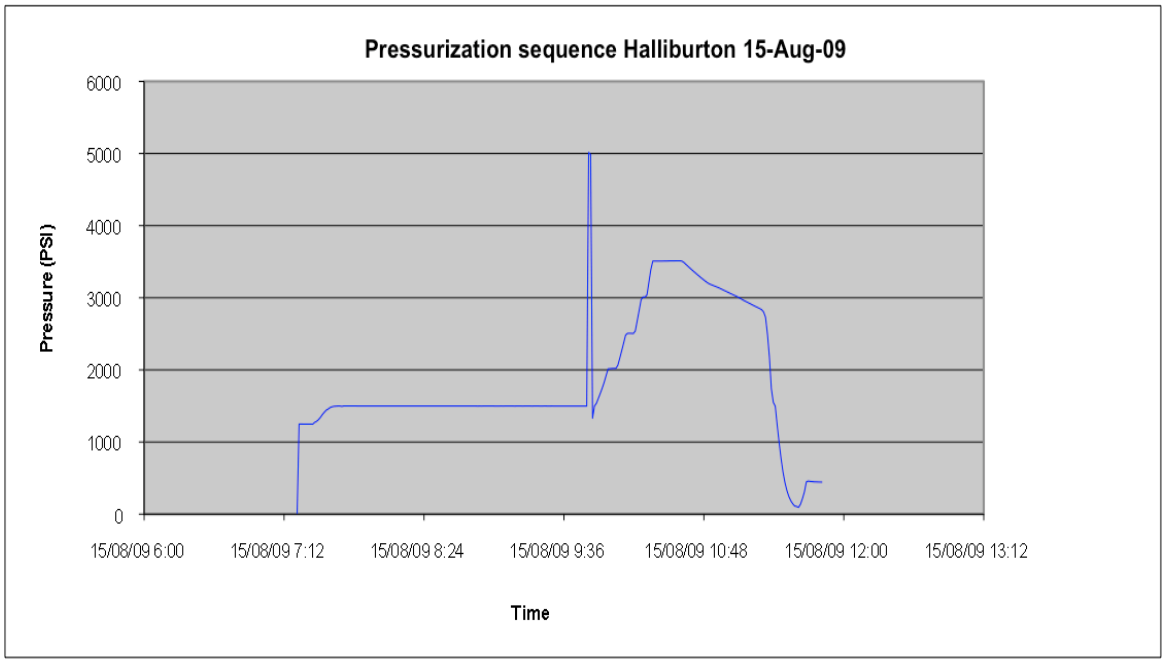
1200
1000
800
600
400
200
0
14/ 13:12
14/ 14:24
14/ 15:36
14/ 16:48
14/ 18:00
14/ 19:12
14/ 20:24
14/ 21:36
14/ 22:48
Time


Pressurization sequence Halliburton 15-Aug-09
Pressure (PSI)
6000
5000
4000
3000
2000
1000
0
15/08/09 6:00
15/08/09 7:12
15/08/09 8:24
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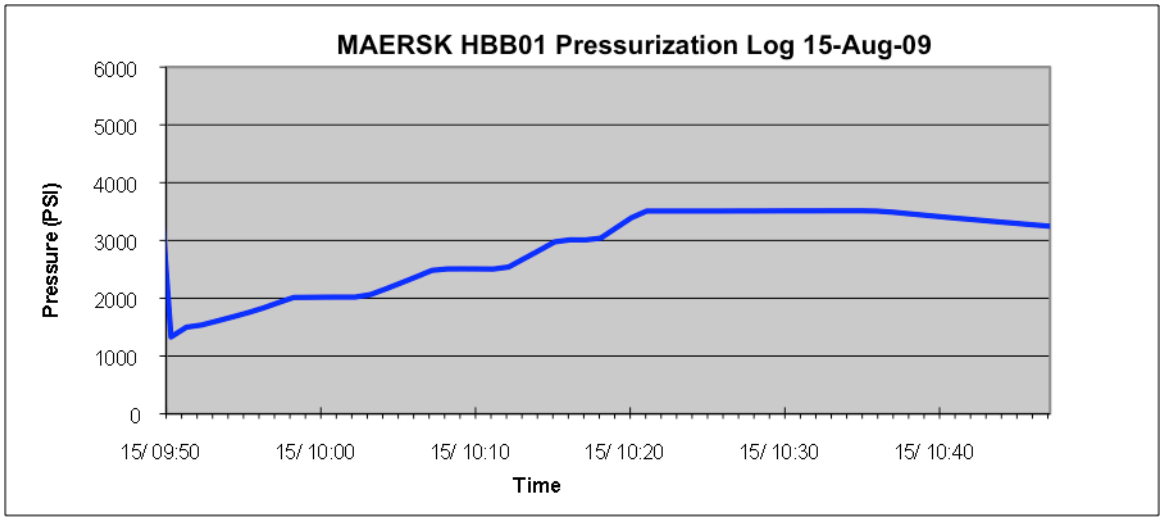
15/08/09 13:12
Time


