

## EUGENE ISLAND BLOCK 330 FIELD, OFFSHORE LOUISIANA: GEOCHEMICAL EVIDENCE FOR ACTIVE HYDROCARBON RECHARGING

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### ABSTRACT

The Eugene Island Block 330 field is a faulted rollover anticline located on the downthrown side of a large growth fault. Since 1972, the field has produced more than 250 million barrels of liquids and 1.2 TCF of gas from 25 Pleistocene sands comprising more than 100 separate reservoirs. Recent geochemical investigations document short-term changes in reservoir fluid composition which provide insight into a variety of dynamic processes affecting these reservoirs.

Oils in the EI-330 field represent a single genetic family that has undergone significant vertical migration from a deeply buried Paleogene or Cretaceous source. Analysis of oils from all producing wells in Block 330 reveals a wide range of molecular compositions that appear to be related to secondary migration and post-accumulation processes. Some of these differences closely reflect geologic structure and serve to independently define the lateral and vertical continuity of individual reservoirs.

Comparison of oils from the same wells collected four years apart show 1) the continuing biodegradation of oils in shallow reservoirs, and 2) a pronounced increase in gaseous hydrocarbons relative to gasoline-range components. The maturity of these isotopically heavy gasses is considerably greater than that of the oils, suggesting an origin from depths approaching or exceeding 20,000 feet. This movement of gaseous petroleum through oil-filled structures has preferentially removed lower molecular weight components from deeper reservoirs, decreasing the gasoline-range fraction and API gravity of the residual oils. These observations suggest that hydrocarbon migration is occurring at the present-day and is associated with the major growth fault bounding the field on the north and east sides.