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EUROPEAN ASSOCIATION OF GEOSCIENTISTS & ENGINEERS

Fourth EAGE CO_2 Geological Storage Workshop

Demonstrating storage integrity and building confidence in CCS

22-24 April 2014
Stavanger, Norway

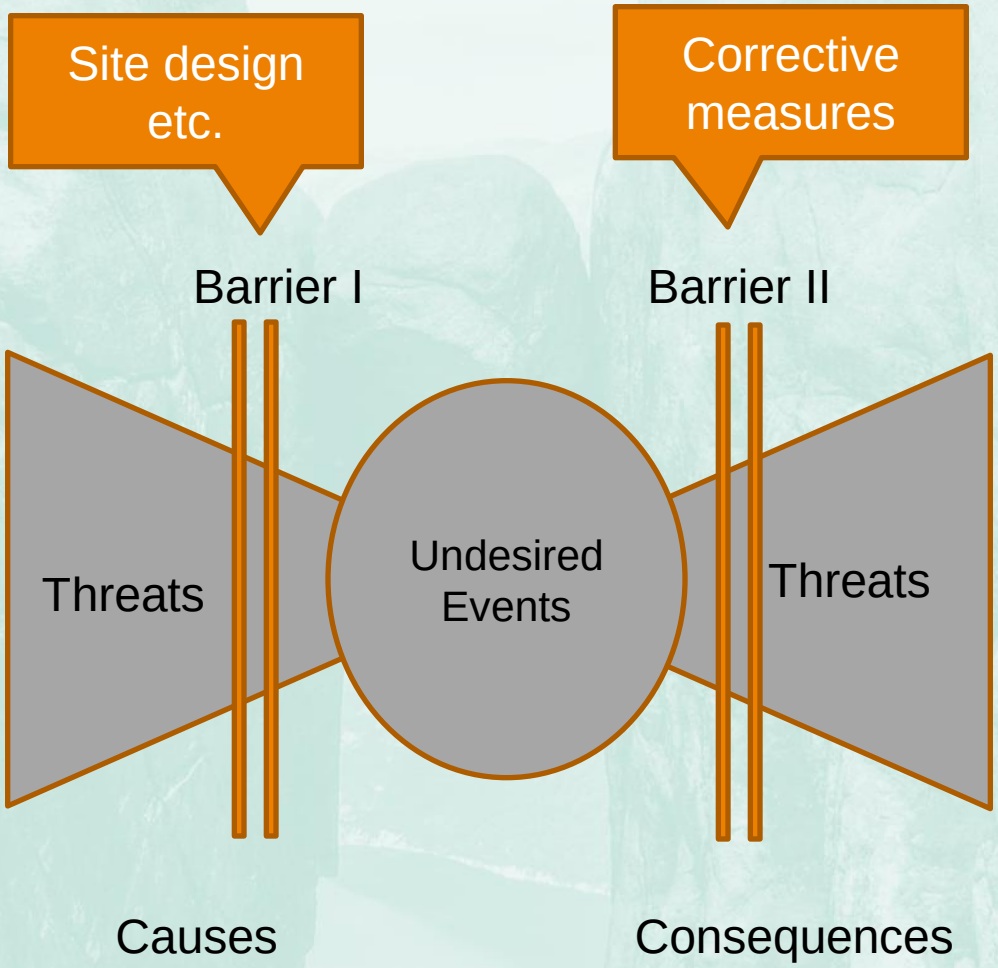
Statoil GASSNOVA

www.eage.org

April 23-24 2014

Corrective measures for CO_2 storage – the MiReCOL project

Filip Neele, TNO, The Netherlands


Site design etc.
Corrective measures
Barrier I
Barrier II
Threats
Undesired Events
Threats
Causes
Consequences

