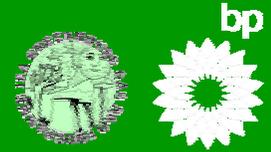


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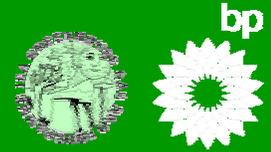
Developing A Roadmap For Risk Assessment for CO₂ Storage in Geologic Formations

Tony Espie, John Gale



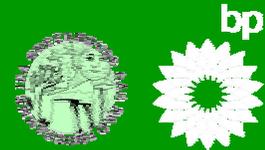
- Capture and storage of CO₂ in geological formations can offer a material contribution to mitigation of GHG emissions
- Technical, commercial, acceptance issues to be resolved prior to large scale implementation
 - Cost (primarily of capture and transportation)
 - Performance prediction (duration of storage and risk)
 - Public engagement
- Considerable activity to understand and model performance as pre-cursor to risk analysis

Risk Assessment Process



- Structured process for Risk Assessment :
 - Identification of key risks and event scenarios
 - Quantification of risks
 - Evaluation of risks (with stakeholder input)
 - Process modification to eliminate excess risk
 - Monitoring and intervention strategy to manage remaining risk

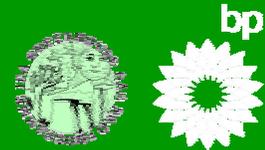
The Challenge



- Performance prediction for sub-surface is inherently uncertain especially for long time frame
 - Limited direct experience base to calibrate expectations
 - Need to ‘reality check’ prediction tools
 - Need to compare and contrast tools to understand strengths and weaknesses
 - Need to identify gaps in data and modelling
- Challenge is to encourage co-operation between groups to accelerate progress
 - Transfer of learnings
 - Development of key datasets
 - Testing of tools and methodologies
 - Stakeholders input

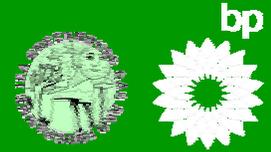


Risk Assessment Network



- Informal workshops on risk assessment in 2002 and 2004
 - Initial objective to exchange information and ideas
- IEA GHG programme to foster establishment of Risk Assessment Network
- Objectives
 - Promote exchange of ideas and data
 - Identify priorities for technology providers and funding groups
 - Develop roadmap for Way Forward

February 2004 Workshop

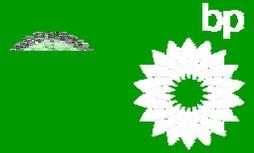


- 55 attendees from Europe, Canada, USA, Japan and Australia
- Agenda
 - Risk Identification and Scenario Development
 - Assessing Long Term Storage Performance
 - Impacts of CO₂ Leakage
 - Wellbore Seepage
 - Breakout Sessions
- Discussions provide basis to develop Roadmap

Status of Risk Assessment 1

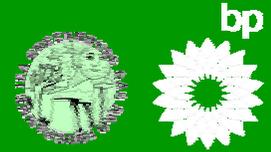
- Identifying key risks and scenarios
 - Two approaches :
 - Experience based
 - Structured identification process such as Performance Factors database
 - Substantial progress made in developing tools
- Quantifying risks
 - Substantial activity on tool development for performance prediction
 - Initial case studies of predicted performance for storage systems now available e.g. Weyburn, NGCAS
 - Initial indications are that fluid migration through and around seals likely to be limited
 - Performance prediction has not been extended systematically to risk

Status of Risk Assessment 2



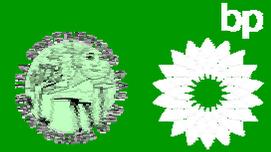
- Evaluating risks
 - Limited activity so far
 - Ongoing debate on criteria for effectiveness
 - Limited interaction with stakeholders on criteria for acceptance of risk
 - Risk based approach to site evaluation in Australia notable
- Monitoring and Intervention
 - Several projects field testing options for monitoring
 - Focus has been on testing technologies and ‘over-acquisition’ of data rather than long term monitoring strategies
 - Synthesis of results and applicability of options in range of scenarios would be timely

Key Messages



- Risk identification process ready for dissemination
- Performance prediction tools becoming available but more use is required to understand strengths and weaknesses
- Case histories indicate that lateral and vertical fluid migration appears to be limited on 1000 year timescale
- Extension of performance prediction to risk assessment incomplete
- Further well monitored demonstration projects and natural analogue datasets required to test tools
- Moving directly to probabilistic modelling of risk is premature at this stage

Summary



1. Substantial advances in identifying key issues and developing a structured risk assessment process for geological storage of CO₂
2. Database of key performance factors ready for review shortly
3. Initial case studies indicate that lateral and vertical migration through caprocks likely to be small on 1000 year timescale
4. Further work is required to allow processes to be tested
5. Gaps in areas of impacts identified

World's Next CO₂ Storage Site



Dimensions of Scale

