

# Subsalt Hydrocarbon Potential Mesozoic Synrift and Post-Rift Rocks: New York, New Jersey, and U.S. East Coast Offshore

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## Abstract

Recent ultra-deep exploration successes have reduced the risk reward ratios associated to prospect viability. The successful deep wells in the Gulf of Mexico target salt structures deeper than 7000 meters, are in the proximity of the Smackover hydrocarbon rich source rocks to the Norphlet sandstone reservoirs. The presence of significant hydrocarbons and reservoir quality rocks at these depths has opened up the possibility of other deep plays in frontier areas, such as the offshore New York and New Jersey, US East Coast Hydrocarbon exploration off the coast of New York and New Jersey during the 1980's targeted Upper Jurassic and younger clastics and carbonates of 32 exploratory wells that were drilled only five had encountered hydrocarbon shows or non-commercial quantities of gas condensates and dry gas. The most significant finds were within Kimmeridgian and Oxfordian Sandstone units in the prograding coastal plain and transitional marine deposits, Jurassic to Early Cretaceous carbonate shelf edge wells encountered no hydrocarbons; highly mature organic source rocks were never identified in any of the wells drilled anywhere. Reinterpretation of gas condensate from the Hudson River Canyon suggests a deeper Lower Jurassic source. Analysis in using the enrichment of diamondoids and Carbon-13 from condensate suggests the condensates originated at a depth greater than six kilometers. The thermal maturation profile model (Shell 273-1 well) indicates the Jurassic age sediments entered the early oil phase at a depth of about 2500 meters and the main gas generation window to a depth of 5000 meters. Gas generation in Early to Middle Jurassic sediments continued through the Cenozoic. Sediments younger than

Early Cretaceous are not thermally mature, fitting the observed field data. In ultra-deep reservoirs the maturation of organic rich source rocks simultaneously occurs with mesogenic diagenesis and creates dolomitized reservoirs at depth. The Houston Oil Minerals 676 well encountered salt at a depth of 3800 meters on the eastern flank of the Schlee Dome. Reprocessed seismic data (AVO analysis) indicate reflectors typical of widespread salt layers deposited during the Early Jurassic (60 meters thick, 40 kilometers wide and 250 kilometers long) suggesting arid and restricted (anoxic) depositional climatic conditions in the Early Jurassic, cultivating an excellent hydrocarbon source rock environment and provide seals for hydrocarbon entrapment. A new exploration strategy should focus on deeper sections of the Lower and Middle Jurassic closer to mature source rocks and less migration dependent, at depths, much greater than previously drilled in the 1980s. An Isopach map of probable Triassic and Jurassic age rocks indicates that a significant area of Jurassic sediments, are buried greater than six kilometers and remains untested.