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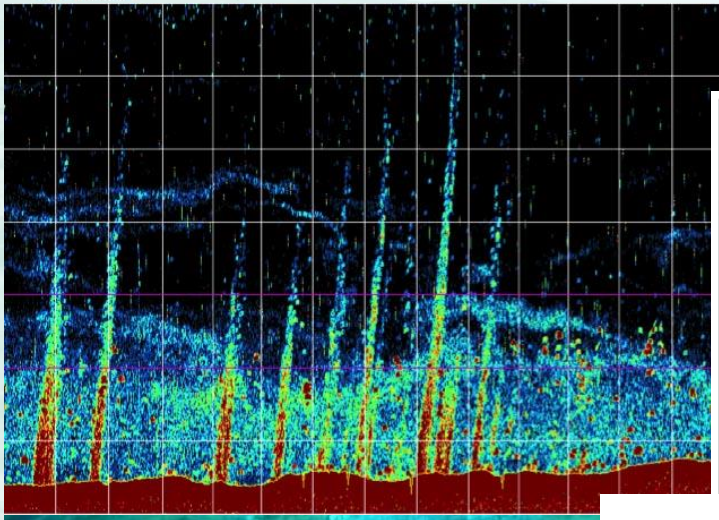
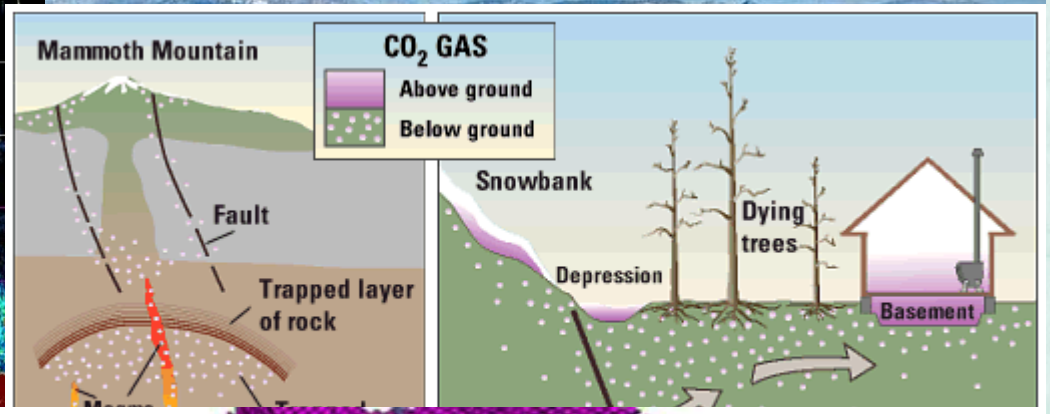
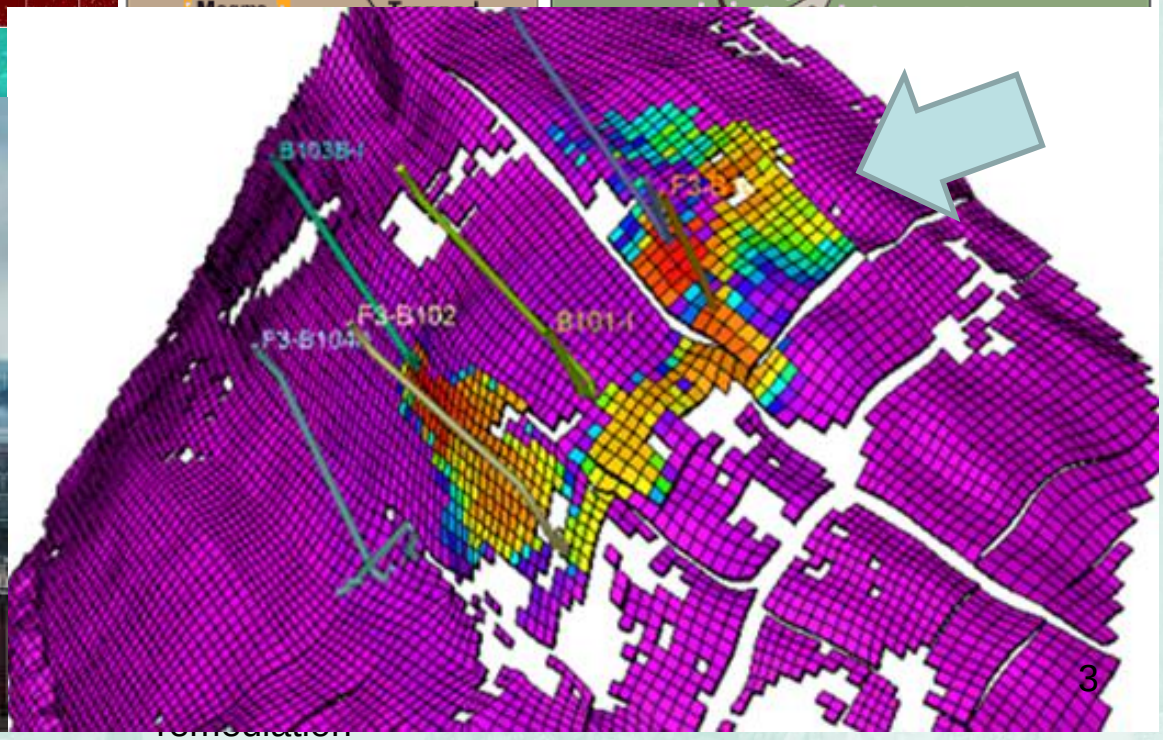
Significant irregularities?







