

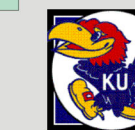
Abstract

Lower Pennsylvanian Morrow sandstone in southwestern Kansas have produced hydrocarbons for more than sixty years, and are still active targets for exploration and development. The Morrow sandstone was deposited across the Hugoton embayment, a shelf extension of the Anadarko Basin, as a series of five depositional sequences above a pre-Pennsylvanian regional unconformity. A large database of wireline logs and cores was used to establish a regional sequence-stratigraphic framework. Three depositional sequences associated with incised valleys are recognized (IV-1, IV-2, and IV-3). Incised valleys are oriented north-south, extend for 60 to 90 km, and range from 30 to 60 km wide. Each sequence is infilled with up to 40 meters of sediments, which thicken southward. Depositional systems composed of fluvial, estuarine and shallow marine lithofacies fill each incised valley. In older incised valleys (IV-1 and IV-2) estuarine facies predominate in a northward direction, while nearshore marine facies increase in the opposite direction. The youngest incised valley (IV-3) is predominantly estuarine. In the north part of the study area, and within depositional sequence 4, a carbonate buildup is characterized by numerous shoaling upward parasequences of open marine subtidal, minor siliciclastic (nearshore marine and estuarine) and paleosol facies. The carbonate buildup is up to 40 meters thick, and covers an area 40 km wide and 120 km long.

Reservoir quality in Morrow sequences is dependent on location within an incised valley complex. An enhanced understanding of depositional environments and stratigraphy of the Morrow sandstone can contribute to improved exploration and development.

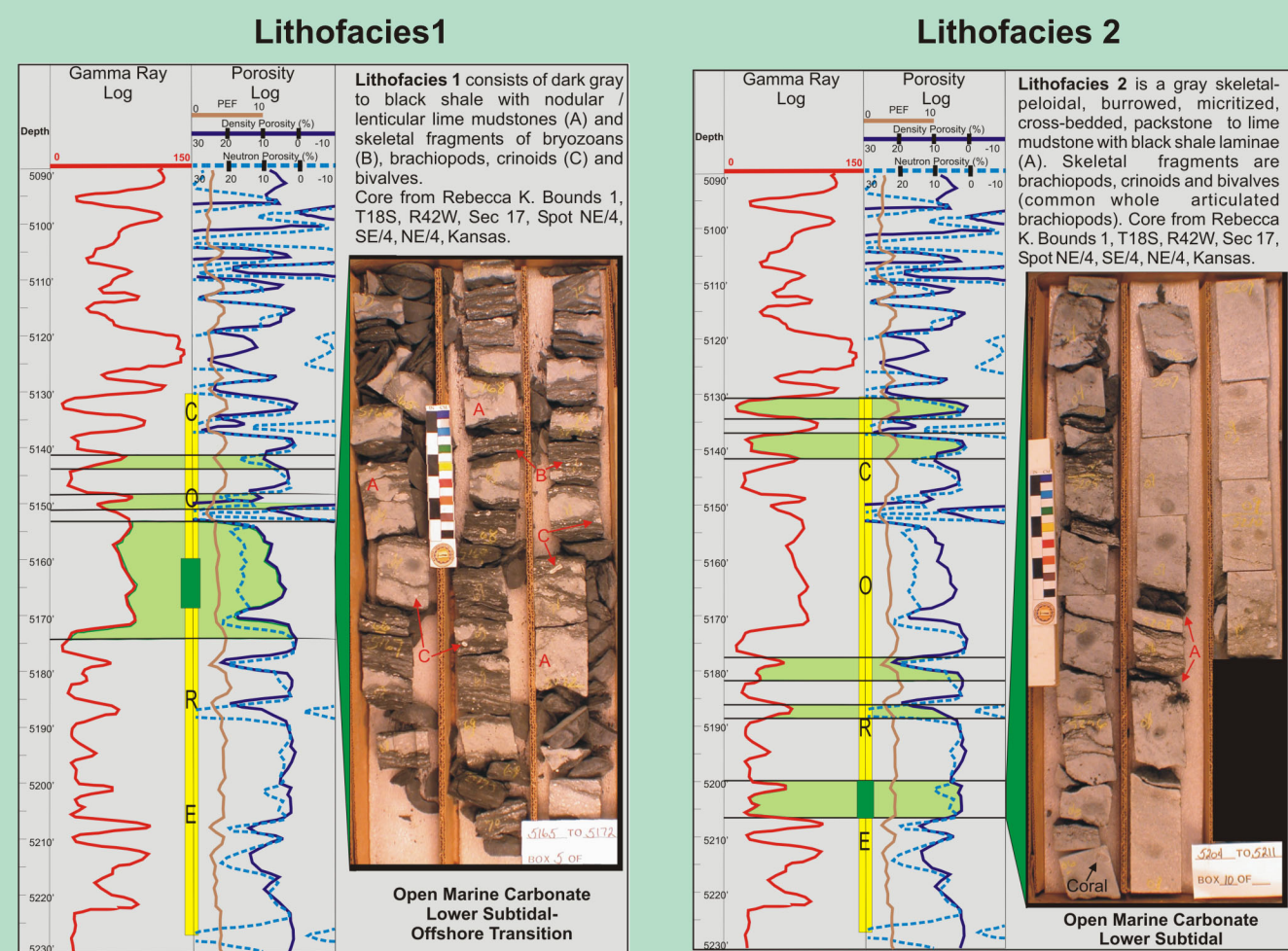
Depositional Environments of Lower Pennsylvanian Reservoir Sandstones, Southwestern Kansas

