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## Abstract

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## **North Sea Chalk: 40 Years of Production at Ekofisk Field from a Rock Some Said Would Never Flow Oil**

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Chalk is deposited by pelagic settling of algal and foraminiferal skeletons, and subsequently modified by re-sedimentation in slumps, debris flows and turbidites. It is an improbable reservoir rock characterized by high porosity (25-45%) but low matrix permeability (typically < 1mD). Effective permeability due to fractures contributes significantly to flow.

Ekofisk field, in the Norwegian North Sea, is approaching 40 years of production from the chalk, and has many years of economic life remaining. Technological advances – including 3D and 4D seismic, the world's largest offshore waterflood, monitoring and

mitigating reservoir compaction and sea-floor subsidence, and creative design and geosteering of long-reach and multi-lateral wells – have extended field life, increased ultimate recovery, and restored daily production to rates not seen since the 1970s.

Ongoing studies by the license partners facilitate effective management of the chalk reservoir, and aid in planning new wells in a field containing >300 existing wellbores, >400 mapped faults, an expanding waterflood, a dynamically deforming overburden, and a challenging matrix which many geoscientists and engineers initially dismissed as non-productive.

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# Charles T. Feazel

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## Education:

Bachelors, Ohio Wesleyan University  
Masters, The Johns Hopkins University  
PhD, The Johns Hopkins University

## Experience:

1975-present: ConocoPhillips (formerly Phillips Petroleum Co.). Research geologist; research supervisor; chief geologist for interpretation technology; director of onshore US development; director of development and operations, Phillips Norway; worldwide carbonate advisor; manager of reservoir characterization; principal carbonate stratigrapher.

## Publications and Awards:

ConocoPhillips Outstanding Mentor award, 2006  
Feazel, C. T., A. P. Byrnes, J. W. Honefenger, R. J. Leibrecht, R. G. Loucks, S. McCants, and A. H. Saller, 2004, Carbonate reservoir characterization and simulation: from facies to flow units: AAPG Bull. 88, 11, p.1467-1470.  
Carr, T. R., E. P. Mason, and C. T. Feazel, eds., 2003, Horizontal Wells: Focus on the Reservoir: AAPG Methods in Exploration Series 14, 270 p.  
Feazel, C. T., and H. H. Nielsen, 2003, Reservoir characterization, well planning, and geosteering in the redevelopment of Ekofisk Field, North Sea: in Carr, T. R., E. P. Mason, and C. T. Feazel, eds., Horizontal Wells: Focus on the Reservoir: AAPG Methods in Exploration Series 14, p.163-172.

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Feazel, C. T., and H. E. Farrell, 1988, Chalk from the Ekofisk Area, North Sea: nanofossils + micropores = giant fields: in A. J. Lomando and P. M. Harris, eds., Giant Oil and Gas Fields: A Core Workshop: SEPM Core Workshop 12, p.155-178.

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Schatzinger, R. A., C. T. Feazel, and W. E. Henry, 1985, Evidence of re sedimentation in chalk from the Central Graben, North Sea: in P. D. Crevello and P. M. Harris, eds., Deep-Water Carbonates: Buildups, Turbidites, Debris Flows and Chalks: SEPM Core Workshop 6, p.342-385.

## Professional Interests:

Carbonate deposition, diagenesis and reservoir quality  
Petroleum exploration and production