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Reservoir Description Challenges of the Haltenbanken Hydrocarbon Fields (Mid Norway)

Production from the Halten Terrace province (Mid-Norwegian shelf) is mainly from siliciclastic successions deposited in Lower Jurassic shallow marine environments. These comprise both relatively homogeneous sands (such as the Garn and Tofte Formations) and more heterogeneous packages formed by an intercalation of mudstone, siltstone, and sandstone (such as the Tilje and Ile Formations). The eight hydrocarbon fields currently on production reach a total production level of ca. 840 thousand barrels of equivalent oil per day.

This presentation gives an overview of the reservoir description challenges of the Haltenbanken hydrocarbon fields. We focus on two main types of reservoir heterogeneity. Firstly, sedimentological heterogeneities are formed by shale and silt layers of various thickness and lateral extent depending on their origin. They were deposited in tide-influence or -dominated deltaic and estuarine environments along the margin of a shallow seaway. Mudstone layers occur at thicknesses ranging from centimeters to meters, and have lateral extensions ranging from several meters to tens of kilometers. Stratigraphic reservoir compartmentalisation is therefore an important issue during modelling and fluid flow studies, but smaller-scale anisotropy is also often a critical factor. Secondly, diagenetic patterns are important in the deeply buried reservoirs such as in the Åsgard and Kristin Fields where burial depths of up to 4.9 km occur. Grain coatings (chlorite, illite/chlorite, illite) have prevented the development of quartz overgrowths and contributed to the preservation of anomalously high porosity. In addition to sedimentary and diagenetic controls, the impact of faults has to be taken into account. We illustrate the challenges and current solutions using several examples of well data, reservoir models, and production data.