Saskatchewan CO₂ Oilfield Use for Storage and EOR Research (SaskCO₂USER)

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Petroleum Technology Research Centre

• Non-Profit Research & Development

• Collaborative partnerships with Industry, Government and Research Organizations

• Committed to improving oil recovery

• Research projects associated with CO₂ management
  
  • IEAGHG Weyburn –Midale CO₂ Monitoring & Storage Project

  • SaskCO₂User

  • Aquistore
Benefit to the Program

• New 2014-2015 Research Program
• Applied research for commercial applications of CO$_2$-EOR operations and CO$_2$ storage.
• Focus on commercialization, SaskCO$_2$User will address:
  – CO$_2$ conformance
  – Wellbore Integrity
  – Monitoring
SaskCO$_2$USER Program

1. Evaluating minimum data sets
2. Storage integrity
3. Passive seismic monitoring
4. History-matched modelling
5. Wellbore design
6. Casing corrosion
7. Core assessment
Evaluating Minimum Data Sets

- Abundance of information unlikely for future geological storage projects
- Need to determine minimum amount of data necessary to identify migration pathways in order to strike a balance between resolution and risk assessment needs.
- Data that are useful for EOR phase may not be necessary for post-EOR phase because of different initial conditions and plume extents.
Monitoring of CO$_2$-EOR Sites for Storage Integrity

• Recommend an MMV strategy appropriate for monitoring CO$_2$ overlying the storage reservoir

• Examine most likely pathways for migration

• A review of existing and emerging regulatory regimes
Passive Seismic Monitoring
• Deployment of 3 broadband stations.
• Correlation between industrial activity and induced seismic events.
• Integrate with geomechanics.
History-Matched Modelling

- Develop automated seismic-constrained history matching workflow to verify CO₂ distributions predicted by dynamic simulations.
- Stochastic inversion of time lapse seismic coupled with flow simulations to identify porosity/permeability in order to improve the predictive accuracy of the model.
Wellbore Design

- Optimized well design for production, CO₂ flood operations, disposal and long-term abandonment.
- Define a general completion procedure and recommend completion tools configuration and material requirements to convert producing wells into long term CO₂ injection wells.
- Identify any well construction or estimated cost differences for wells that may or may not require conversion to CO₂ EOR injection.
Casing Corrosion

• Estimate in situ corrosion rates and locations for wellbore casing/cement in an operational field.

• Three case studies from collected data.

• Determine corrosion rates and locations, as well as contributing factors.
Core Assessment

• Investigate the affect of injected CO$_2$ on the rock properties

• Two recently drilled observation wells with core and DSTs from the Weyburn field post CO$_2$ flood initiation

• Compare these cores to equivalent cores in the area and determine if the CO$_2$ flood has changed the reservoir mineralogically and/or geochemically over the course of the past 15 years
Summary of Accomplishments to Date

– Project launch
– RFPs, contracts awarded, executed
– Phase I Kick-Off Meeting held
– Equipment installation currently underway
– Projects to be completed by September 2015
QUESTIONS?

Thank you.

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Best Practice Manual

• Characterisation
• Performance Predictions
• Geochemical Monitoring
• Geophysical Monitoring
• Performance Validation
• Well Integrity
• Risk Assessment
• Community Outreach
Theme Leads:
Dr. Chris Hawkes;
Theresa Watson;
Dr. Don White.

Research Providers:
Texas BEG; Schlumberger Carbon Services;
University of Bristol; TNO;
Bisset Resource Consultants;
EERC;
Saskatchewan Geological Survey
Gantt Chart

Task 7 - Define Applied Research
10/1/2013 - 5/31/2014

Task 8 - Implementation of Applied Research
6/1/2014 - 9/30/2015

Task 9 - Integration of Applied Research
7/1/2015 - 9/30/2015

2013
Q4
2014
Q1
Q2
Q3
2015
Q4

Project Selection
5/22/2014
Kick-off Meeting
7/31/2014

Task 7 Work Plan
Updated Project Management Plan
6/16/2014

Task 9 Work Plan
12/31/2014
Progress Update Meeting #1
11/30/2014

Progress Update Meeting #2
7/31/2015

Final Report
11/30/2015