

Solution Mining Research Institute Fall 2019 Conference  
Berlin, Germany, 23-24 September 2019

## **Modelling Versus Reality - A comparison of modelling versus reality including an assessment of limitations and measures to be considered in Operator decision making process**

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### **Abstract**

Numerical modelling is an inherent part of the solution mining industry. It is used to predict the behaviour of inaccessible subsurface assets subject to complex physical, geological and thermodynamic processes. To make such predictions, assumptions and simplifications are made which introduce conservatism that may skew the modelling results away from the measured reality.

Operators are reliant on the recommendations derived from the output of such models to navigate the gas storage market place and ensure a safe, sustainable future for the industry. Inevitably the conservatism used will drive Operators to make decisions that prevent safe tolerances being exceeded however these decisions also have the potential to drive Operators to miss key opportunities to maximise their revenues.

This paper explores how numerical modelling is used in the industry specifically considering the interactions between Operators and Designers and the means by which different perspectives can impact the overall decision making process.

This paper:

- 1) Discusses the underground gas storage commercial and regulatory framework in which numerical modelling is deployed.
- 2) Provides a high level summary of the typical modelling cycle for an underground gas storage asset.
- 3) Compares how modelling results are perceived by Operators versus Designers.
- 4) Provides a case study where modelling was used to support Operator decisions however the measured reality did not reflect the modelled prediction.
- 5) Discusses the lessons learned from the case study and how these can be adopted by the wider industry.

**Key words:** computer modelling, gas storage, salt caverns, rock mechanics, United Kingdom