

# Abandonment of Nedmag salt caverns

Salt Cavern Abandonment workshop, 11 November 2019, Utrecht

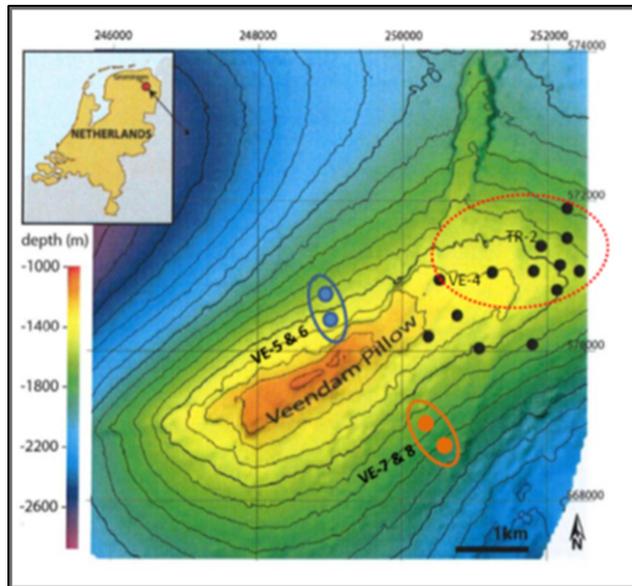
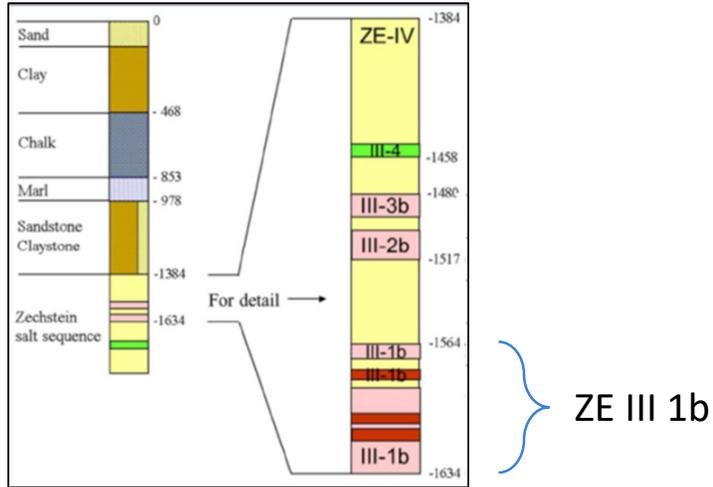
Abel Jan Smit, Mine Manager

- Located in Veendam



- Producer of  $\text{MgCl}_2$ ,  $\text{Mg}(\text{OH})_2$ ,  $\text{MgO}$ , DBM and  $\text{CaCl}_2$
- $\text{MgCl}_2$  solution mining from Veendam pillow
- Turnover € 130 mln/year, about 150 direct employees and 600 indirect

# Solution mining of pure $MgCl_2$ (bischofite)



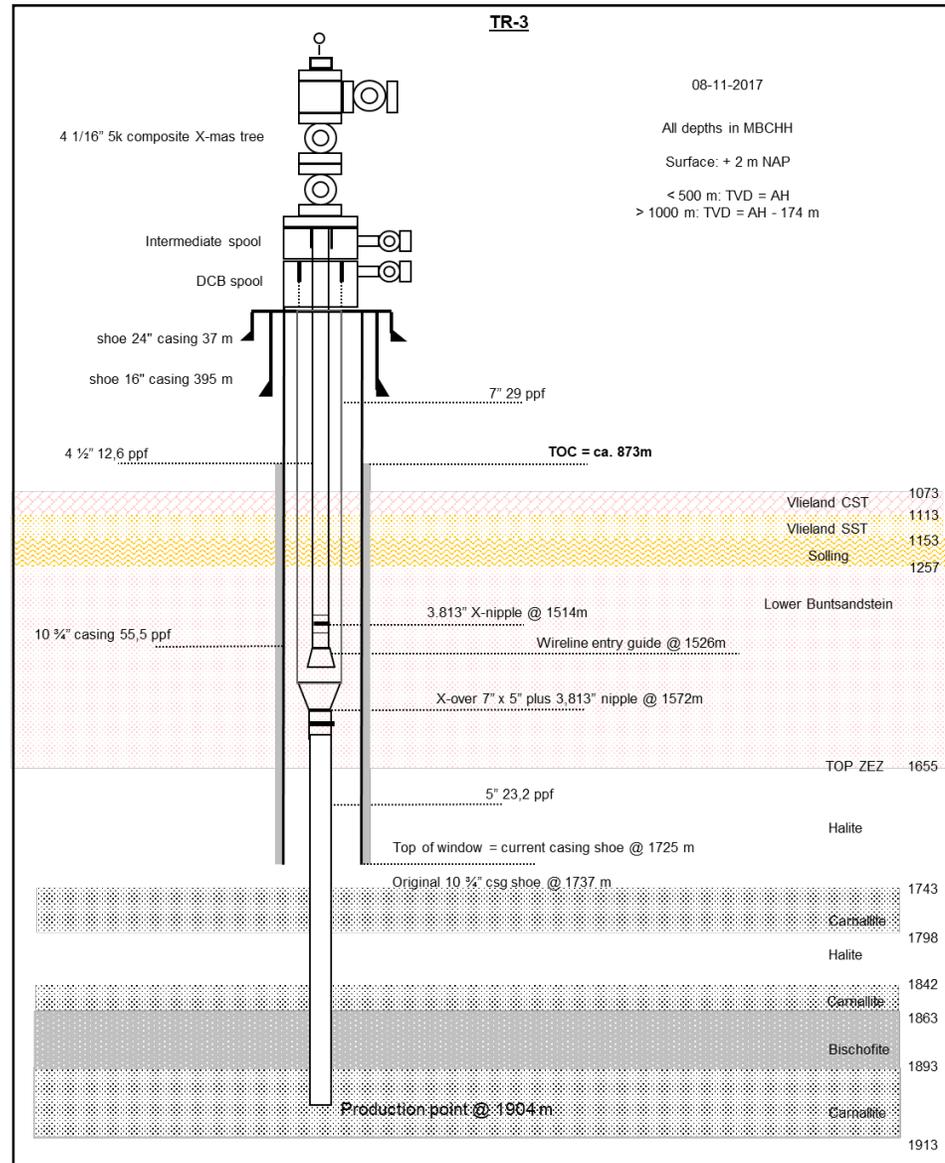
- Selective leaching from the Zechstein III 1b layer with 40-120 m thickness
- 13 wells, 4 planned
- 9 caverns connected
- Cavern characteristics
  - Irregularly shaped
  - High solids content
  - Not measurable with sonar
  - Size from mass- and volume balances
- Squeeze mining
  - Limits underground volumes
  - Causes soil subsidence
  - Efficient

