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Hydraulic Soft Stimulation Treatment of Well RV-43 in October 2019 in Reykjavik

Reykjavik is almost entirely heated by geothermal energy. Yet, the recent growth of the city significantly increased heat demand. Past experiences in Iceland's capital region showed that hydraulic stimulation of existing geothermal wells is suited to improve hydraulic performance and energy supply. However, a fluid injection may also trigger felt or even damaging earthquakes, which are of concern in populated areas and pose a significant risk to stimulation operations. Consequently, soft stimulation concepts have been developed to increase geothermal well performance while minimizing environmental effects such as induced seismicity. In a demonstration project of hydraulic soft stimulation in October 2019, more than 20.000 m³ of water were injected into well RV-43 in Reykjavik in multiple stages and with different injection schemes. The hydraulic performance of the well was improved without inducing felt seismicity. An a priori seismic risk assessment was conducted, and for the first time, the risk was continuously updated by an adaptive traffic light system supported by a sophisticated real-time microseismic monitoring. Our results suggest that it is possible to improve the performance of geothermal wells in Reykjavik and worldwide with acceptable technical, economic, and environmental risks.

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