

# Used Fuel Disposition Campaign

## Feature, Event, and Process (FEP) Catalogue for SNF/HLW Disposal in Salt

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**Jens Wolf, Dieter Buhmann, Jörg Mönig** The logo for GRS (Gesellschaft für Reaktor-Sicherheit), consisting of the letters 'GRS' in a stylized, italicized font inside a square.

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Las Vegas, NV  
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## ■ U.S.-German collaboration to produce a common FEP list

- Identify relevant features, events, and processes (FEPs) for disposal of heat-generating waste (SNF and HLW) in salt
  - *Applicable to all potential salt concepts and sites (bedded and domal)*
- Develop FEP matrix as an organizational structure for the salt FEPs

## ■ NEA Salt Club

- FEP Catalogue for use by all Salt Club members
  - *Countries with potential interest in salt*
- Consistency with new NEA FEP database

## ■ UFD

- Provides basis for generic FEPs for deep borehole disposal and defense repository concepts

# Used Fuel Disposition

## FEP Matrix Approach

Characteristics, Processes, and Events		(CP) Characteristics															
Features and Components	(CP) Characteristics	Processes						Events									
		(TM) Mechanical and Thermal-Mechanical	(TH) Hydrologic and Thermal-Hydrologic	(TC) Chemical and Thermal-Chemical	(TB) Biological and Thermal-Biological	(TT) Transport and Thermal-Transport	(TR) Thermal	(RA) Radiological	(LG) Long-Term Geologic	(CL) Climatic	(HP) Human Activities (long timescale)	(OP) Other	(NC) Nuclear Criticality	(EF) Early Failure	(SM) Seismic	(IG) Igneous	(HE) Human Activities (short timescale)
<b>Waste and Engineered Barriers Region</b>																	
(WF) Waste Form and Cladding																	
• Commercial SNF & Cladding																	
• Commercial HLW Glass																	
• Naval SNF & Cladding																	
• Defense SNF & Cladding																	
• Defense HLW																	
• Other																	
(WP) Waste Package and Internals																	
• Commercial SNF																	
• Commercial HLW																	
• Naval SNF																	
• Defense SNF																	
• Defense HLW																	
• Other Packages																	
(BB) Buffer/Backfill																	
• Waste Package Buffer																	
• Tunnel/Drift/Room Backfill																	
(MW) Emplacement Tunnels/ Drifts and Mine Workings																	
• Open Excavations																	
• Drift Support																	
• Liners																	
• Other																	
(SP) Seals/Plugs																	
• Drift/Panel Seals/Closures																	
• Shaft Seals																	
• Plugged Boreholes																	
<b>Geosphere and Natural Barriers Region</b>																	
(HR) Host Rock (Repos. Horizon)																	
• Bedded or Dornal Salt																	
• Disturbed Rock Zone																	
• Interbeds and Seams																	
(OU) Other Geologic Units																	
• Aquifer(s)																	
• Unsaturated Zone																	
• Pressurized Brine Reservoir(s)																	
<b>Surface Region</b>																	
(BP) Biosphere																	
• Natural Surface and Near-Surface Environment																	
• Flora and Fauna																	
• Humans																	
• Food and Drinking Water																	
• Dwellings and Man-Made Surface Features/Materials																	
<b>System Region</b>																	
(RS) Repository System																	
• Assessment Basis																	
• Pre-closure and Operational																	
• Other Global																	

### ■ Two-dimensional organization structure

- Matrix rows = Features and Components
- Matrix columns = Processes and Events

### ■ Matrix Cell contains

- all FEPs related to the “Process/Event” acting upon or within the “Feature”

### ■ FEP Identification

- Matrix-based alpha-numeric
- Can still be mapped to the NEA Database for traceability



■ **Generic Salt FEPs Catalogue, Volume II, Revision 0**

- June 2015 Progress Report (UFD and WIPP)

■ **Developing complete list of Matrix-based FEPs**

- February 2016: identified ~ 350 matrix-based FEPs at SNL-GRS working meeting in Washington DC
- Spring-Summer 2016: ~ review and refine matrix-FEPs
- September 2016: SNL-GRS working meeting in Washington DC to finalize refinements
  - *in conjunction with the NEA Salt Club and US-German Salt Workshop*

■ **Ongoing testing/review of NEA FEP Database Version 0.3**

■ **2016 Documentation**

- TBD