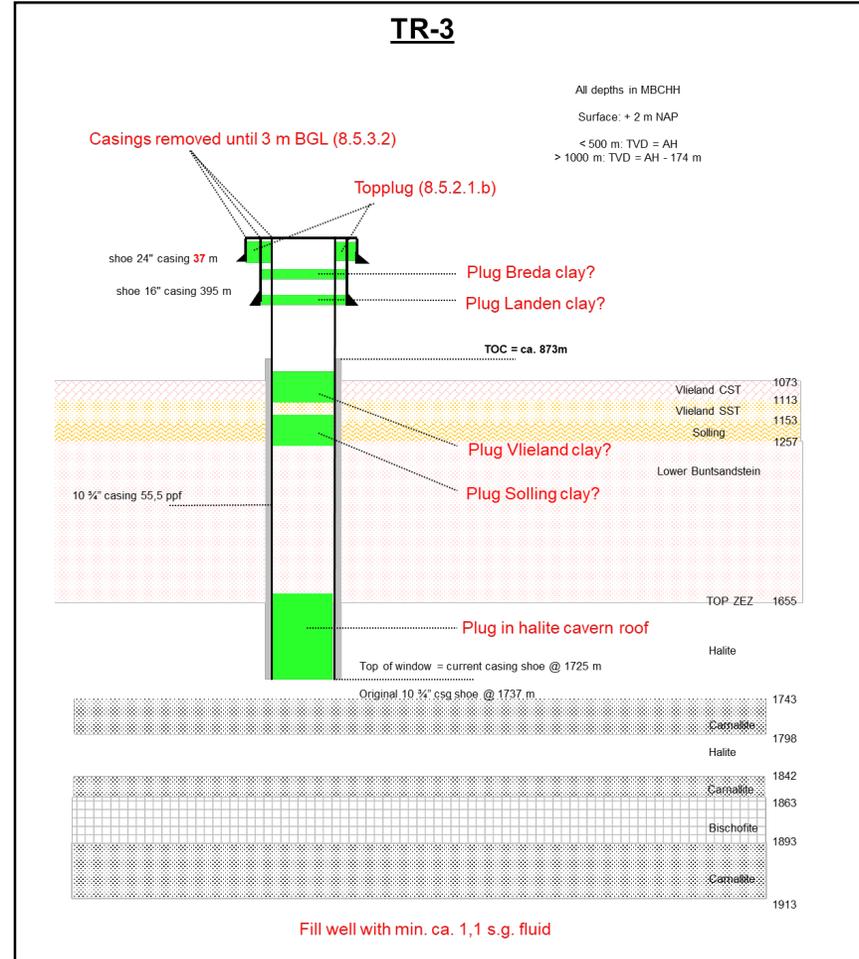
# Abandonment of Nedmag wells

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- First: each situation and every salt well is unique
- At Nedmag
  - 1 well partially abandoned
  - Prior to abandonment, free cavern brine will be bled off
    - Squeeze mining can reduce minimum stress in halite cavern roof
    - Post abandonment fracs can not be ruled out
    - Free brine will be bled off in order to safeguard environment
  - Abandonment planning
    - A.s.a.p. in case well integrity issues require (partial) abandonment
    - In other cases: obsolete wells are useful
      - to monitor cavern behaviour
      - to monitor cavern cluster connectivity
  - Sometimes reality will dictate how to abandon a well
    - Most recent MBR § 8.5.1.4 seems to offer the flexibility to deal with this

# Example existing well





MBR: each sealing layer (“sluitlaag”) should be plugged

Can plugs be combined? Below which permeability can a layer be classified as seal?