# DEPOSITIONAL SYSTEMS IN THE NACATOCH SAND (UPPER CRETACEOUS) EAST TEXAS BASIN AND SOUTHWEST ARKANSAS[1]

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## EXTENDED ABSTRACT

The Nacatoch Sand, the middle formation of the Navarro Group, consists of marine sandstones and mudstones derived largely from a source area to the north and northeast of the east Texas embayment. Terrigenous clastics were supplied to the Nacatoch basin by two major dispersal systems: 1) a bifurcating northwestern and northern system in southern Hunt and southern Delta Counties, and 2) a northeastern system originating in southwestern Arkansas.

Five facies are recognized in surface exposures of southwestern Arkansas: tidal flat, tidal channel, tidal inlet association, shoreface, and shelf facies. In northeast Texas, a deltaic sequence is recognized in south central Hunt County, and shelf sandstones and mudstones are present in Navarro and Kaufman Counties. The lateral association of deltaic-influenced deposits and tidal flat sequences together with the type, scale, and distribution pattern of inferred tide-produced structures, suggests that mesotides (6-12 ft; 2-4 m) were operative in the east Texas and north Louisiana embayments during deposition of the Nacatoch Sand.

Nacatoch sands in the east Texas basin are restricted to the northern and western parts of the basin. Dominant trend of sandstone bodies is northeast-southwest in the northern part of the basin and north-south along the western margin. In the southern half of the basin the Nacatoch interval is represented by mudstones.

Within the subsurface of the east Texas basin the Nacatoch Sand can generally be subdivided into nearshore and offshore deposits. Nearshore sequences include deltaic deposits of the northwestern part of the basin located downdip from surface exposures of the same facies. Two net sand highs, oriented normal to the outcrop belt, extend into the basin. Orientation of these sandstone bodies changes abruptly to become coincident with the dominant northeast-southwest trend, suggesting that the deltaic complex was dominated by marine processes. It is possible that nearshore depositional features is interdeltaic areas included short barrier islands, broad tidal inlets with associated tidal delta sequences, and tidal flat deposits.

Sand bodies in the offshore facies are elongate, exhibit gradational lower boundaries and abrupt upper contacts, and grade laterally into muddy sands and mudstones. Sands comprising these depositional sequences are well sorted, calcitic, glauconitic, fine-to medium-grained, and contain shell fragments. These sandstone bodies are interpreted to be offshore bars (the geometry of which resulted primarily from tidal current processes).

Tectonism, coincident with deposition, locally controlled sandstone distribution patterns. Development of rim synclines concomitant with salt dome growth exerted considerable effect upon the thickness and distribution of the Nacatoch Sand, for example, the thick section around Hainesville salt dome in Wood County. Other piercement domes with salt withdrawal basins that were active during Nacatoch deposition are Steen, Mt. Sylvan, East Tyler, Brook, and Bethel.

Because of the lack of well developed sands in the Nacatoch interval in the southern part of the east Texas basin, this sand is not considered a threat to the hydrologic integrity of salt domes presently being investigated for nuclear waste repositories in the southern part of the basin.

Nacatoch sandstones in the east Texas basin are significant shallow oil and gas reservoirs. Production of hydrocarbons from the Nacatoch is restricted to the shelf-sand facies. Hydrocarbon occurrence is perhaps more a function of structural closure than depositional facies. Hydrocarbon production is associated with the Van salt dome in Van Zandt County and coincident with the Mexia fault system trend along the western margin of the basin.

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