

FRISIA – SODM Quarterly meeting Q3 2017

Minutes/Action items list:

30 October 2017, SODM The Hague

Minutes by:

Attendees:

SODM  
SODM  
SODM  
FRISIA

FRISIA  
WEP  
WEP

Attachment

20171030 FZ\_Mining\_Operations\_Overview\_Q3 2017

Sequence

Agenda was revised to fit availability of attendees. Update M&R 2015 will be discussed in a different meeting.

1. Updates BAS-4
  - a. Cavern end volume
  - b. Production strategy
2. Updates BAS-1
3. Updates BAS-2
  - a. Abandonment BAS-2
  - b. Diesel balance
  - c. Geo-mechanical study
4. Updates BAS-3O
5. Update Havenmond
6. Update subsidence
7. Special topics
  - a. Update M&R 2015
  - b. 2nd opinion abandonment
  - c. Frimakal injection
  - d. Frisia Self-assessment
8. Wvttk

Update BAS-4:

1. Discussed status BAS-4 as per presentation
2. Production line repaired, production is flexible to meet demand for salt while BAS-3O is currently the main producer.
3. Plan is to maintain additional back pressure on cavern and reduce production rates to reduce convergence/subsidence rates and grow the cavern to 1.3mil m<sup>3</sup>. FRISIA received letter from SODM (28aug17), concerns SODM:
  - a. Larger cavern end volume of 1,3 mil m<sup>3</sup> (winningsplan Barradeel II states indicative end-volume of: 0,5 mil m<sup>3</sup> to 1,0 mil m<sup>3</sup>). **FRISIA** to submit an updated winningsplan to grow the cavern above 1.0 mil m<sup>3</sup>. With the update the following needs to be addressed:
    - i. Risk and impact on environment with larger cavern:
      1. Evaluate impact with worst case scenario, fast permeation of the brine.
      2. Evaluate impact on subsidence
    - ii. Abandonment of the cavern, hard shut-in or bleed-off.
    - iii. Stability cavern at 1.3 mil m<sup>3</sup>, especially roof stability (modeling)
  - b. Significant change in mining method from squeeze mining at steady state cavern volume to solution mining with growing cavern volume. FRISIA did not change the production method, BAS-4 has always been a growing cavern, the growth however reduces due to additional squeeze (as cavern is larger) and production requirements have reduced. **FRISIA** to send SODM a letter to describe the intended production method and pressures in the cavern versus lithostatic during these production methods.

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4. **FRISIA** to inform SODM if size of BAS-4 cavern is larger than 1.0 mil m<sup>3</sup>.
5. SODM indicated that FRISIA could ask for additional 5cm subsidence budget for Barradeel II, 35cm instead of 30cm. FRISIA commented that it will not increase the subsidence budget.

Attendees:

SODM	FRISIA
SODM	WEP
FRISIA	WEP

Update BAS-1:

6. Discussed status BAS-1 as per presentation.
7. Still some room for production on BAS-1, not intended by FRISIA to re-start production.
8. Frimakal injection on BAS-1 still optional, however assessing alternative use, eg. agriculturale or cement industry. AKZO option no longer considered.

Update BAS-2:

9. Discussed status BAS-2 as per presentation, current pressure build up in the well seems temperature related.
10. Abandonment operations are delayed to November, unit was not available in intended period (June-July). Meeting held with SODM about the workprogram on 26oct, small update program required, no further questions raised.
11. EZ raised some questions with submittal of the BARMM (see memo 20171010\_Onderbouwing\_technische\_haalbaarheid\_terugwinning\_diesel\_BAS-2.pdf)
  - a. Can the diesel which is contained in the Ommelanden Chalk be retrieved. FRISIA -very limited amount, volume possible to retrieve depends on solubility of the diesel in the formation water.
  - b. Will the abandonment of the well prevent future access to the diesel which is contained in the Ommelanden Chalk, to be able to retrieve it. FRISIA - the abandonment allows future access, is not irreversible.
  - c. No further questions were raised and BARMM was approved by EZ.
12. Long term trend (pressure vs GPS) shows no subsidence although BAS-1 is regularly bled-off (450m<sup>3</sup>/month), investigation ongoing on possible rebound.

Update BAS-3O:

13. Discussed status BAS-3O as per presentation, cavern size is growing.
14. The Workover on BAS-3O is planned in May 2018 to allow optimization of the long-term production strategy.

GPS trends:

15. Update M&R 2015 to be discussed between \_\_\_\_\_ and \_\_\_\_\_, meeting to be planned. **FRISIA** to setup meeting.
16. Discussed the BAS-4 GPS for deepest point identification, instead of the modeling. The GPS (deeply founded) is a direct measurement, the modeling is good to define the size of the bowl, however induces errors to define the deepest point. **FRISIA** will submit the measurement procedure to use GPS to SODM. SODM commented that the tie-in of the BAS-4 needs to be checked.

Update Havenmond:

17. Nulmeting to start one year before start production.
18. Current plan is to drill one well, no plans yet for the other two wells.
19. 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.
20. Sluitingsplan Havenmond to be submitted before start production, as stated as a condition within the winningsplan.

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