MAERSK HBB01 Pressurization Log 15-Aug-09
Pressure (PSI)
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4000
3000
2000
1000
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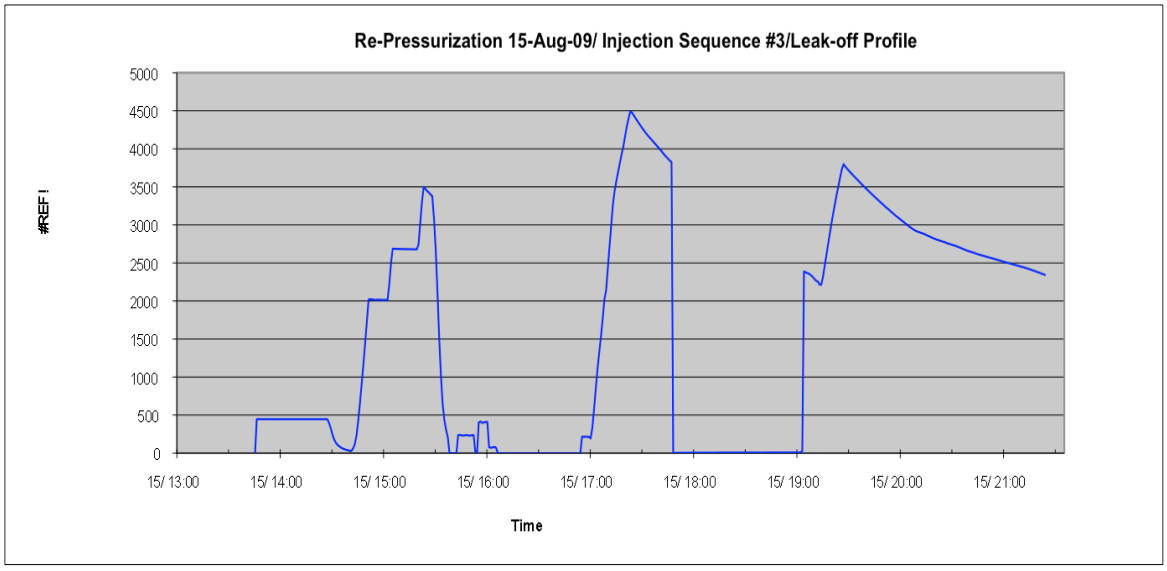
15/ 09:50
15/ 10:00
15/ 10:10
15/ 10:20
15/ 10:30
15/ 10:40
Time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#REF!
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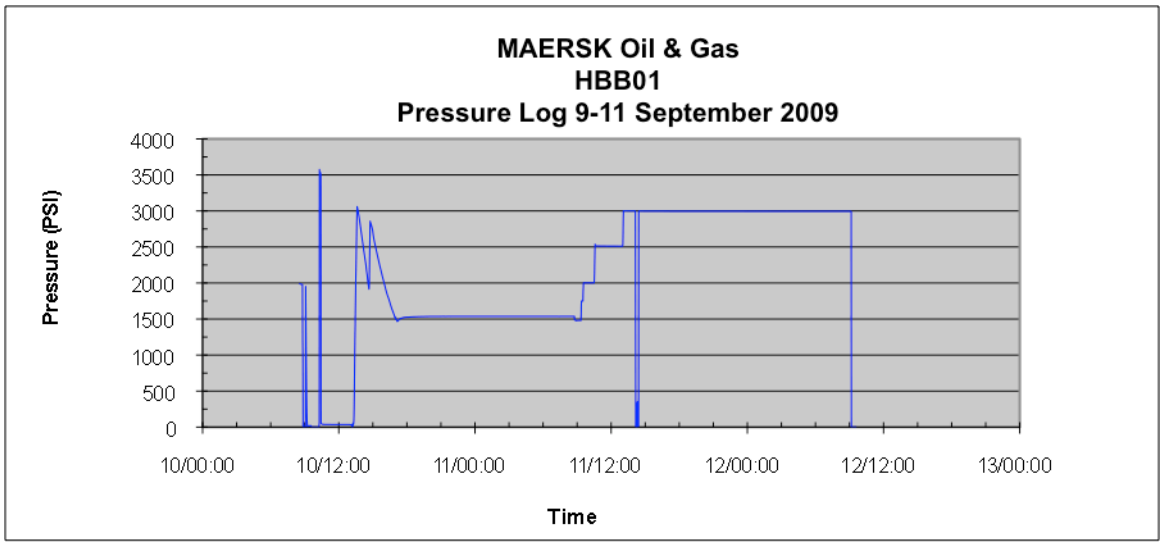
4000
3500
3000
2500
2000
1500
1000
500
0
15/ 13:00
15/ 14:00
15/ 15:00
15/ 16:00
15/ 17:00
15/ 18:00
15/ 19:00
15/ 20:00
15/ 21:00
Time


MAERSK Oil & Gas
HBB01
Pressure Log 9-11 September 2009
Pressure (PSI)
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3000
2500
2000
1500
1000
500
0
10/00:00
10/12:00
11/00:00
11/12:00
12/00:00
12/12:00
13/00:00
Time

Final Job Report
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DAILY WORK REPORTS

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