BUNDESGESELLSCHAFT FÜR ENDLAGERUNG

ERAM GETTING REAL – MOVING TOWARDS THE CONSTRUCTION OF A SAFE DGR

Interaction between technical requirements and safety analysis

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TOPICS

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HISTORY

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- ERAM is an old potash- and rocksalt mine
- about 5 Mio m³ open volume (originally 9 Mio m³)
- Deposition of low and intermediate level radioactive waste
- Inventory: 10^{14} Bq
- 2009 plan documents for the licensing authority
- 2011 public discussion
- Revision taking into account current knowledge and requirements

PHASES OF THE ERAM REPOSITORY

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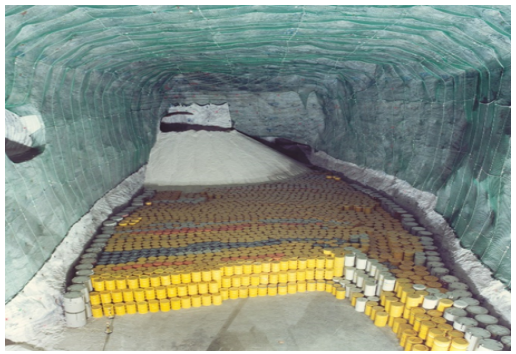
- Mining (1898 – 1968)
- Storage of radioactive waste (1981 – 1998)
- Opening / Decommissioning Planning (since 1992)
- Implementation phase after approval (planned for the early 2030s)



PHASES OF THE ERAM REPOSITORY

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TOPICS OF OPTIMIZATION AND RD&D

- Mining
  - maximum yield/profit
- Storage
  - logistical and inventory-related requirements
  - Storage technology

  but not: how to realize a safe decommission!

PHASES OF RD&D AND OPTIMIZATION

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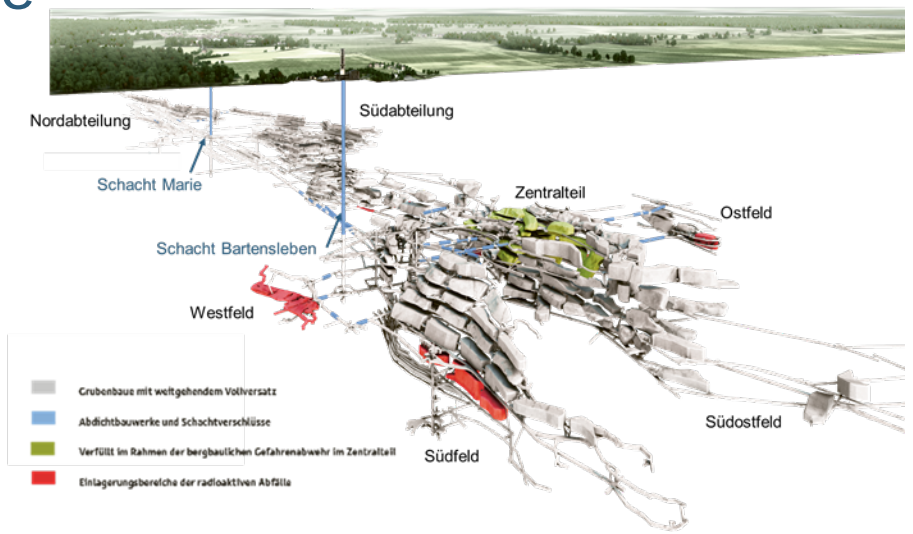
„Decommissioning planning“ and „Demonstration“

- Stability of the mine building (occupational safety)
  - We have improved measurements and evaluation methods (local seismics, deformations) for the observation of the mine building