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Significant irregularities?

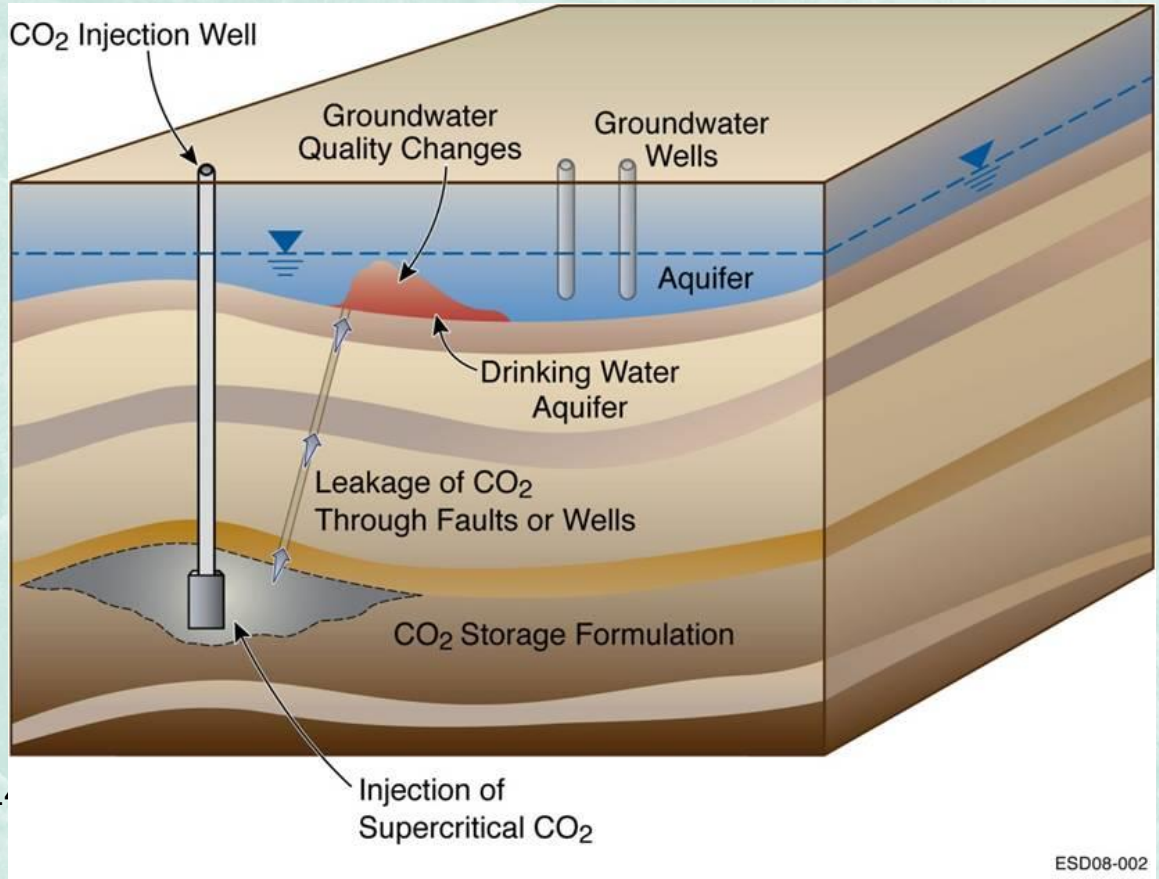
Nagylengyel, Hungary, 1998

Currently available techniques

- Existing techniques
  - Pressure management
  - Back production of CO_2
  - Well remediation techniques

Mirecol objective

- To develop a toolbox of techniques available to mitigate / remediate undesired migration or leakage of CO_2
  - Support the definition of corrective measures plans
  - Help building confidence in deep subsurface storage of CO_2



Berkeley Lab Earth Sciences Div.

Project approach

1. Create an inventory of **existing** remediation techniques
   - Study merit for number of real / realistic storage complexes, e.g.:
     - Fluid migration control through pressure management
     - Remediation techniques for leakage along well
2. Add **new** remediation techniques
   - Study merit for number of real / realistic storage complexes, e.g.:
     - Sealants
     - Smart materials in wells
3. Focus is on mitigation and remediation techniques in **deep subsurface**
   - Corrective measures in (near-) surface region: use literature overview and other projects

Project approach

- Central concept is **risk level**
- Merit of mitigation or remediation technique is obtained by establishing overall risk level *before* and *after* deployment of the technique
  - ***Unmitigated risk*** (i.e., threat or leak has occurred, but no action is taken)
  - ***Mitigated risk*** (i.e., residual risk of threat or leak after deployment of mitigation or remediation technique, plus the impact of the deployment of the technique on the risk level of the storage site)
- A mitigating or remediating action should be taken only when the mitigated risk is lower than the unmitigated risk

