References
Calculation Projects

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Selected activity fields of the calculation department

Customer	Project/Service
AVR GmbH	• Activity atlas for RPV and its internal components as well as for the biological shield • Preparation of a sampling concept and validation of activity calculations based on measuring results • Thermodynamic analyses of the heat removal for filling the AVR reactor pressure vessel with cellular lightweight concrete • Shielding calculations for internal radiation protection
Daher-NCS	• Criticality analyses for transportation casks with spent fuel assemblies from research reactors • Quality assurance for the use of Type B(U)F packages • Preparation of the accompanying documents for the transportation of spent fuel assemblies from research and breeder reactors • Mechanical and shielding verification for the transportation of large components as IP2 packages
Energiewerke Nord GmbH	• Shielding and thermal design of an interim storage facility for transport and storage casks with spent fuel assemblies as well as for waste containers and large activated components • Stability verification for earthquakes and beyond-design events • Mechanical and shielding verification for the transportation of large components as IP2 packages • Radiation protection analyses for the transportation provision of HAW casks • Thermodynamic analyses of the heat removal for filling the AVR reactor pressure vessel with cellular lightweight concrete • Shielding analyses for the internal radiation protection during handling of the reactor pressure vessel • Activity analyses of the KNK research reactor biological shield including sampling plan and validation of the activation calculations • Shielding assessment of waste packages with Monte Carlo methods to validate corresponding point-kernel calculations • Assessment of conditioned waste concerning the compliance with the Konrad requirements for final disposal • Shielding design for the hot cells of the VEK vitrification plant • Characterization of the activity inventory of the VEK vitrification furnace and development of a disposal concept for plant decommissioning

Customer	Project/Service

GNS Gesellschaft für Nuklear-Service mbH	• Design of transport and storage casks for spent nuclear fuel (PWR, BWR, WWER440, WWER1000, RBMK1500, MTR, HTR, SNR) and HAW canisters for the German and the international market
	  ○ inventory
	  ○ shielding
	  ○ heat removal
	  ○ criticality safety
	  ○ activity retention
	  ○ long-term activation
	• Accompanying the licensing procedures for transportation certificates and atomic interim storage approvals for transport and storage casks

	• Shielding and thermal design of containers for waste with negligible heat generation • Characterization of operational waste concerning radiological and chemical properties, especially concerning long-term safety

	• Development of disposal strategies for the optimized use of casks
	• Planning of cask loadings and preparation of the documents for the verification of compliance with transportation and interim storage requirements
	• Assessment of final disposal concepts for spent nuclear fuel assemblies and HAW canisters concerning
	  ○ criticality safety
	  ○ shielding
	  ○ heat removal

	• Planning and supervision of experimental programs for the qualification and validation of calculation methods, e.g.
	  ○ Evaluation of post-radiation experiments with spent nuclear fuel for the validation of burn-up calculations for inventory determination as well as for the use of burn-up credit
	  ○ Radiation resistance of materials
	  ○ Physical and chemical properties of materials
	  ○ Material behaviour under dynamic loads
	• Evaluation of international benchmarks to validate calculation methods
	• Participation in national and international expert committees for the standardization and further development of regulations

Customer	Project/Service
Forschungszentrum Jülich GmbH	• Thermo-mechanical design of components for the ITER international fusion reactor • Safety analyses for storage casks and building structures under earthquake loads • Design of handling equipment for storage casks
Höfer & Bechtel	• Development of a burn-up measuring system • Criticality safety verification and shielding design for nuclear fuel handling equipment • Stability verification for components in the storage pool and on the reactor hall level of NPPs for the event of an earthquake
NUKEM Technologies GmbH	• Shielding and thermal design of a hot-cell building and on-site interim storage facilities under consideration of skyshine effects • Criticality safety analyses for the handling of intact and damaged fuel assemblies • Shielding calculations for the internal radiation protection, e.g. for a welding system for the welding of cask lids
EnBW Kernkraft GmbH **E.ON Kernkraft GmbH** **RWE Power AG** **Vattenfall Europe Nuclear Energy GmbH Hamburg**	• Disposal studies for spent fuel assemblies • Determination of the activation of reactor pressure vessel, core components and biological shield • Design of on-site interim storage facilities for storage casks with spent fuel assemblies or conditioned operational and decommissioning waste ○ Design of the (passive) heat removal ○ Shielding calculations for the internal radiation protection and the environmental impact by direct radiation, skyshine and discharges ○ Mechanical analyses for the stability safety during an earthquake and beyond-design events
NAGRA	• Burn-up calculations for fuel assemblies to determine the nuclide inventory • Calculation of neutron flux densities und spectra in the core components, reactor pressure vessel and biological shield of a PWR-NPP
TU München	• Thermo-hydraulic design of research reactor fuel assemblies • Thermal design and nuclear calculations for a Mo-99 radiation facility
VGB	• Development and supervision of an experimental program to determine the reactivity of spent PWR fuel assemblies • Evaluation of the experimental results within the scope of an international consortium

Customer	Project/Service
Wiederaufarbeitungs-anlage Karlsruhe GmbH	• Activity analyses of the KNK biological shield including sampling plan and validation of the calculations • Shielding assessment of waste packages with Monte Carlo methods to validate corresponding point-kernel calculations • Assessment of conditioned waste concerning compliance with the Konrad requirements for final disposal • Shielding design for the hot cells of the VEK vitrification plant • Radiation protection analyses for providing transportation of HAW casks • Characterization of the activity inventory of the VEK vitrification furnace and development of a disposal concept for plant decommissioning