

NoScale - CHARACTERISATION OF THERMAL DEEP GROUNDWATER FOR THE PREVENTION OF SCALING AND CORROSION IN GEOTHERMAL PLANTS

Haslinger, E.¹, Goldbrunner, J.², Dietzel, M.³, Leis, A.⁴, Boch, R.³, Knauss, R.⁵, Hippler, D.³, Shirbaz, A.², Fröschl, H.⁶, Wyhlidal, S.¹, Plank, O.¹, Gold, M.² & Elster, D.¹

¹AIT Austrian Institute of Technology, Center for Energy, Tulln, Austria

²Geoteam, Technisches Büro für Hydrogeologie, Geothermie und Umwelt Ges.m.b.H, Graz, Austria

³Graz University of Technology, Institute of Applied Geosciences, Graz, Austria

⁴JR-AquaConSol, Graz, Austria

⁵Joanneum Research, Graz, Austria

⁶Seibersdorf Labor GmbH, Seibersdorf, Austria

stefan.wyhlidal@ait.ac.at

During the exploitation of thermal water for the use in a geothermal plant a series of hydrochemical reactions such as solution and precipitation processes (scaling) or corrosion processes can be caused by pressure and temperature changes and degassing of the thermal water. Operators of hydrogeothermal plants are often confronted with precipitations in water-bearing parts of their plant, such as heat exchangers and pipes, which result in considerable costs for cleaning or remediation or the use of inhibitors. In the worst case, scaling and corrosion can lead to the abandonment of the system. The effects of the fluids on the technical facilities of hydrogeothermal plants are usually difficult to predict. This applies in particular to the long-term effects in the exploitation and use as well as the aspect of the reinjection of the fluids. In publications and guides for thermal water use in Austria, it is emphasized that the hydrochemical conditions have to be checked during the operation of geothermal plants, but precise directives and thus guidance for operators as well as a scientific investigations on this topic are almost completely missing today. The aim of the research project NoScale was the assessment of deep thermal water bodies in different geological reservoirs in Austria and Bavaria and therefore different hydrochemical compositions with regard to their scaling and corrosion potential in geothermal use. In the course of parallel chemical and mineralogical laboratory investigations, conclusions were drawn about the effects of thermal water on different technical components of hydrogeothermal plants and on the other hand a data basis for the model simulation of the relevant hydrochemical processes was developed. Subsequently, on the basis of detailed hydrochemical model calculations, possible effects of the use of the thermal waters on the technical components of the geothermal plants were shown. This approach of complex process modeling, detailed laboratory studies and experimental approaches has not been followed in Austria so far. The research results contribute significantly to the increased visibility of potential risks of the exploitation and use of thermal water. Thus, the project NoScale supports the operators of hydrogeothermal plants to assess risks of scaling in corrosion already in the pre-drilling phase, which leads to a much more energy and cost efficient operation.