Project approach

- **Site specificity vs general guidelines**
  - The details of threats to safe and secure storage, and of leakage events are strongly **site specific**, and so are the options to mitigate or remediate
  - The project will study mitigation and remediation techniques on a range of real or realistic storage complexes, to derive a range of *site-specific results*, from which more general conclusions will be drawn

Result of the project

- "**Handbook**" of remediation and mitigation options that can be applied in different parts of storage complex, against various leakage scenarios.
    - *Handbook to inform operators, regulators, public*
    - *Results in handbook based on modelling for specific sites, to illustrate value of remediation & mitigation options*

- The Handbook will also be implemented in a **web-based tool** that allows easy access to the project's results
    - This tool will also support operators in setting up a corrective measures program

Workshop!

- **Aim**
  - Optimise shape and form of results for maximum impact
- **Audience**
  - Operators, regulators, R&D
- **Date, venue**
  - TNO offices, Hoofddorp, The Netherlands (close to Schiphol!)
  - Wednesday, July 2nd 2014
- **Invitation**
  - Audience: (potential) operators, regulators
  - Let us know you're interested!
- **Contact**
  - Me! filip.neele@tno.nl

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MiReCOL
Mitigation and Remediation of CO_2 leakage

MItigation and Remediation of CO_2 Leakage

Project granted under
EU FP7 Energy – Theme 5.2
Mitigation and remediation of leakage from geological storage

SINTEF
TNO innovation for life
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Statoil
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