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Ref.: OSJ/kbr/15368
Dato: 2. december 2011
Side: 1/2

EXECUTIVE SUMMARY FRA LR SCANDPOWER LTD – 2. REVIEW

Ifølge aftale fremsendes hermed vedlagt den endelige rapport fra review udført i perioderne 27.-29. september 2011 og 17.-19. oktober 2011, af LR Scandpower Ltd. (tidligere Lloyd's Register EMEA), på alle vore offshore og onshore installationer.

Rapporten bekræfter, i lighed med den første rapport fra marts 2011, at Maersk Oil har etableret procedurer, som sikrer overholdelse af de vilkår, der findes i vores udledningstilladelser for produktionsenhederne.

Rapporten bekræfter ligeledes, at de anbefalinger som Maersk Oil i brev af 1. marts 2011 lovede at implementere, nu er gennemført.

De anbefalinger, der blev beskrevet i første rapport, og som nu er implementeret, kan opdeles i følgende områder:

OiW procedurer:

Disse er opdateret, så der findes en ensartet procedure for analyse og platformspecifikke procedurer for prøvetagning og rapportering iht. anbefalingerne. Procedurerne er nu mere robuste, og reducerer derfor signifikant risikoen for misforståelser og fejl.

Data integritet:

Der er indført håndskrevne logbøger på alle laboratorier, og der er etableret procedurer for onshore databehandling. Der udføres i tillæg verifikation af data flere gange årligt af interne og eksterne auditører.

Medarbejdere:

På Tyra E har initiativet til forbedring af kommunikationen mellem medarbejdere og ledelse været en succes, da medarbejdertilfredsheden er steget markant på Tyra E. Endvidere er der etableret en træningsmatrix for laboranter, og der gennemføres "On-the-job" træning for nyansatte laboranter.

Rapporten påpeger, at enkelte prøver ikke er udtaget iht. kravet i udledningstilladelseerne. Denne praksis er nu stoppet. Rapporten indeholder desuden nogle forslag til mulige forbedringer af den eksisterende praksis. Disse forslag vil nu blive gennemgået, og de relevante forslag implementeret.

Maersk Oil står gerne til rådighed for yderligere diskussion af rapportens konklusioner.

Med venlig hilsen



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Bilag

Independent Critical (Follow-up) Review of Oil in Water Procedures and Processes: Danish Offshore Operations Executive Summary



Report no. ABN1191647
Date: 1 December 2011
Client: Maersk Oil Denmark

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|--|---------------------|---------------------|---|------------------|
| Report no.: ABN1191647 | | | <input type="checkbox"/> Open distribution <input checked="" type="checkbox"/> Distribution only after client's acceptance | |
| Rev. no.: | Prepared by: | Reviewed by: | Approved by: | Date: |
| Draft A | Linda Murray | Amy Annand | Nick Jackson | 18 November 2011 |
| Final | Linda Murray | Amy Annand | Nick Jackson | 1 December 2011 |
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| Title: INDEPENDENT CRITICAL (FOLLOW-UP) REVIEW OF OIL IN WATER PROCEDURES AND PROCESSES: DANISH OFFSHORE OPERATIONS EXECUTIVE SUMMARY | | | | |
| Client: Maersk Oil Denmark | | | | |
| Client specification: Independent review of produced water management. | | | | |

Summary:

LR Scandpower Ltd. (formerly Lloyd's Register EMEA) was contracted to conduct a follow-up review of the status progress since the February 2011 review. This report outlines the findings and recommendations from our return visits to the Esbjerg office and the following installations:

- Tyra West.
- Tyra East.
- Dan.
- Halfdan A.
- Halfdan B (note: Halfdan B is newly commissioned and was not included in the February 2011 review).
- Gorm (including Skjold).
- Harald.

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EXECUTIVE SUMMARY

Introduction and Scope of Work

During December 2010, a series of newspaper allegations raised a number of significant concerns within the Maersk Oil operations in Denmark. As a result, Lloyd's Register EMEA was engaged to conduct an independent critical review of procedures relating to produced water management.

In September 2011, LR Scandpower Ltd. (formerly Lloyd's Register EMEA) was contracted to conduct a follow-up review of the status progress since the February review. This report outlines the findings and recommendations from our return visits to the Esbjerg office and the following installations:

- Tyra West.
- Tyra East.
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- Harald.

In line with the previous independent review, this follow-up review evaluated existing documented processes and procedures, and compared their implementation onshore and offshore to recognised industry practice, best laboratory practice. The review also commented on compliance with the current OiW discharge permits for operating in the Danish sector of the North Sea. It included a series of interviews with workforce representatives who developed and used these processes and procedures. Additionally, the review verified a number of samples of reported concentrations, following the path along data transfer points.

Findings

Commendations

- ✓ An enhanced suite of OiW procedures has been implemented, including newly established procedures for monthly, quarterly and annual reporting.
- ✓ Laboratory logbooks have been introduced on all platforms in order to improve data traceability.
- ✓ Platform specific OiW procedures have been developed with the involvement of the Laboratory Assistants.
- ✓ In compliance with the new permit expectations, Maersk Oil Denmark has explored a number of options relating to OiW process control monitoring.
- ✓ Excel workbooks now contain a log for data changes, increasing the degree of data transparency.
- ✓ Onshore personnel track the daily and monthly averages using the EBJ-OLS reported data.

