

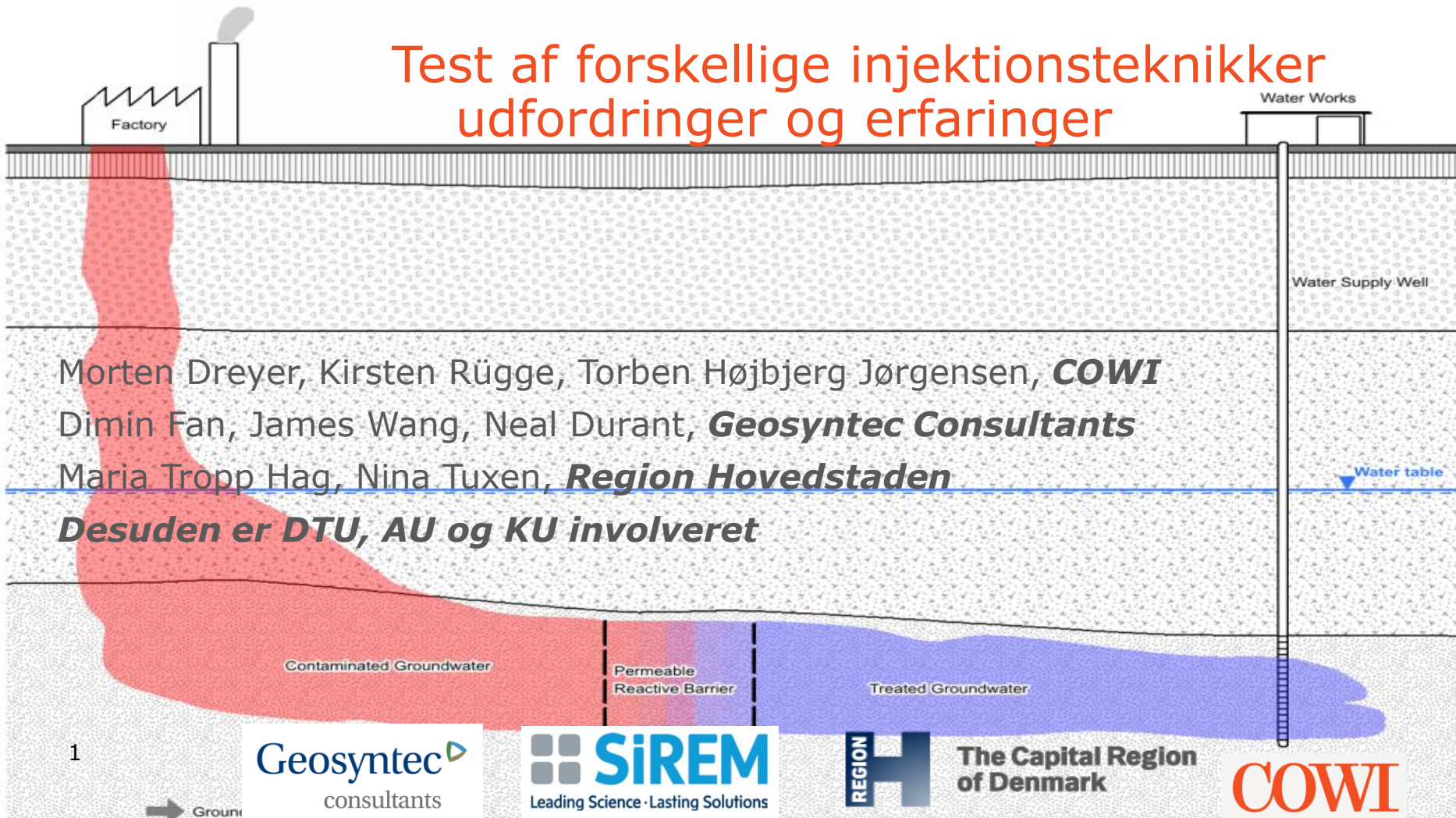
Test af forskellige injektionsteknikker udfordringer og erfaringer

