

Turbidity Challenges and Water Quality Management in the Grábrókarveita Drinking Water Utility, Iceland, in times of Seismic Unrest and Climate Change

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Abstract

Veitur Utilities operate the Grábrókarveita utility which supplies drinking water for residents in the Borgarfjörður region in SW-Iceland. The utility extracts water from the porous and permeable 3200 years old Holocene lava flow known as Grábrókarhraun, which naturally filters water from the Hreðavatn lake and local precipitation. Commissioned in 2007, the utility's average annual production from the aquifer has been around 30 L/s. There are two active production wells in the lava field and numerous research wells.

Despite generally meeting drinking water requirements, turbidity in produced water from the aquifer has been a challenge since the commissioning of the utility. The material is very fine grained, has a strong color and appropriate filters that can handle the grainsize and fluctuations in material load have been difficult to find. Presently, the water undergoes filtration through 10 µm filters followed by UV disinfection.

The utilization history has shed light on the characteristics of the turbidity behaviour. The turbidity levels increase notably during precipitation events, when flow is increased, when pumps are started and during seismic activity, even as far as in North Iceland. Intense seismic unrest started on the Reykjanes Peninsula, SW-Iceland, in the beginning of 2020. Since then, this unrest has caused numerous turbidity spikes in the Grábrókarhraun aquifer. It is expected that this unrest period will last for the next decades to centuries. This, coupled with potential climate change impacts exacerbating precipitation intensity, underscores that turbidity will continue to be a challenge in Grábrókarhraun.

This is motivating Veitur to look into further possibilities to improve water quality in the utility. This could include increased filtering, further operational scheme refinements or exploring new water sources.

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