- ✓ DNV has recently conducted some OiW data verification through ISO14001 certification audit and Environmental Statement verification.
- ✓ A third party survey has been completed to calculate the estimated level of uncertainty associated with the measurement of volume for produced water discharges.
- ✓ Uncertainty levels have been reduced with the introduction of more accurate laboratory glassware.
- ✓ A training matrix for Laboratory Assistants is in the process of being implemented, accompanied by training plans for individuals.
- ✓ Comprehensive recruitment processes for Laboratory Assistants includes a written test.
- ✓ A newly hired Laboratory Assistant was subject to a three day on-the-job training programme.
- ✓ The profile, roles, and responsibilities of Laboratory Assistants were the focus of a recent onshore workshop.
- ✓ A good team culture exists on some platforms between the Laboratory Assistants and production crews in seeking to optimise OiW treatment.
- ✓ A culture of researching and initiating improvements exists on some platforms.
- ✓ There was a widespread willingness to change and improve the OiW working practices and ultimately, the results.
- ✓ In general terms, LR Scandpower Ltd. was able to consistently verify data from the point of sample collection to external reporting, following all data transfer points.

Areas for Improvement/Recommendations

The follow-up review identified eight areas of potential improvement; the associated recommendations are summarised below.

OiW Procedures

1. Enhance the clarity in the platform specific procedures relating to sample-taking during (routine) abnormal conditions (e.g. when the centrifuge discharges “shots”). Additionally, platform specific procedures should also be updated to reflect the continuous monitoring equipment, when commissioned.
2. Enhance the clarity of OPM 2B Part 3 OiW procedure to fully address the absorbance acceptance criteria. Clear instructions should also be provided for action in the event of unstable absorbance readings, to ensure that all absorbance raw data is included in the OiW calculation.
3. Provide cool storage for Halfdan A samples in order to ensure sample integrity in the event of transport delays to Halfdan B (for analysis).
4. The OPM 2B Part 3 OiW procedure states that during sample extraction, the sample temperature should be approx 20°C (i.e. room temperature). Across the DUC installations, there is no consistent method for measuring room or sample temperatures. Provide a consistent method to achieve this and include it within the revised OiW procedures.
5. OPM 2B Part 3 procedure should be updated to make accommodation for the potential formation of emulsions.

Integrity of Data

6. Ensure that laboratory logbooks are consistent in structure and content. This should include:
 - i. Page numbers.
 - ii. Legible data entry and comments.
 - iii. Discontinuation of the use correction fluid.
 - iv. The requirement for changes and corrections to be struck-through and initialled.
7. Enhance security on platform specific Excel worksheets (i.e. password protection).

Verification of Processes

8. Improve efforts to fully capture data anomalies during integrity sense checks that are conducted as part of the monthly reporting process.
9. Efforts should be made to enhance engagement at supervisory level in the verification and quality assurance of OiW management activities and practices. For some Supervisors, this will require a raised awareness of the OiW sampling, analysis and reporting procedures and processes.
10. The scope of the HSE audits should be extended to ensure that issues relating to produced water management are adequately assessed, so that value adding feedback and verifiable data checking can be delivered on the topic.
11. Ensure that the existing Force Technology audits include OiW data verification.
12. Introduce a process to verify that on-the-job training is taking place offshore and is being applied effectively to sample collection and analysis tasks.

Variability of Reported Concentrations

13. Maersk Oil should encourage the Technological Institute, to seek ISO17025 accreditation for the OSPAR and Wilks OiW analytical methodologies.
14. Method validation should be conducted in order to understand the Limit of Detection.
15. In order to understand whether balance check results are acceptable, clear performance limits should be calculated and adhered to.
16. Maersk Oil Denmark should implement structured laboratory Quality Control processes for OiW analysis. This could be in the form of analysing known concentrations (i.e. standards), OSPAR calibration checks, or 'Round-Robin' analysis carried out by all the laboratories.

Commentary on OiW Permit Compliance

17. Maersk Oil Denmark **must** enhance the offshore performance in meeting the requirements of the discharge permits in relation to OiW sampling and analysis. Onshore management should provide more robust monitoring processes. Offshore, the critical importance of permit and legal compliance must be reinforced to all individuals engaged in, and with influence on, produced water management.

Competency Assurance

18. Ensure that role descriptions for all personnel engaged in produced water management activities are consistently defined.
19. Enhance the training matrix to fully address OiW detail and knowledge requirements to make it value adding for those engaged in produced water management. This should also recognise varying competence levels required, including: awareness, knowledgeable and specialist.
20. Enhance the competency assurance processes to include the verification of on-the-job training in OiW management.
21. Verify the competency levels required for temporary (contracted) Laboratory Technicians.

Culture and Climate

22. The attitude and motivation of those working in OiW management is critical to the effectiveness of the overall processes. Maersk Oil Denmark must reinforce the criticality of permit/legal conformance in order to enhance a culture of compliance and performance improvement relating to mandatory HSE requirements.

Data Verification Sampling

23. In order to improve the degree of transparency and traceability of reported data, Maersk Oil Denmark should ensure that:
 - i. Samples are collected on time.
 - ii. Discrepancies between sample times in laboratory logbooks/spreadsheets/OLS are minimised.
 - iii. Provide clear comments when concentrations exceed 20mg/l.
 - iv. Updates of the Wilks calibration is provided to the Laboratory Assistants in a timely manner.