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A comparison of bedded and domal salt regarding heat-generating nuclear waste disposal

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Verantwortung für Generationen / Responsibility for Generations DBE TECHNOLOGY GmbH

PTKA Project Management Agency Karlsruhe

Karlsruhe Institute of Technology

6th US/German Workshop on Salt Repository Research, Design, and Operation

Hotel Pullman Dresden Newa

September 7-9, 2015

U.S. DEPARTMENT OF ENERGY | NNSA National Nuclear Security Administration

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Motivation

- Compare and contrast characteristics of bedded and domal salt as they pertain to disposal of heat-generating nuclear waste in salt formations
- Clear and contemporary reasons to pursue comparison of bedded and domal salts
- Workshop discussion:
  - Annotated outline comparing bedded and domal salt
  - Publication options

Comparison Document(s)

- Expected to be a major deliverable(s) for international salt repository R&D
  - Nuclear waste disposal in the United States has concentrated on bedded salt
  - Similar efforts in Germany emphasized geologic domal salt
- Provide collective understanding of basic salt physical, mechanical, chemical, petrological, hydrological, and thermal behavior
- Relevance of similarities and differences are discussed on the basis of scale from the large-scale (formation), to the mesoscale (meters), and to the microscopic scale

Venues

Authored collaboratively by US and German scientists

- USA Nuclear Energy Report
- KoSiNa contribution
- Publications - open literature
- NEA Salt Club

1.0 Introduction

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1.1 Salt Characteristics

1.2 Generic Repository Evolution

1.3 Transferability

1.4 Potential Generic vs. Site Specific Issues

2.0 Formation Scale

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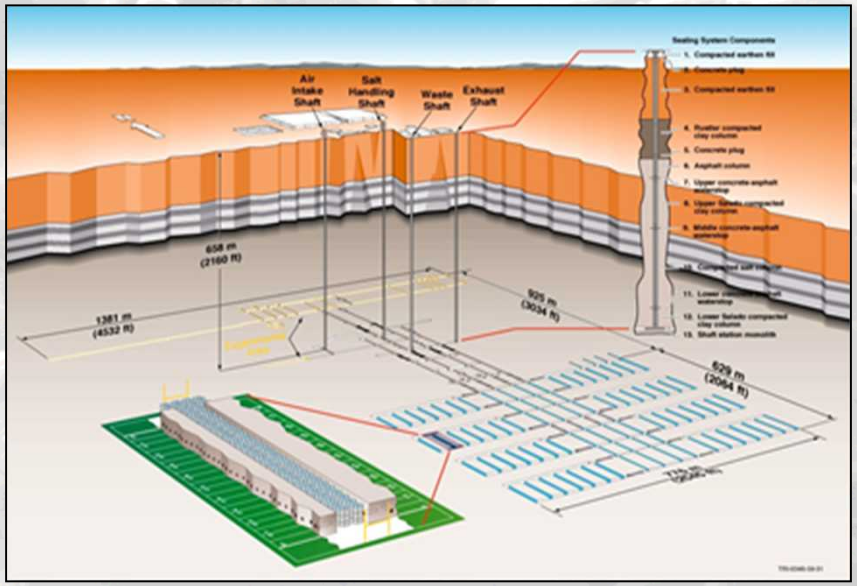
2.1 Structural Geology

2.2 Salt Basins

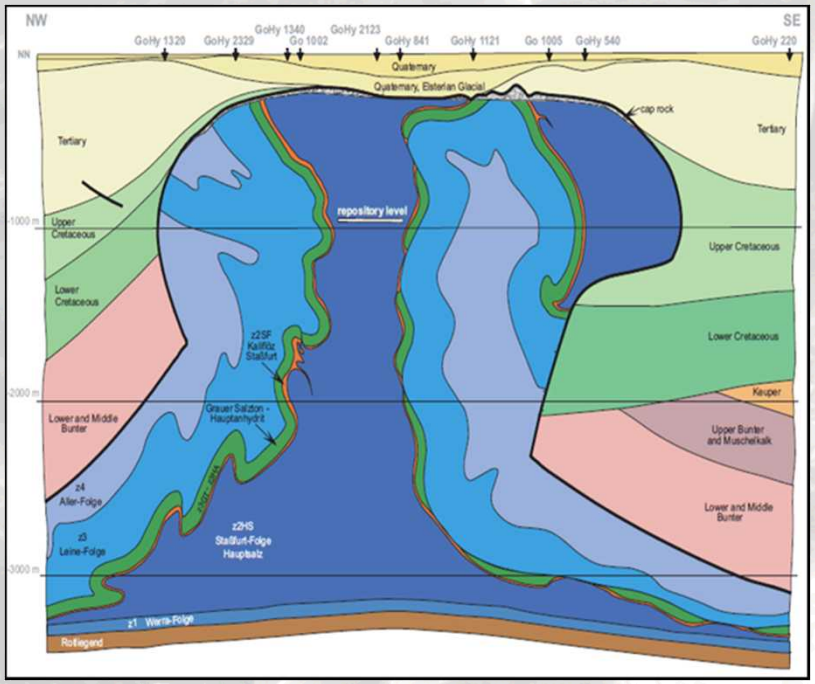
- 2.2.1 Salt basins in Germany
- 2.2.2 Salt basins in The Netherlands
- 2.2.3 Salt basins in Poland
- 2.2.4 Salt basins in the United States

2.3 Large-scale modeling

Existing Information



WIPP Underground Layout



Preliminary safety analysis of the Gorleben site (VSG)

(Vorläufige Sicherheitsanalyse Gorleben)

3.0 Mesoscale

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- 3.1 Thermal Effects
- 3.2 Brine Migration
- 3.3 Mechanical Properties
- 3.4 Creep
  - 3.4.1 Results of the Joint Project Testing
  - 3.4.2 Results from the SPR program
- 3.5 Mesoscale Lithology
- 3.6 Excavation Damage Zone
- 3.7 Modeling
- 3.8 Seal Systems (or separate document?)

4.0 Microscale

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4.1 Mineralogical Comparisons

4.2 Microprocesses

4.3 Brine Content

Goals of Breakout Session

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- Discuss differences and similarities as they pertain to the safety case
- Solicit input from 6th Workshop participants
- Create a document that can serve as a guide for development of a compendium
- Provide scientific basis for FEPs evaluations