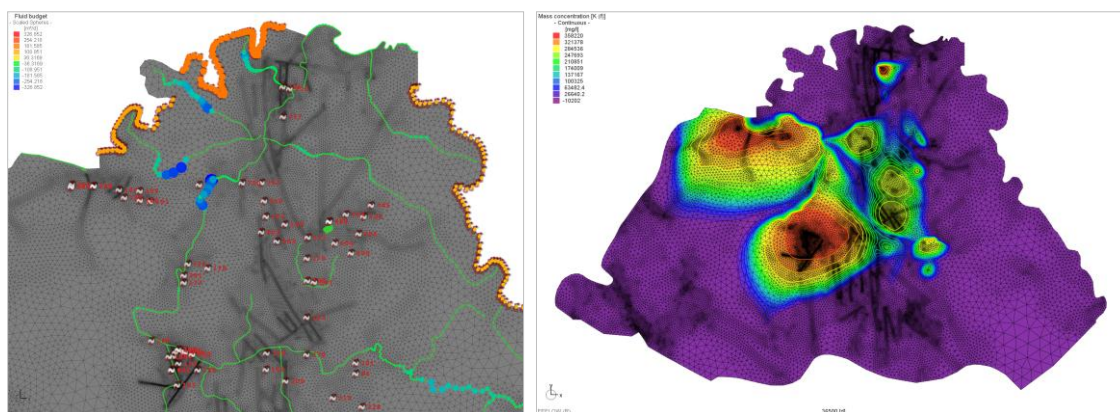


Saltwater Injection Into a Fractured Aquifer

(2007-2009)

Location	Werra-Kali region, Germany
Type of project	A density-coupled multicomponent flow and mass-transport model
Client	K+S KALI GmbH, Germany



Objective Since 1925 highly saline waters have been injected into a deep and fractured aquifer of the Zechstein geological unit in the Werra-Kali district. Groundwater levels, water levels in the river Werra, and salt concentrations in these water bodies have been monitored in the region for several decades. The aim of this project is to develop a numerical model capable of simulating the injection regime of the past 75-80 years in order to identify possible relations between the saltwater injections and the detected diffuse saltwater flows into the river Werra.

Approach A two-dimensional density-coupled flow and mass-transport FEFLOW[®] model was built to simulate the saltwater injection into the deep aquifer (Plattendolomit) of the Zechstein unit. A multicomponent approach with five different salt components and a single-component approach where the total salt concentration was treated as a single species were considered separately.

Benefit Simulation results for both the single- and the multicomponent mass-transport model agreed very well with the measured groundwater levels and the salt distribution in the project area.

The results strongly related the diffuse saltwater discharges into the river Werra to the saltwater injections in the project area.

The calibrated model can be used to evaluate the impacts of ongoing saltwater injection on the groundwater and surface-water system.