SAND2011-0253P

Overview of BLM Gas Migration Project

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BLM Stakeholder Meeting
January 10, 2011
Albuquerque, NM

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Gas Migration Project: Baseline Risk Assessment, Hydrologic and Geomechanical Analyses to Investigate Wellbore/Mine Interactions in the Potash Enclave of Southeastern New Mexico

Objective

- A previous study used computer generated models, which demonstrate some conditions that will cause casing failures. The proposed studies will follow-up by field verifying the results of the computer models developed in the initial study. Three interrelated studies are proposed to verify the results of the computer models or test conditions discovered during the study which need further analysis, development of a risk assessment framework for analysis of scenarios arising form potash and hydrocarbon resource development.

Scope of Work

- Task 1: Development of a Risk Assessment Tool and baseline analysis. Once this tool is fully developed, it can be used to analyze engineered solutions to mitigate risk
- Task 2: Field tests and logging of wells for well integrity
- Task 3: Lab testing of casing and joints for hydrologic integrity during deformation

Task 1: Development of a Risk Assessment Tool : Types of Risk Assessment

RA Tasks	Methodology	Comments
FEP Analysis	Develop FEP Databases and Evaluate Applicability of FEPs to Site	Hazard Identification with Mitigation; Used for Centuries
Elicited Consequence and Probability	Pooled Expert Judgment and Risk Matrix	Requires Experience Base
Data Source Evaluation	Propagate Data Quality Through Decision Tree	Tracks Value of Collecting More Data
Deterministic	Simulate Aspects of the System that Span Possible Ranges or Use Catalog of Previous Analysis	Creates Experience Base
Probabilistic Risk Assessment with Sensitivity Analysis and Iterations	Comprehensive Propagation of Uncertainty through Exposure Pathway Models	Used for Setting Technical Risk Criteria; Used for Radioactive Waste Disposal

Gas Migration Project: Geomechanical Analyses to Investigate Wellbore/Mine Interactions in the Potash Enclave of Southeastern New Mexico

Question: What is the potential for gas to migrate from a wellbore to a mine?

Develop a tool to examine features, events, processes and scenarios and their complex interactions =**Risk Assessment**

For this iteration..

1) Design a basic computer modeling approach using proven methods, can be grown over time (Rechard)
2) Collect & use prior research on the area=WIPP
3) Begin development of parameter lists and data values
4) Develop a high-level conceptual model and identify the sub-elements
5) Perform more detailed study of **selected** pieces of the problem to stay within budgeted scope; Focus on:
   a) Wellbore construction (Gaither)
   b) Geomechanical influences on gas migration pathway (Sobolik)
   c) Gas migration pathway through the hydrology/geology (Hadgu)

Examine old wellbores and detail their condition (Sattler and Knudsen)

Data contributes to Risk Assessment to support determination of risk of loss of wellbore integrity=sealing

Design and perform a test to show effects of stress on casing couplings (Dwyer)

Data contributes to Risk Assessment to support understanding of factors that can compromise casing integrity

Take away:

- A Baseline Risk Assessment Tool Developed for Gas Migration
  - This Tool incorporates modules for 1) well and casing interactions, 2) formation and hydrology interactions, and 3) mine and formation interactions. *The Tool also creates a basis for integrative analysis on new well designs and materials or alternate engineered mitigation strategies.*
  - This tool is iterative such that new well designs and engineered mitigation approaches can be evaluated.
- Gathering information on well integrity of actual wells and lab tests of casing used in the basin
  - Using analog studies for probability of well integrity, such as the Alberta Basin (Watson and Bachu) where 300,000+ wells and the West Texas portion of the Permian Basin (Paine, TBEG)
  - Vision is to eventually have the same level of detail for a study of well in the Potash area