  -> Hazard prevention measure



PHASES OF RD&D AND OPTIMIZATION

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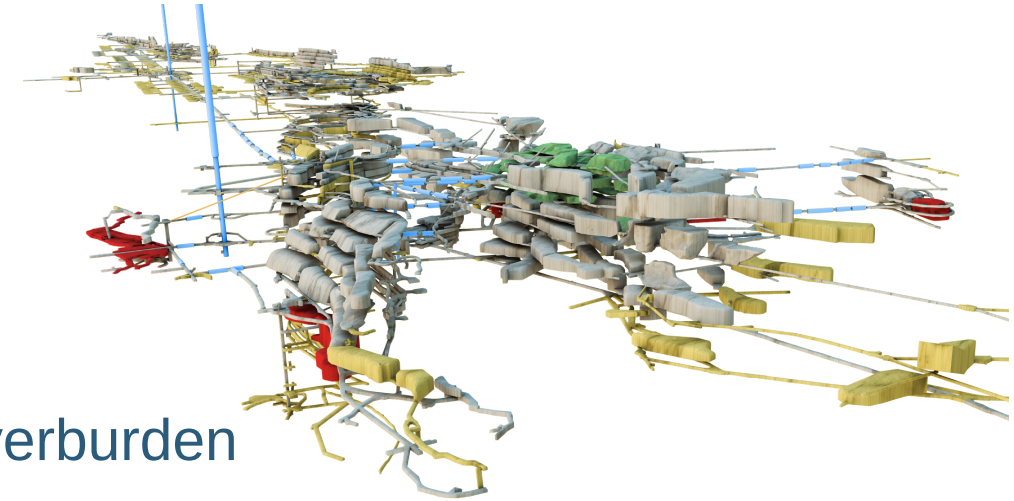
Aim of decommissioning:

- Keep nuclides out of the environment



Based on:

- preventing the inflow of solutions from the overburden
- limiting transport processes within the mine workings

Three main measures:

- the extensive backfilling of the mine with salt concrete
- underground sealing structures
- the closure of the two existing shafts

SAFETY CONCEPT

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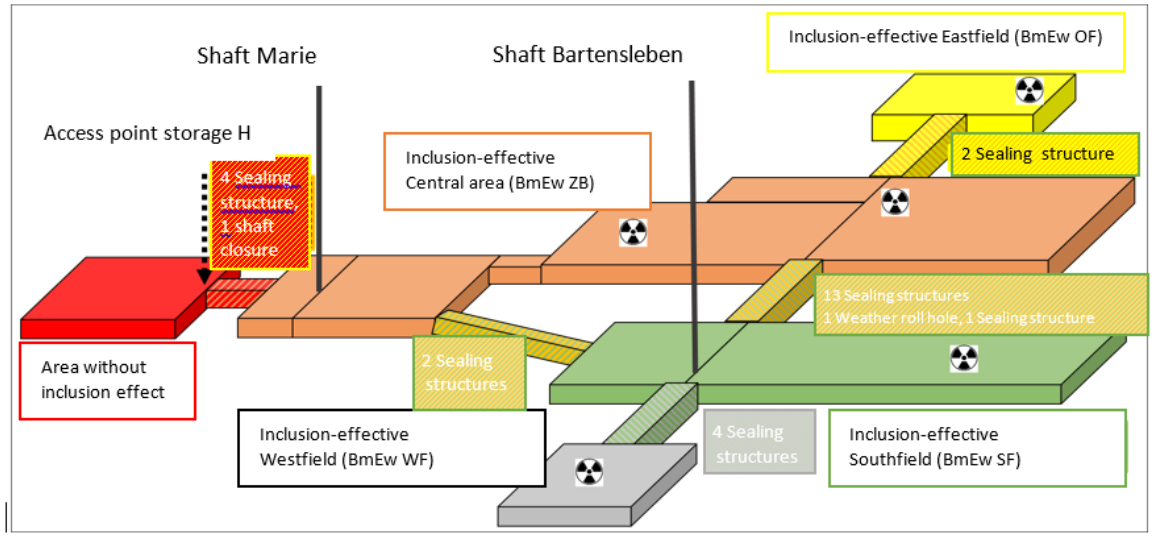
- Safety concept aimed at secure containment is based on:
  - Integrity preservation of the geological barrier
  - Comparison of different decommissioning alternatives
  - Reducing conservatism through improved measurement methods
  - In accordance with updated regulations, the planning and optimization of measures is based on realistic assessments for system development
  - Determination of properties that define barrier characteristics on real structures