Morten Dreyer, Kirsten Rügge, Torben Højbjerg Jørgensen, **COWI**

Dimin Fan, James Wang, Neal Durant, **Geosyntec Consultants**

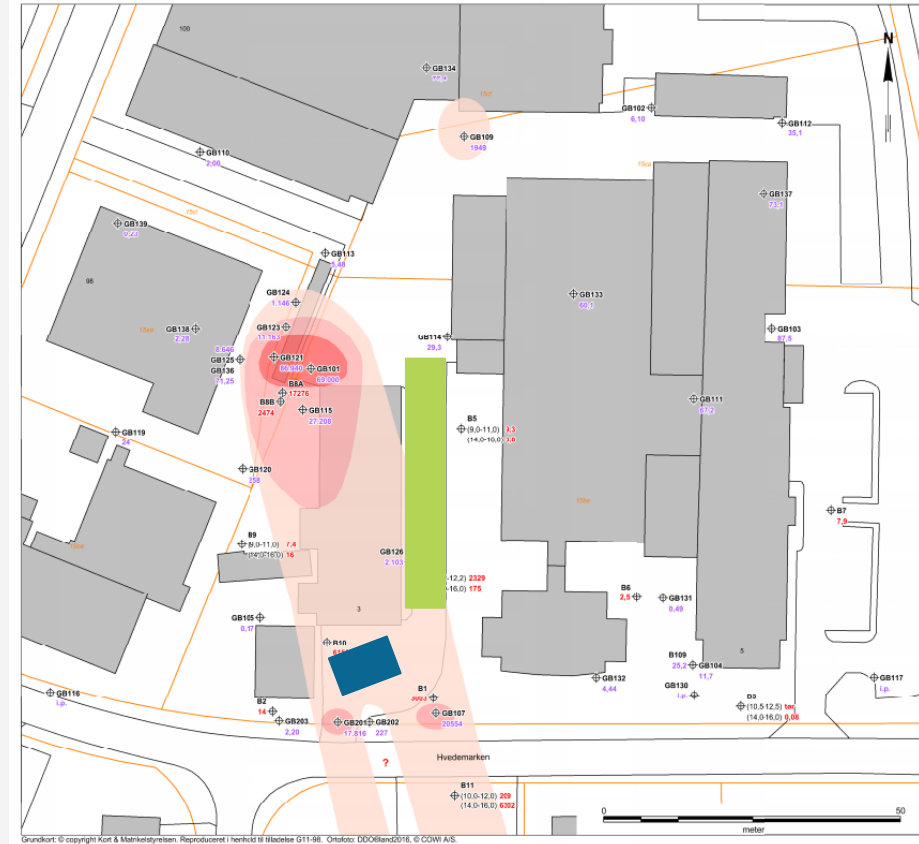
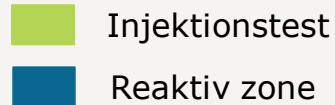
Maria Tropp Hag, Nina Tuxen, **Region Hovedstaden**

Desuden er DTU, AU og KU involveret



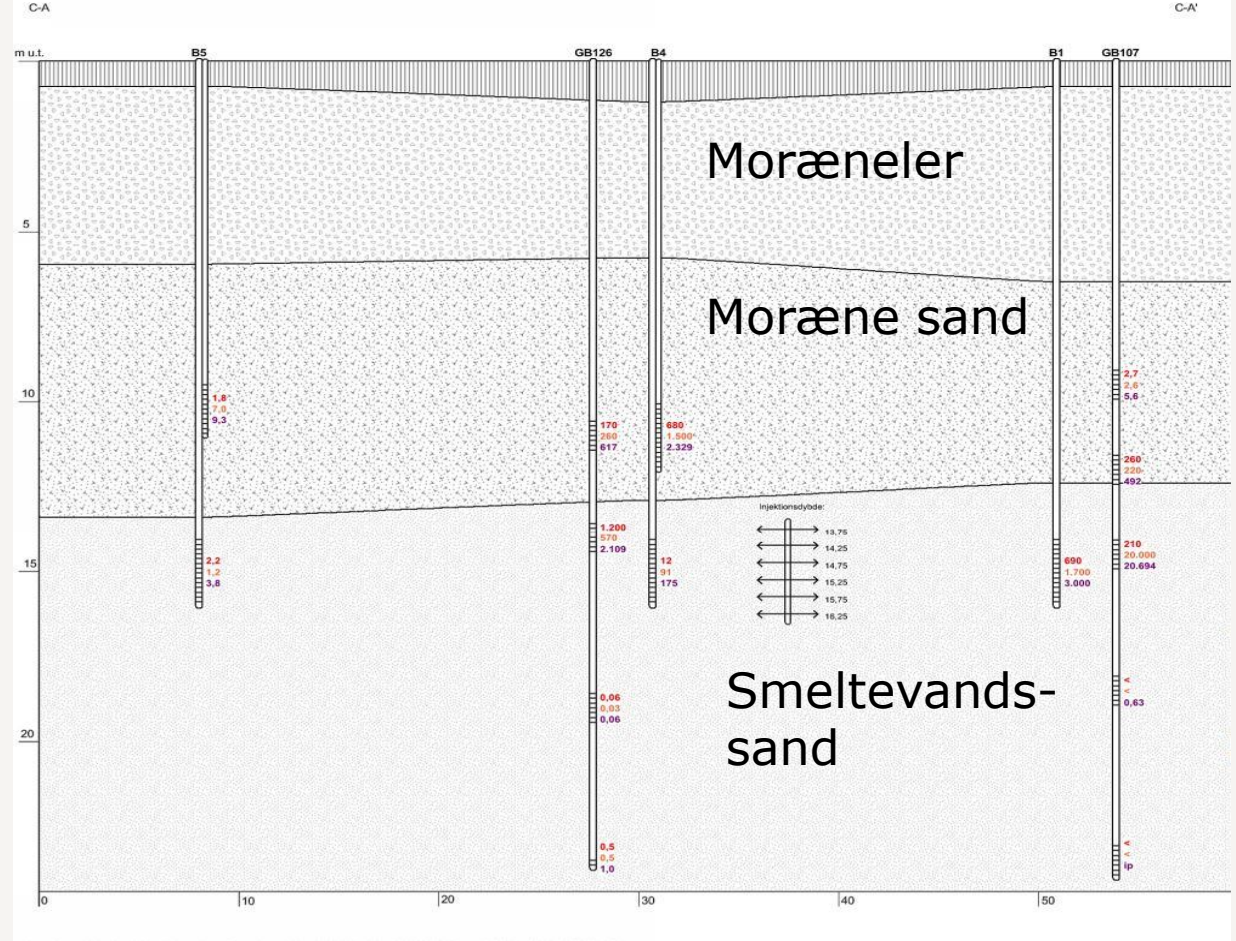
Baggrund

- > Udviklingsprojekt
- > Test af ny og innovativ metode
- > Testgrund: Forureningsfane med TCE og cis-DCE i sandmagasin

