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## Paleoenvironments and Reservoir Quality of the Norphlet Formation, Southeastern Alabama

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### ABSTRACT

The Jurassic Norphlet Formation has been a major reservoir target for decades, with several well-tested fields in the Gulf Coast, particularly in Mississippi, Alabama, and Florida. Recent major discoveries offshore in the eastern Gulf of Mexico, notably the >500 MMBOE Shell Appomattox Field, have spurred renewed interest in this extensive eolian unit. The Norphlet Formation was deposited in an arid continental setting characterized by dryland/fluvial environments as the Gulf of Mexico opened. Dryland/fluvial environments include facies with distinct sedimentary features and reservoir properties; among these facies are grainflow, wind ripple, interdune, and the marine reworked facies that formed during transgression of the Smackover carbonate shelf, which produces the source and seal for the Norphlet reservoir. Here we evaluate how paleoenvironments vary onshore in the Conecuh Sub-Basin of southern Alabama using an integrated core lithofacies and well petrofacies characterization scheme. By evaluating environments of deposition and constructing novel, multi-proxy geochemical datasets from legacy cores at the Geological Survey of Alabama, the reservoir quality of related sedimentary facies in the Conecuh Sub-Basin will be characterized regionally and across scales. Core description, pseudo-gamma logs from scintillometer measurements, finely sampled elemental composition from handheld X-ray fluorescence and laser-induction breakdown spectroscopy devices, laser particle size from a Malvern Mastersizer 3000, and microfabrics from thin section analysis are integrated to characterize depositional facies and associated reservoir properties in 9 cores from Escambia County, Alabama. These data are integrated with well logs to interpret large scale paleoenvironmental changes with topography, the water table, and time. The ultimate goal is to better understand facies and reservoir quality distribution in the Norphlet Formation of the onshore Alabama play, which may ultimately aid in the prediction of reservoir quality in expensive offshore plays, especially in underexplored areas such as the recently opened Campeche margin.