REALISATION OF MEASURES

DRIFT SEALING MADE OF MAGNESIA MATERIAL

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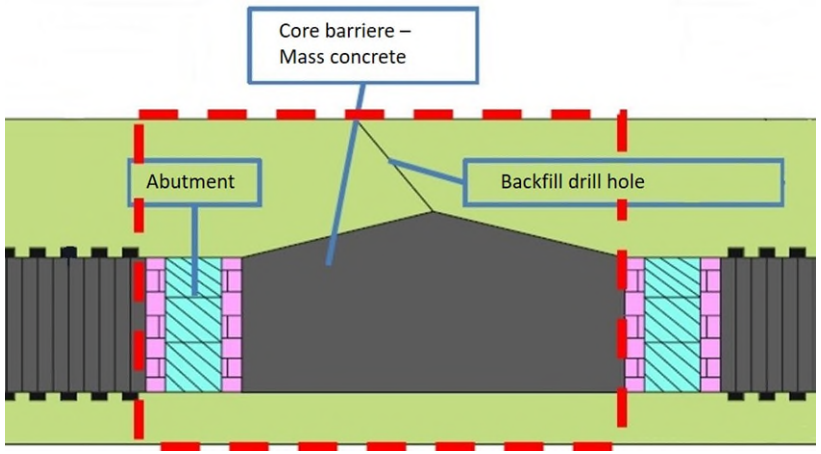

Main Objectives

- quality-assured building material production
- form-fit connection of the building material to the rock salt
- Determination of the relevant geotechnical, geochemical, mechanical and hydraulic parameters after pressurization by gas and solution in order to demonstrate the functionality of the drift sealing segment for the long-term safety assessment
- Development, application and optimization of the planned quality assurance program

REALISATION OF MEASURES

Quality-assured building material production

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e.g. the (long) path from the lab to real scale…

REALISATION OF MEASURES

Form-fit connection

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REALISATION OF MEASURES

Determination of relevant parameters

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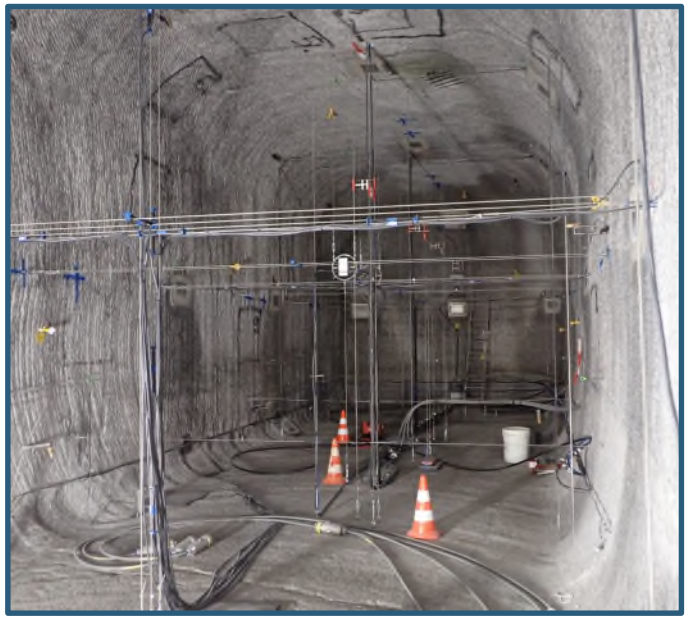
- Reliable measuring instruments *(temperature- and solution resistant)*
- Instrumentation must not influence the essential measured variables
- Cable routing by using bundling systems, development of wireless systems
- Construction of a pressure chamber



Conclusion

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- The different parts of RD&D have varying degrees of importance throughout the project
- Research and development is most important at the beginning
- Demonstrations become more important when the plans have already reached a high level of maturity
- Demands of security-related research should be clarified before the application for approval

But nevertheless:

➢ Further monitoring of the development of project-relevant research topics is essential to assess whether further optimizations are feasible

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