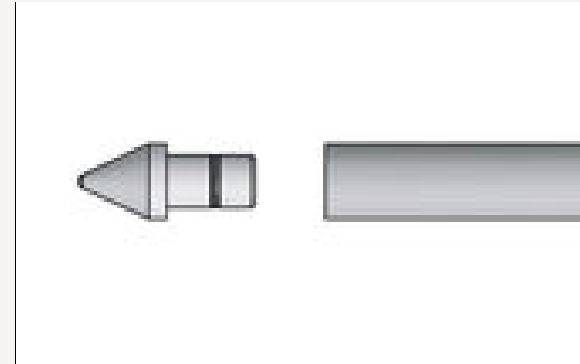


Injektionstest

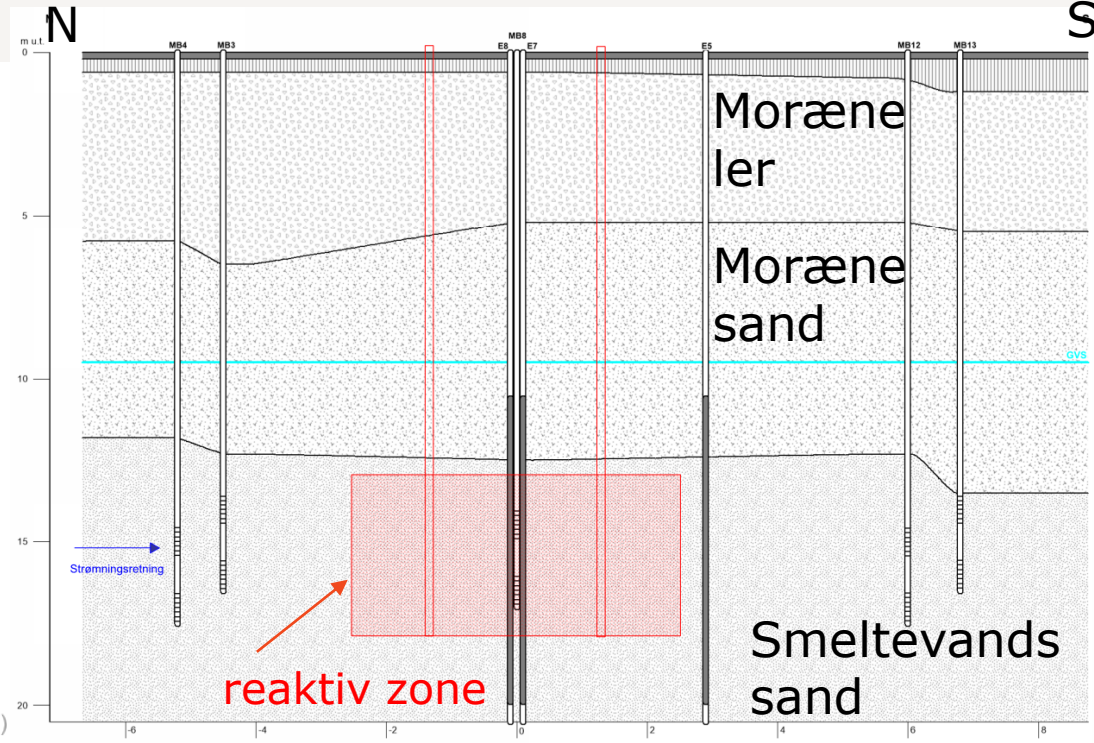
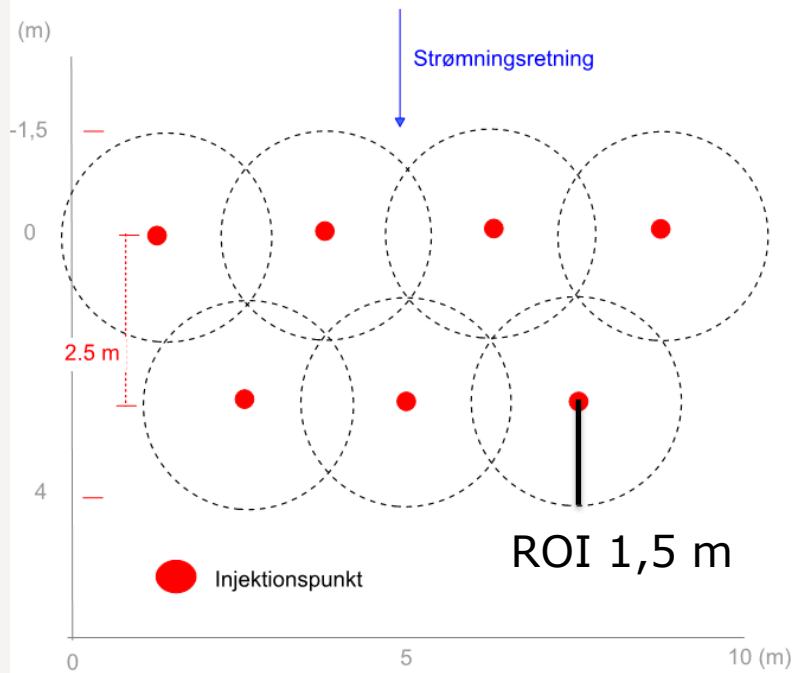
- > Sonic
- > Spin[®] injection
- > Geoprobe DPT



