

FRISIA – SODM Quarterly meeting Q4 2017

Minutes/Action items list:

09 January 2018, SODM The Hague

Minutes by:

Attendees:

SODM
SODM
FRISIA

WEP
WEP
WEP

Attachment

20180109 FZ_Mining_Operations_Overview_Q4 2017

Sequence

1. Updates BAS-1
2. Updates BAS-2
3. Updates BAS-3O
4. Updates BAS-4
 - a. Cavern end volume and production
5. Update subsidence
6. Update Havenmond
7. Wvttk

Update BAS-1:

1. Discussed status BAS-1 as per presentation.
2. Regular bleed-off operations were planned to interfere least with BAS-2 abandonment operations during November and December.
3. Discussed BAS-1 sonar reports 2004, 2010 and 2011. Only sonar measurement 2004 shows the entire cavern. The straddle installed in the 7" in January 2010 prevents wireline tools being lowered below 2584m. Since 2004 the caverns has been under high-pressure shut-in and cavern volume and shape are roughly constant (ΔV currently ± 35.000).

Update BAS-2:

4. Discussed status BAS-2 as per presentation
5. Abandonment operations have been performed as per plan and program as discussed during meeting held with SODM on the 26th of October.
 - a. Additionally to the original program a scraper run was performed to clean inside 10-3/4" casing
 - b. Secondary abandonment plug was placed 100m higher than planned based on USI/CBL log showing good quality annular cement at this depth.
 - c. Casings will be cut 3 mBGL and cellar removed in January 2018 to finalize abandonment.

Update BAS-3O:

6. Discussed status BAS-3O as per presentation
 - a. Cavern is growing because of high cavern pressure and limited salt convergence
7. The Workover on BAS-3O is planned in April 2018 to allow optimization of the long-term production strategy.
8. The blanket annulus has shown signs of being blocked since the 8th of November 2017. Operations (condensate injections) have been performed and communication with the cavern re-established. Studies into the cause of the blockage are under investigation.

Update BAS-4:

9. Discussed status BAS-4 as per presentation
10. A workover was performed on BAS-4 end of November/beginning of December 2017 to repair the bent inner leaching string. BAS-4 is now back in production.
 - a. A sonar measurement was performed during workover operations. The results are considered inaccurate because of the shown growth in cavern size ($\pm 160.000 \text{ m}^3$ in a year) while production on

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BAS-4 was reduced. Also, volume balance of BAS-4 suggests the cavern is roughly in equilibrium with cavern volume of $\pm 975.000 \text{ m}^3$. Inaccuracy is the result of sonar probe not being lowered into the cavern as previously resulting in limited measurement points. Therefore, an additional sonar measurement is planned for end of January 2018.

11. Plan is to maintain additional back pressure on cavern and reduce production rates to reduce convergence/subsidence rates and grow the cavern to 1.3 mil m^3 . FRISIA received letter from SODM (28aug17), concerns SODM and replied on the 1st of November:

- a. It is not unlikely BAS-4 will temporarily grow to a volume more than $1.000.000 \text{ m}^3$. However, the cavern volume can be reduced such that the end-volume is less than $1.000.000 \text{ m}^3$.
- b. Planned production pressures for BAS-4 are within limits of the Barradeel II concession and do not exceed pressures currently applied to BAS-30.

Final reply from SODM received on the 5th of December:

- a. Cavern end-volume is not to exceed $1.000.000 \text{ m}^3$ under current winningsplan.
- b. Excess volume of the cavern during production period will be deducted from the subsidence budget
- c. Production at higher pressures to reduce convergence rates is within limits of current winningsplan
- d. Remaining production from 1st of December 2017 is approximately 300.000 tons under current winningsplan.

The 300.000 tonnes can be revised based on progressing insights until updated winningsplan is approved.

12. **FRISIA** will submit an actualization of the winningsplan to EZ. SODM will share a shortlist of any concerns they may have regarding larger cavern end-volumes. Until winningsplan is updated, Frisia will adhere to the operation boundaries stated in the letter from SODM received on the 5th of December (pending actual subsidence and cavern volume measurements).

Subsidence:

13. M&R 2015 is considered closed off and focus is now on M&R 2017. Leveling measurements have been taken by Antea end 2017.
14. **FRISIA** submitted a proposal for a new measurement procedure for M&R 2017. The basis of the update is to show measured data (contour maps) without forward iterative modeling. Kriging will be applied to obtain a full contour map, parameters used for Kriging are to be clear. Finally, the tie-in of the BAS-4 GPS which started measurements one year after production started, needs to be checked and redetermined. The principle to adjust measurements for autonomous subsidence is agreed.
15. Current subsidence above the BAS-4 cavern as measured with GPS is 267,7 mm, there is no offset between GPS and deepest point.

Update Havenmond:

16. Nulmeting to start one year before start production. Poles to be installed Q1 of 2018, drilling planned for Q1 2019.
17. Current plan is to drill one well, no plans yet for the other two wells.
18. Alternatives diesel study, diesel is the best product to use, no degradation and no impact on integrity of the last cemented casing. Study is also made for NEDMAG.
19. Sluitingsplan Havenmond to be submitted before start production, as stated as a condition within the winningsplan.

WVttK:

20. Next quarterly meeting Wednesday 11th of April 10:00-13:00 at SODM.
21. RiskID is used to identify the 'staat van de sector', this report will be shared February/March 2018, first with the Salt industry, then made public.
22. SODM and is now SODM account manager for Frisia. is now 'head of the salt sector' at replaced

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Overview action points:**SODM**

- a. Share shortlist of potential concerns regarding larger cavern end-volumes.
- b. Share 'staat van de sector' with Salt industry

FRISIA

1. Share slides of quarterly meeting and minutes of quarterly meeting (attached)
2. Update winningsplan BAS-4
3. Inform SODM when the BAS-4 cavern larger is than 1.0 mil m³

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