

**Altered basement rocks as sediment source and oil reservoir - the southern Utsira High, Norwegian North Sea**

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The Utsira High is an intra-basinal structural high forming the eastern flank of the South Viking Graben. The Utsira is a granitic basement high located about two kilometers below the seafloor in the Norwegian North Sea. In Mid-Triassic the high was sub-aerially exposed and resulting in deep weathering of the crystalline rocks. From early Cretaceous until recent, the entire Utsira High has been submerged and covered by shallow-marine successions.

During the last few years four substantial oil discoveries have been made on and around the southern part of the Utsira high with Lundin Norway as operator; Johan Sverdrup (PL501/PL265), Edvard Grieg (Luno and Tellus, PL338), and Luno 2 (PL359).

For the first time on the Norwegian Continental Shelf, altered and fractured basement rocks have proven to act as sediment source, reservoirs and possible migration pathways for commercial hydrocarbon deposits. Following recent discoveries on the Utsira High (e.g. Edvard Grieg field), moderate reservoir properties have been observed in parts of the altered basement underlying Cretaceous oil reservoir rocks.

Hydrocarbon exploration wells drilled into the basement have encountered Silurian and Ordovician granites. On the western Utsira High the Silurian granites and caldera volcanics as well as minor Ordovician granites are the clastic source of non-marine Triassic sediments that make up the main oil reservoir of the Edvard Grieg field. In addition several wells in the area have encountered hydrocarbons in weathered and fractured granites. In well 16/1-15 (Tellus) a full scale test was perforated in the fractured and weathered basement interval, producing 650 BOPD (Barrels of oil per day).

A well-developed weathering profile was identified in cores from well 16/1-15; expressed as an upwards increase in degree of basement disintegration accompanied by a parallel increase in the amount of clay minerals.