Injektionsprober og udfordringer



Setup reaktiv zone



Praktiske overvejelser

- › Top-down eller bottom-up
- › Injektionsprobe
- › Skal der forbores
- › Placering af reaktiv zone



Etablering af reaktiv zone

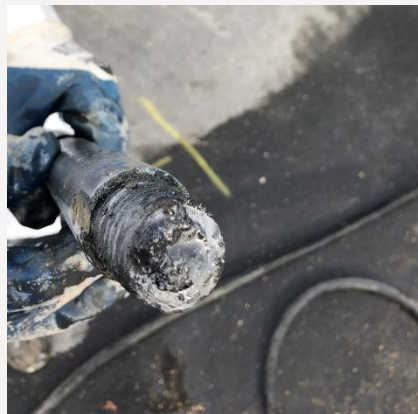


Etablering af reaktiv zone – injektion af KB-1® kultur



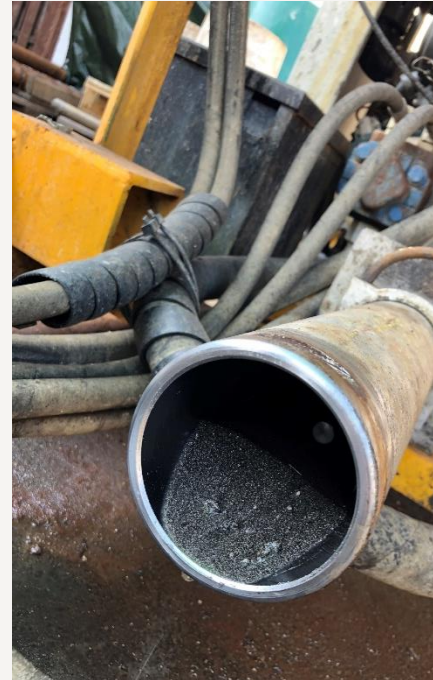
Udfordringer

- > Clogging af injektionsprobe
- > Løsninger
 - > O-ring
 - > Elektriker tape
 - > Bottom-up



Udfordringer

- > Clogging af pumpe
- > Løsninger:
 - > Efterskyl med guar opløsning
 - > Rense pumpe dagligt

