

Geothermal Projects in the Molasse Basin of Upper Bavaria (Interim Results and Outlook)

Numerous geothermal projects are currently in the drilling phase in the Bavarian Molasse Basin or will start within the next months. In the years 2007 to 2009, power generation projects were started in Mauerstetten, Dürnhaar, Kirchstockach and Sauerlach and successfully realized in Unterhaching. Heat generation projects were started in Garching, Poing and Oberhaching and successfully realized or expanded in Aschheim, Unterföhring and Erding. 2008 and 2009 became the years of deep hydrothermal geothermics in Bavaria. Never before were there so many deep drilling projects at so many geothermal locations at the same time, with Bavaria occupying a position of pre-



Drilling rig in Unterföhring ■



Drilling rig in Sauerlach ■



3D-seismic exploration in Bernried ■

eminence in Germany due to its particularly favorable geological location. All existing deep geothermal projects in the Molasse Basin have in common that there is no “one size fits all” for these undertakings. Each project has its own individual framework conditions and faces different kinds of challenges. So far, all projects that are aimed exclusively at heat generation have proved to be successful and most of them have proceeded virtually without major difficulties. In contrast, the technical requirements and difficulties involved in the power generation projects are much greater and more complex due to the significantly deeper boreholes, larger diameters of the development wells and high production temperatures. The financial risk of drilling for power generating projects in the Molasse is significantly greater and requires a large „war chest“ on the part of the client.

It is particularly encouraging in this context that the success predictions by the geological consulting firms proved mostly accurate and were even significantly surpassed in some cases.

This shows that with realistic concept designs the geological exploration risk in the Malm (Upper Jurassic) can be kept better predictable. It is evident that the productivity of the projects north and east of Munich has been quite excellent in most cases. Indications are emerging that there is a link between the favorable hydraulics, the relatively shallow depth of the Malm and the associated karstification. The reprocessing of existing hydrocarbon seismic surveys and the targeted use of directional drilling have become an established standard in the Malm aquifer.

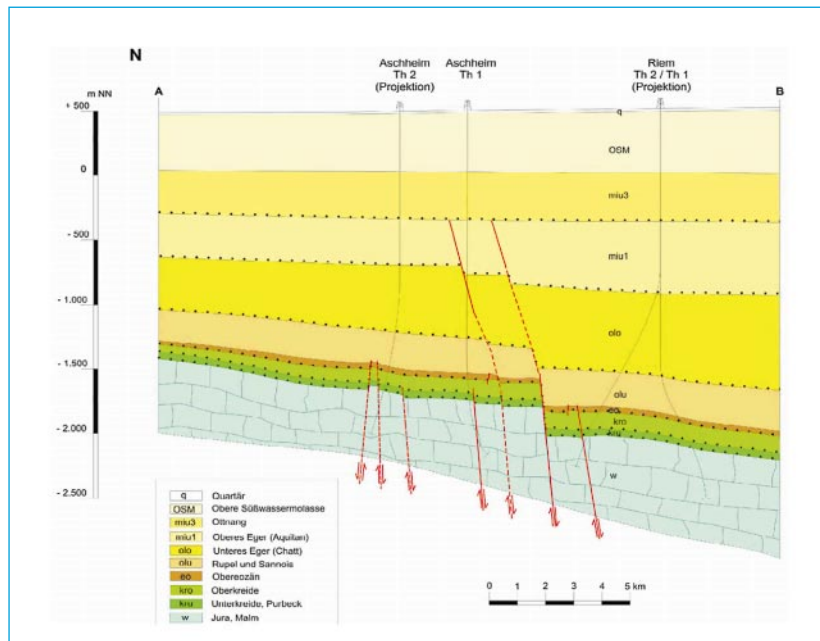
In some cases, the thermal water temperatures that were encoun-

tered south of Munich were higher than predicted. It is particularly encouraging to see that the mineralization of the waters generally does not appear to increase in a southerly direction, despite the greater depth of the Malm. When comparing the water mineralization of the projects Pullach, Sauerlach and Dürrenhaar it becomes apparent that the thermal water mineralization of the more southern locations is in fact lower in some cases. These new insights confirm the scientific notions of a functioning deep groundwater circulation system south of Munich. Accordingly, the fault zones and the facies of the Malm are playing very decisive roles in the mechanism of underground movement of thermal water, which is being explored further on a continuing basis with new 2-D and 3-D seismic surveys by the various concessionaires. In spite of the remarkable increase in knowledge many questions regarding the deep groundwater movements in large areas around Munich remain unanswered. It is hoped that significant new insights will be gained from the newly initiated research projects in the greater Munich area during the coming years.

The general low mineralization of the thermal water is of crucial importance for the subsequent



Pump test in Dürrenhaar ■



Geological section with geothermal facilities in Aschheim and in the trade-fair town Riem ■

production and reinjection operations. The relatively low precipitation tendency of the water during the reinjection process



Casing covered with ice (final cool-down before things heat up!) ■

guarantees a trouble-free operation of the equipment for many years and is an invaluable advantage over geothermal facilities in the Upper Rhine Graben or in North Germany. The long-time experience with present geothermal Malm doublets in East Bavaria and Austria confirms these observations and gives reason to great optimism in connection with the current results in the greater Munich area.

In the future, hydraulic and hydrochemical monitoring of already running geothermal facilities will take on much greater significance.

The necessity for this is based on the increasing spatial proximity of the facilities and the associated hydraulic interactions, as well as on the need for answers to questions regarding reservoir development and preservation and corrosion prevention. ■

Authors:



Dipl. Geol. Dr. Achim Schubert
CEO



Dipl.-Geol. Dr. Klaus Dorsch

ERDWERK GmbH
hydrogeologie geothermie

Bonner Platz 1
80803 München/Germany
Phone: +49-(0)89 961 600 3 00
E-mail: office@erdwerk.com
www.erdwerk.com