

# DSDP 603B and BR 93-1: examination of clues to the possible presence of petroleum system(s) in the USA Central Atlantic OCS

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Deep Sea Drilling Project (DSDP) 603B drilled during 1983 in 15 201 ft. (4633 m) of water about 270 mi (440 km) east of Cape Hatteras, NC, reached a total depth (TD) of 20 402 ft. (6218 m) in Early Cretaceous (EK) Berriasian marl and limestone. It encountered thin, variable, immature source rocks of Late Cretaceous (LK) and EK age with total organic carbon (TOC) content of 0.57–20.4%. Maturation pathways indicate Types II/II–III and III kerogens. An EK (Valanginian–Barremian age) turbidite ~980 ft. (299 m) thick, 45% being siltstone and sandstone, topped by ~130 ft. (39 m) of clean, uncemented sands of ?Barremian–Aptian age deposited in a lowermost slope–abyssal setting was encountered. Heavy mineral analysis suggests a Central Appalachian provenance.

In 1984, Shell *et al.* drilled Baltimore Rise (BR) 93-1 well approximately 265 mi (430 km) northwest of DSDP 603B (ca. 80 mi / 130 km east of the Maryland coast). Targeting a large, faulted structure of the Gemini Fault System, in 5017 ft. (1529 m) of water, the well reached a TD of 17 740 ft. (5407 m) in EK Valanginian–Berriasian limestones and shales. TOCs in the oil window, below 13 700 ft. (4175 m), were 0.15–2.19%, averaging 1.3%. Types III (gas-prone) and IV (inert) kerogens dominate. There were no significant hydrocarbon shows. Modelling indicates little hydrocarbon generation/expulsion. Anticipated shelf-margin delta reservoir sandstones updip from the turbidites in DSDP 603B were not encountered. BR 93-1 penetrated ~6234 ft. (1900 m) of Barremian shale interbedded with thin limestones and siltstones. These strata were primarily deposited in shallow (inner shelf, <100 ft. / 30 m) paleowater depths (WDs), although some paleo suggests deep outer shelf WDs of ~600 ft. / 182 m. The low petroleum potential of the thermally mature kerogens in the Cretaceous shales and marls of BR 93-1, and the lack of reservoirs resulted in a dry hole.

Between BR 93-1 and DSDP 603B, heat flow and sediment thickness isopachs suggest mature source rocks may occur. EK paleoslope and basin-floor channels, conduits for sediment transport to the area of DSDP 603B can be interpreted on the single, strike-oriented seismic line between the wells. Seismically well-imaged paleoslope channels occur farther northeast. The possible existence of source and reservoir suggest petroleum system(s) may occur in this large, unexplored area. The BOEM recognized this potential, delineating the Cenozoic–Cretaceous and Jurassic Paleo-Slope Siliciclastic Core and Extension Assessment Units, with total mean undiscovered technically recoverable resources of approximately 5.6 billion barrels of oil equivalent.