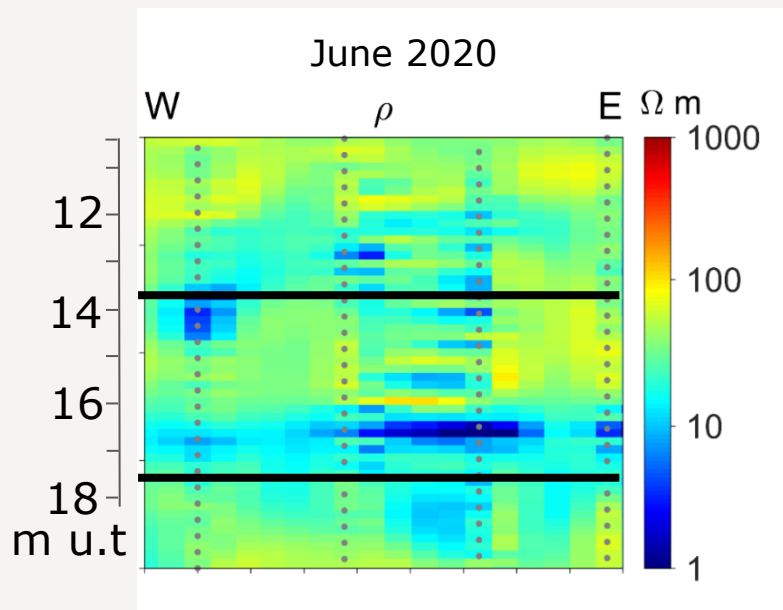


Udfordringer

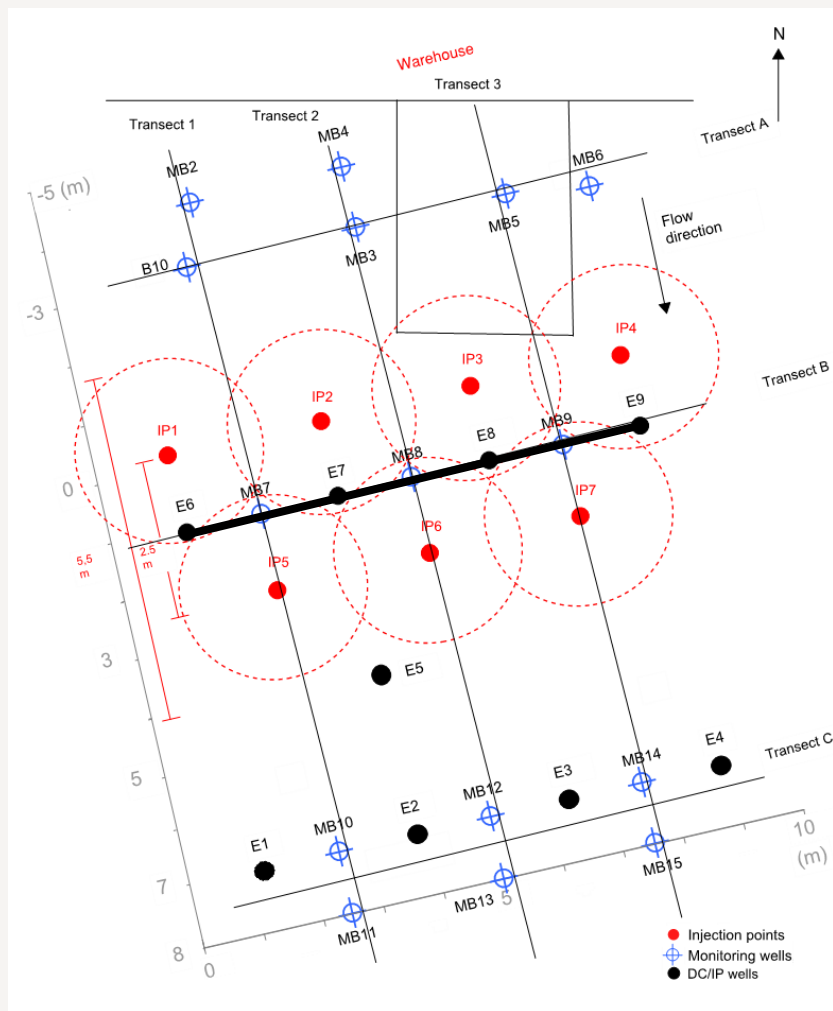
- › Daylighting
25 m væk



Dokumentation DCIP

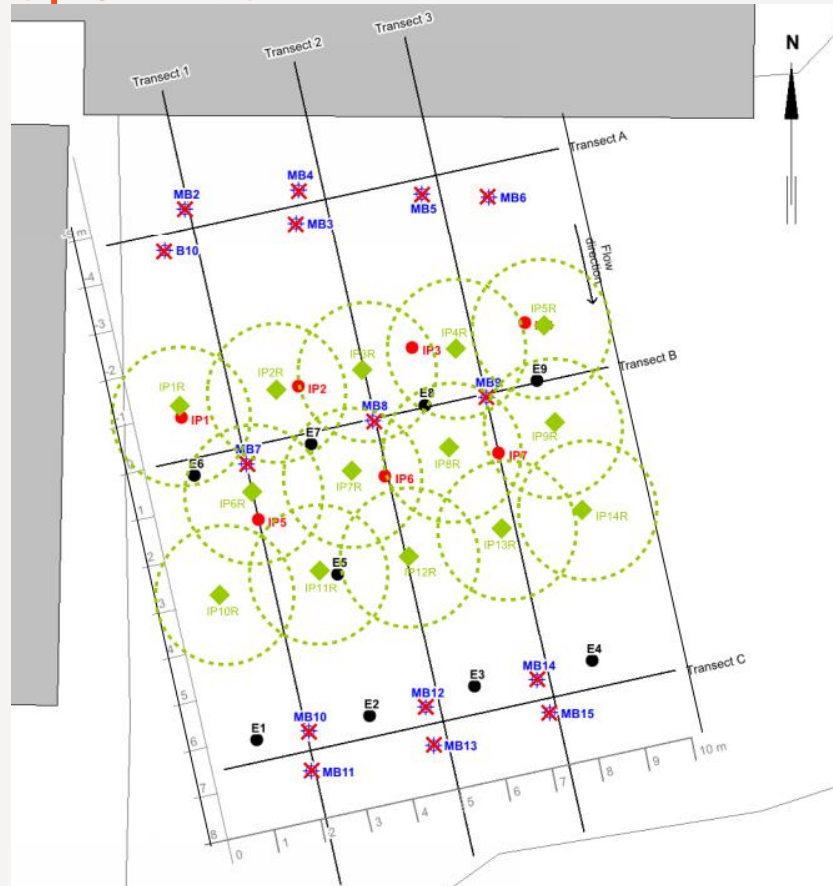


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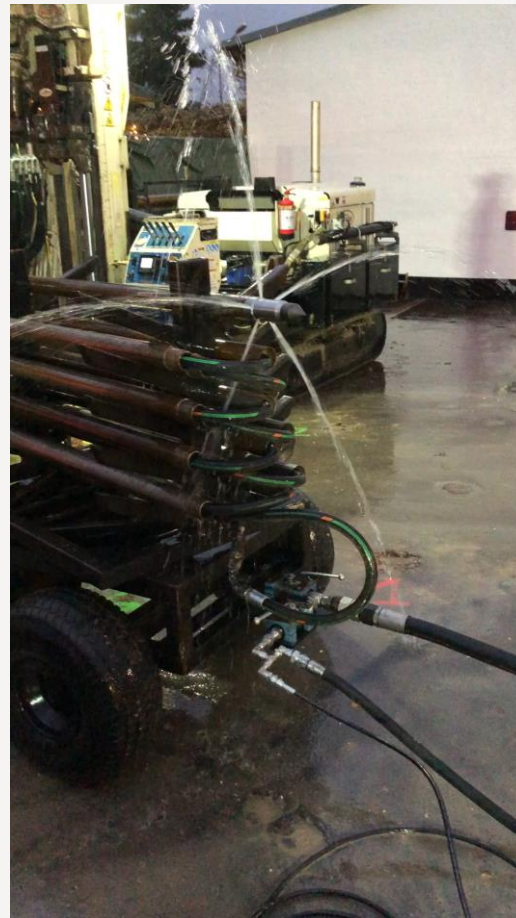


