

Long-term subsidence study in the Wadden Sea Region

Bestuur

Prof. dr. Pavel Kabat (voorzitter)
Prof. dr. Jos Bazelmans
Prof. dr. Jouke van Dijk
Prof. dr. Peter Herman
Dr. Hessel Speelman

To: NAM/Shell, Steering Committee (SC), State Supervision of Mines (SSM), Advisory Group for Economic Affairs (AGE), Wadden Academy (WA)
From: B. Orlic
Date: 19 June 2014
Subject: Minutes of the Rock mechanics meeting held on 17 June 2014 from 10:30-13:00 at the KNAW-building in Amsterdam
Filename: [02-Minutes-Rock-mechanics-meeting-17June2014-public.docx](#)
Legend: => Action points NAM

Distribution list:

NAM/Shell:

Antony Mossop, Pieter van de Water, Dirk Doornhof, Ruud van Boom, Hermann Bähr, Harry Piening, Wim van der Veen, Sander Hol, Arjan van der Linden, Fons Marcelis, Pedro Zuiderwijk

SC:

Hessel Speelman, Ramon Hanssen, Patrick Baud, Robert Zimmerman, Ryszard Hejmanowski, Rune Holt, Adriaan Houtenbos, Bogdan Orlic

SSM:

Hans de Waal, Annemarie Muntendam-Bos, Rob van Lieshout

AGE:

Jaap Breunese

WA:

Klaas Deen

Attendance:

NAM/Shell: S. Hol, T. Mossop

SC: P. Baud, R. Holt (first part of the meeting), B. Orlic

Technical documents prepared by NAM and distributed to SC/SSM/AGE before the meeting:

-

Action points from the previous meeting (the 3rd SC meeting held in April 2014 in Delft) relevant to this meeting:

⇒ [Rock mechanics meeting in June 2014](#)

NAM is requested to consider the recommendations given by the SC and present results from the on-going research at the Rock mechanics meeting to be held separately in June 2014 due to limited availability of the SC members in that period.

The technical documents to be discussed at these meetings need to be prepared and sent to the meeting participants not later than **1 week** before the meetings.

Two Rock mechanics meetings were held in June to fulfil this action point. By holding this second Rock mechanics meeting the action point is closed.

Meeting objective

- Update on recent experimental results by NAM/Shell.

Meeting highlights

- **Presentation and review of experimental results**

Shell presented the outcomes of the recently finalized experiments and showed particle size distributions of the analyzed samples and the derived geomechanical parameters.

The tests on Ten Boer samples are being finalized.

The failure tests on Rotliegendes samples are also being finalized.

The long-term tests on Rotliegendes samples are ongoing.

Advice is sought from the SC on long-term creep tests.

Recommendations:

It is suggested to show additional geomechanical parameters, which can be calculated directly from the measurements (the same recommendation was given at the previous Rock Mechanics meeting on 2 June 2014).

- **Anomalous experimental results**

The vast majority of tests have been successfully completed. However, the anomalous behavior was observed on a few samples. Possible reasons for this were discussed during the meeting.

A malfunction of drifting transducer is the likely explanation for the anomalous results of a high-temperature experiment. After this test the performance of radial gauges at high temperatures has been checked to ensure that this doesn't happen in future experiments.

Recommendations:

Sample needs to be inspected for visible damage.

Experimental results should be plotted to demonstrate the lack of performance of the radial strain sensor during the experiment.

- **The experiments with sample failure**

Recommendations:

Recommended to collect acoustic emission data during testing.

Recommended to check the 2014 ARMA paper by Fjaer et al. for a new, simple creep model, which was successfully fitted to sandstone.

Recommended to check whether low porosity intervals in the core show the same compositional bands as the high porosity samples. A narrow distribution of grain sizes usually promotes localization.

- **Questions posed by NAM/Shell to the Steering Committee**

Advice sought on long-term creep tests.

Recommendations:

Recommended to perform a long-term creep test with a 6-months creep phase (the same recommendation was given in the previous Rock Mechanics meeting

on 2 June 2014). Long-term test will be technically challenging for many reasons, but it is recommended to carry out for as long as possible.

Recommended to lengthen standard tests from 15 days to 30-45 days.

Recommended to perform more tests at higher temperatures..

Recommended to populate dataset more densely with repeat tests.

Requests and Action points NAM

⇒ **Future experiments**

NAM will finalize a follow-up plan for the experimental testing over the next few months.

Next meetings

Communication / virtual meetings in the summer of 2014

There is a need for more frequent (once in 2-3 months) communication and advice from the SC on the ongoing experimental work. Communication or series of virtual meetings will be held with each of the rock mechanics experts in the SC during the summer of 2014.