



## Fractures in Granite: Results from United Downs Deep Geothermal well UD-1

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The geothermal potential of the granites of SW England has long been known. The first significant exploration of the resource was in the Carnmenellis Granite under the 'Hot Dry Rock (HDR) Project' during the 80's and early 90's. Following completion of the HDR project there was little further exploration in the area for geothermal power generation. Recently however, development of the United Downs Deep Geothermal Power (UDDGP) project marks a significant leap forward, and this aims to be the first commercial project to explore deep geothermal power generation in SW England.

The UDDGP project targets the Porthtowan Fault zone, a regional scale NW to NNW striking strike-slip fault that is inferred to transect the NE margin of the Carnmenellis Granite. Two directional wells were drilled to intersect this fault zone, maximising the surface area of the fault exposed. A production well with a measured depth of 5275 m true vertical depth of 5054 m and an injection well vertically above the production well at a measured depth of 2393 m and a true vertical depth of 2214 m. A full suite of geophysical wireline logs were collected for the production well, including borehole image logs from 900 mMD to 5160 mMD (900 - 4097mTVD).

Interpretation of the borehole imaging across the 4260 m identified a total of 12031 discontinuities. The features were classified using a simple schema and provide new insights into the complex nature of faulting and fracturing within the Granite. Stress field indicators including Borehole Breakouts and Drilling Induced Tensile Fractures (DIFs) were also interpreted.

The orientations of the borehole breakouts and DIFs are consistent and are comparable to previous measurements in the region and the regional stress field, indicating the direction of maximum compression is, approximately horizontal trending towards 320°.

The data show variable fracture density along the imaged section of the well with the maximum

density tentatively associated with discrete fault zones. At least 3 fracture sets are identified with the largest concentration of fractures approximately parallel to inferred Porthtowan Fault Zone, suggesting UD-1 intersected the target fault zone. Key fracture attributes are explored and discussed including orientation, spacing, intensity, and spatial correlation.