OWI

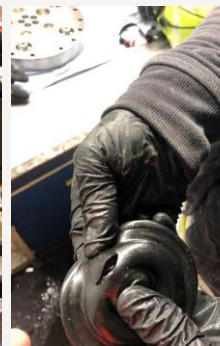
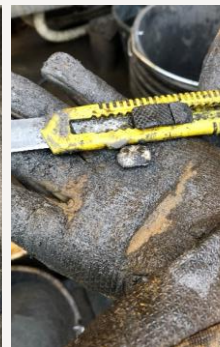
Reinjektionspunkte



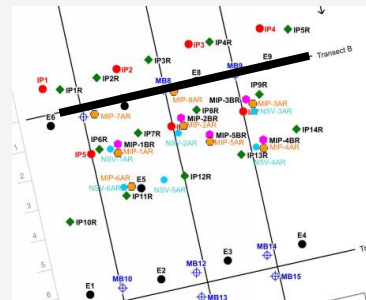
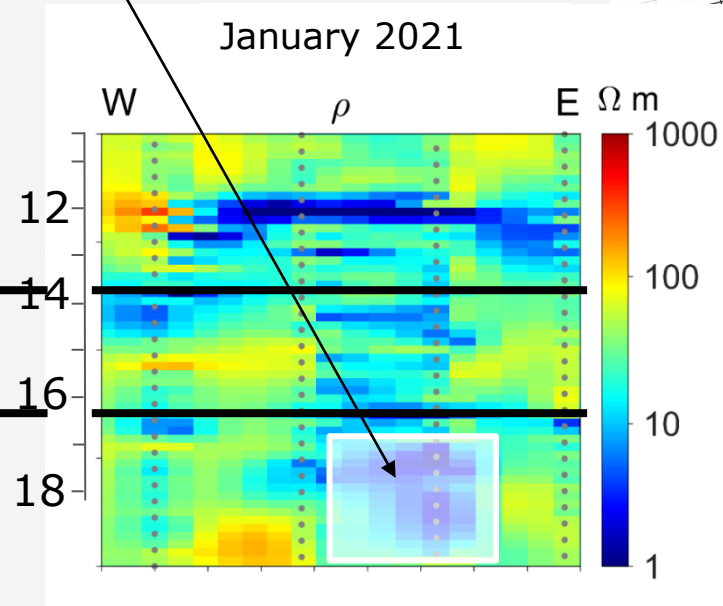
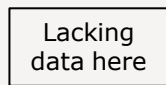
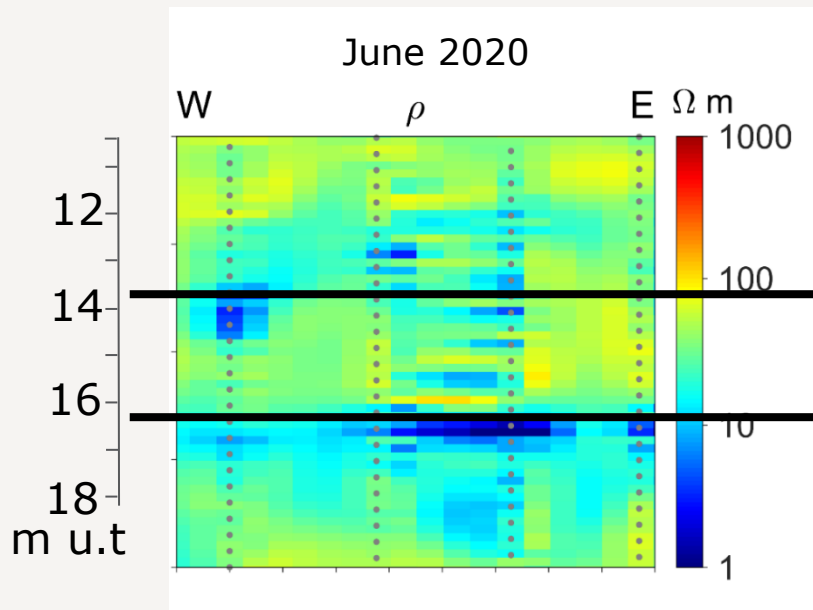
Udstyr



Udfordringer



Dokumentation DCIP



Lessons learned/overvejelser

- > Forboring undgås



Lessons learned/overvejelser

- > Vigtigt med entreprenører som har erfaring med injektion



Lessons learned/overvejelser

- > Løbende dokumentation af injektion (MIP/DCTD)



