

## Detail scale *in situ* fracture modelling of excavation damage zone

KOITTOLA NOORA<sup>1</sup> MUSTONEN SANNA<sup>1</sup> OLSSON MATS<sup>2</sup>

<sup>1</sup>Posiva Oy, Olkiluoto, 27160 Eurajoki, Finland, noora.koittola@posiva.fi

<sup>2</sup>EDZ Consulting, Isbergsvägen 38, 125 55 Älvsjö, Sweden

Posiva Oy is responsible of implementing the final disposal programme for spent nuclear fuel of its owners TVO and Fortum Power & Heat. Within the geological concept of final disposal, knowledge of the properties and limitations of surrounding rock are on high importance for long term safety analysis. For example excavation damage zone (EDZ) studies in ONKALO research tunnel are part of this long term safety analysis

As a part of these EDZ studies, a detail scale *in situ* fracture model has been created. A specific area from ONKALO has selected for EDZ Study Area and from this area, totally four ca. 1m<sup>2</sup> rock blocks were wire sawed and lifted from tunnel floor. These rock blocks were sliced ca. 10 cm rock slices and these rock surfaces were covered with penetrant, photographed and measured with tacheometer. With this data, rock slice photographs were transferred to 3D form with Geovia Surpac software.

From each rock slice, visible fractures were digitized and characterized in four categories: 1) Excavation induced fractures, 2) Natural fractures 3) Natural fractures opened by excavation and 4) Horizontal, possibly stress induced, fracture. After digitizing, fracture strings were started to combine between the rock slices to create fracture planes of the area. The result was an exact fracture pattern model of the wire sawed area.

The key results of this study was the actual *in situ* fracture model and also recognize the areas were locates most of the excavation induced fractures. Based on the model, most of the EDZ fractures locate close to round ends. It was also possible to detect that EDZ fractures themselves don't form a continuous planes in the tunnel floor but they do connect to natural fracture network.

### References:

- Olsson, M., Koittola, N. & Mustonen, S. 2015. Block Sawing Experiment in EDZ Study Area in ONK-TKU-3620. Working Report 2015-31. Posiva Oy, Eurajoki
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