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Down the hole hammer drilling technologies: status and future development

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See contribution of E. BUSCHER "Geothermal Development and Activities in Germany" (in replacement of W. WITTIG)

Geothermal resources tend to be found in deeper and harder geologic formations than typical hydrocarbon reservoirs. Therefore, drilling technologies from the oil & gas field need to be improved constantly to make for more efficient, economic drilling. Yet today drilling cost are the largest factor in any geothermal project.

One innovation over the past ten plus years has been the development of downhole fluid hammer systems at GZB in Bochum and elsewhere worldwide for geothermal, hydrocarbon, and mining applications. These tools, commonly powered with compressed air for shallow (< 400 m) drilling, have shown and proven to increase ROP in the order of tenfold over conventional drilling methods based on tricone or PDC bits.

However, several disadvantages of these hydraulic, DTH water hammer systems do hold back their widespread use so far. Main hindrances are e.g. the required water quality of almost clean tap water, missing recirculation systems and thus, no possibility of using drill mud additives for borehole control and improved flushing capabilities. With new hydraulic hammer systems being developed in Bochum and gradually coming onto the market, some of these problems have been addressed or even solved by now, also pushing their drilling applications further down to 5.000 m.

Drilling methods for shallow and deep geothermal applications will be discussed, with the focus on DTH water hammers including case studies, recirculation and recycling systems, DTH mud hammers. Furthermore, DTH fluid hammers do make for an excellent logging tool, being used as a good noise source for seismic-while-drilling (SWD) logs and measurements. These greatly help predict and find good geothermal reservoirs as well as reducing drilling risks.

Thus, the DTH mud hammer drilling technology will greatly help the geothermal industry to make their drilling efforts far more economic, especially but not exclusively in deep, hard rock drilling situations.

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Figure 1: E. BUSCHER FOR W. WITTIG

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