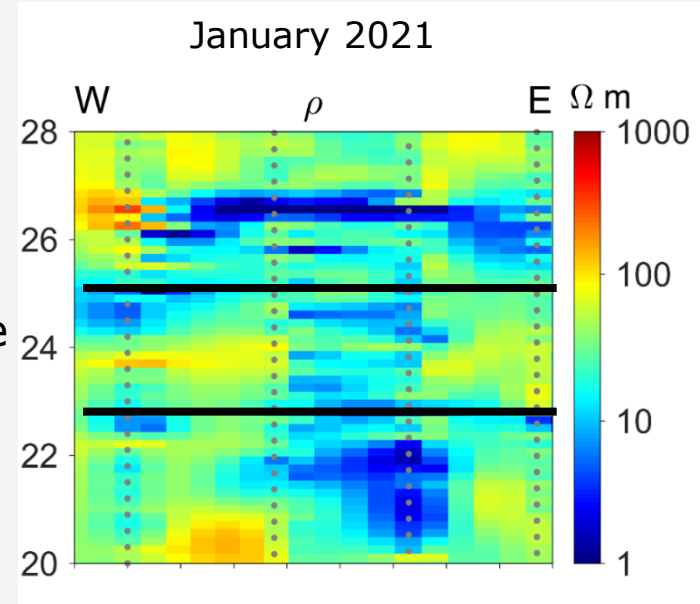
Lessons learned/overvejelser

- > ROI er svær at bestemme



Lessons learned/overvejelser

- › Bottom up -> produkt i bunden af injektionsdybde
- › Top down -> produkt i toppen



Lessons learned/overvejelser

- › Er det teknikken eller geologien der driller?
- › Skulle vi overveje kun at injicere i en dybde?

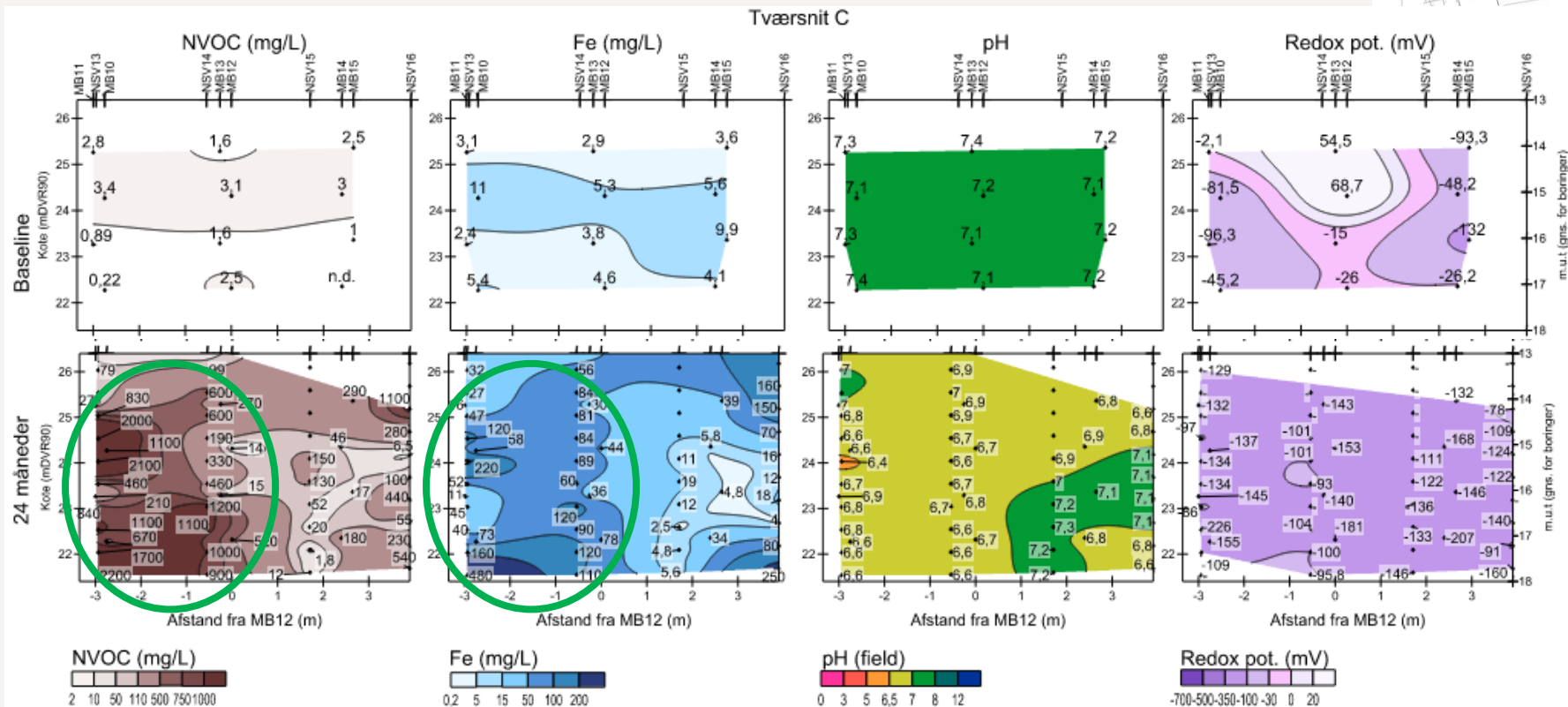
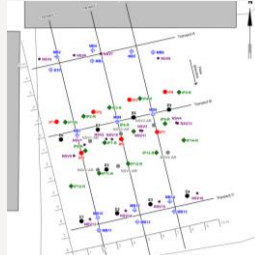
Lessons learned/overvejelser

> Acceptere daylighting?

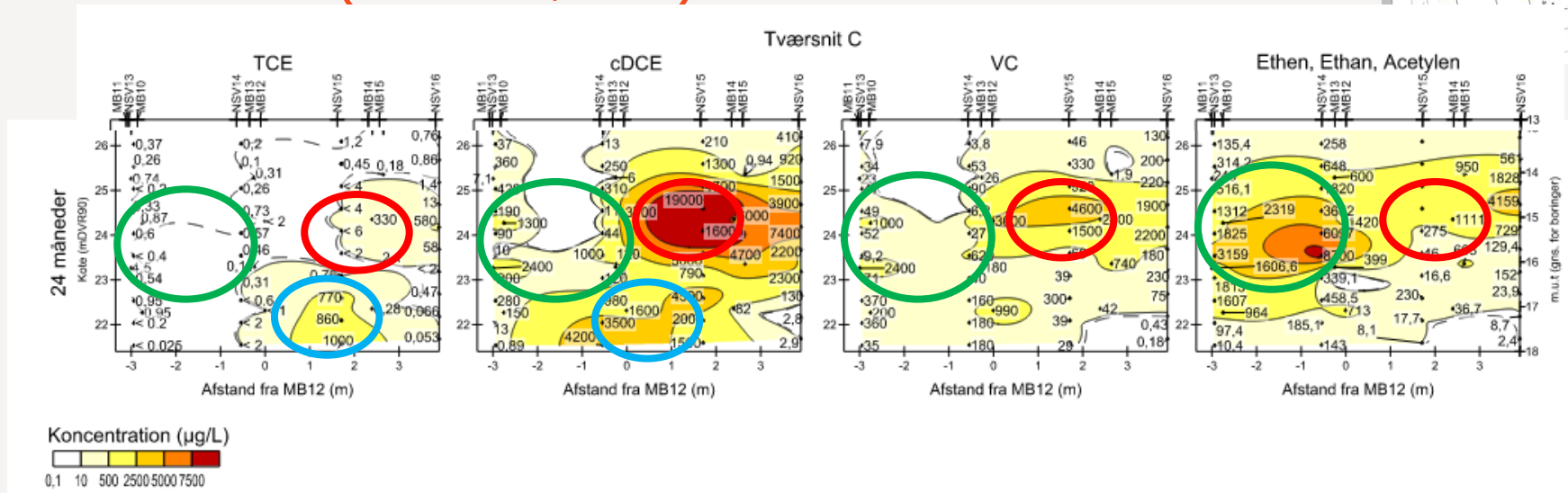
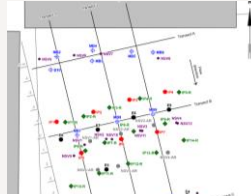




Transekt C (Nedstrøms)



Transekt C (Nedstrøms)



Aktivt område



Kontrol/mindre aktivt område



Uopdaget cVOC eller?

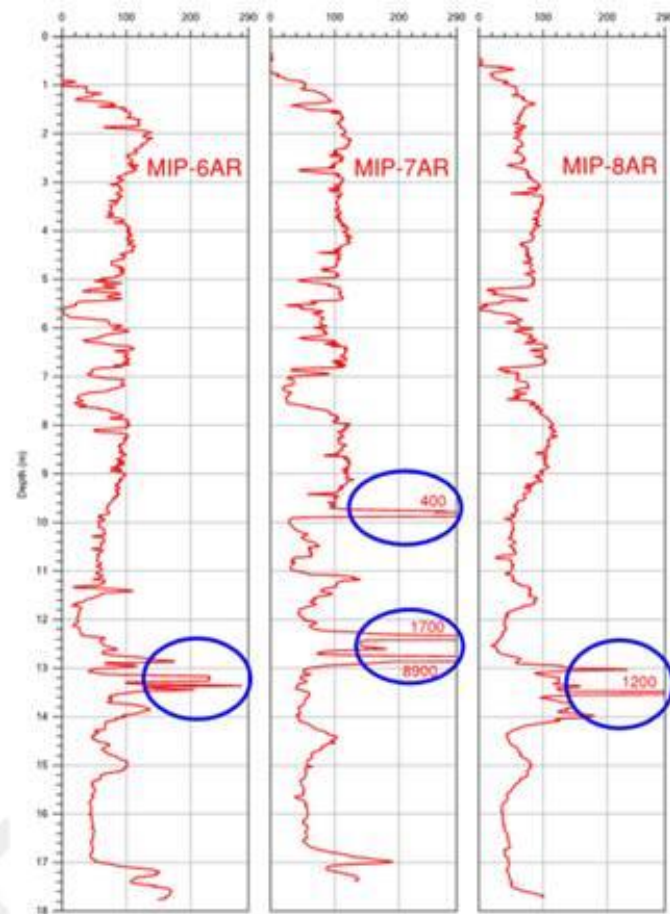


Figure 4.3 MIP profiles MIP-6AR to MIP-8AR showing the EC response. Blue circle shows where increased EC response could indicate the presence of *Exovect-1R*[®]. There are no MIP profiles from before reinjection to compare with. Note that the EC response exceeds the axis at three depths in MIP-7AR and at one depth in MIP-8AR.