Galo A. Salcedo, Kansas Geological Survey, The University of Kansas.

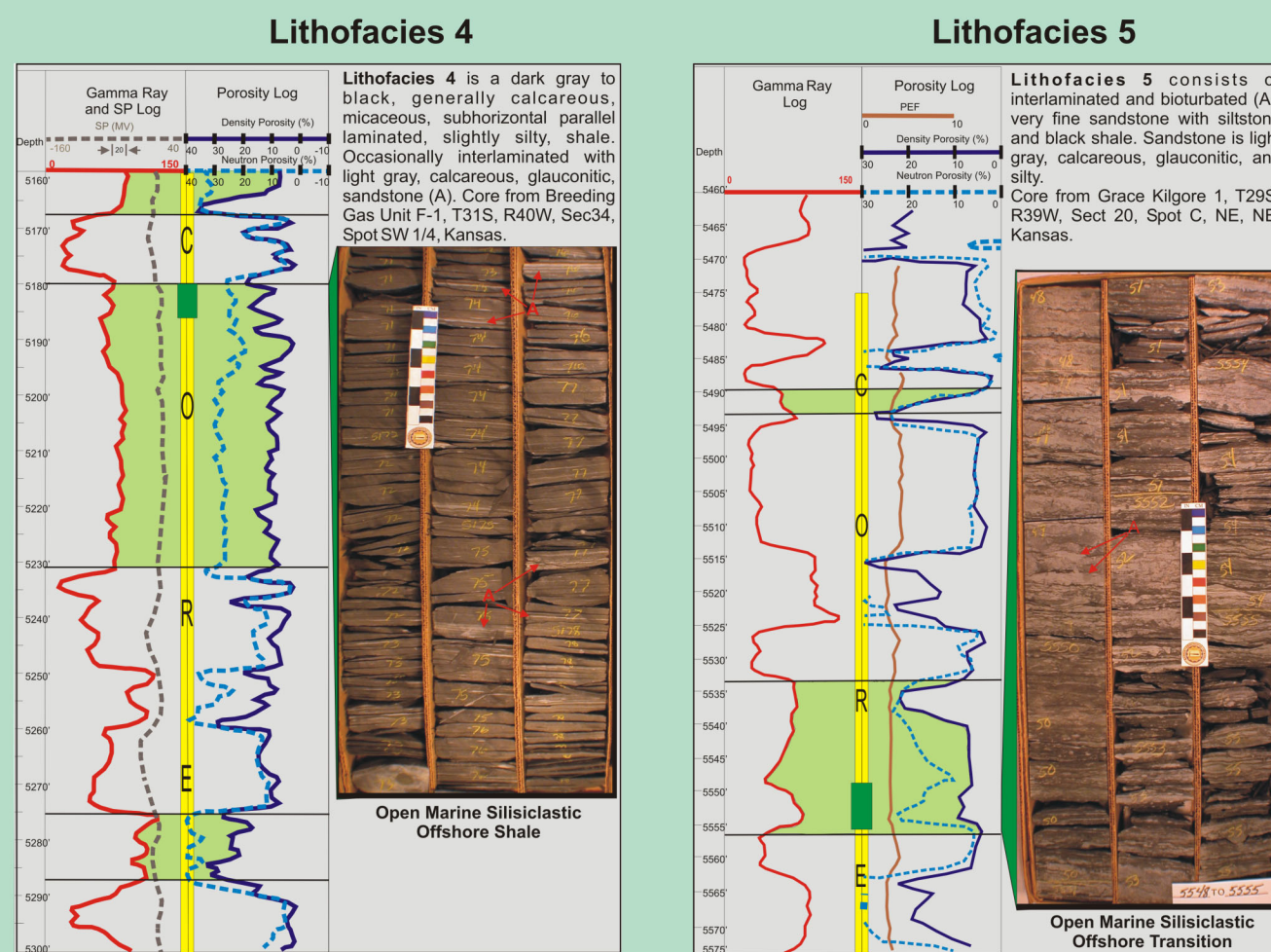


Morrow Lithofacies and Petrofacies

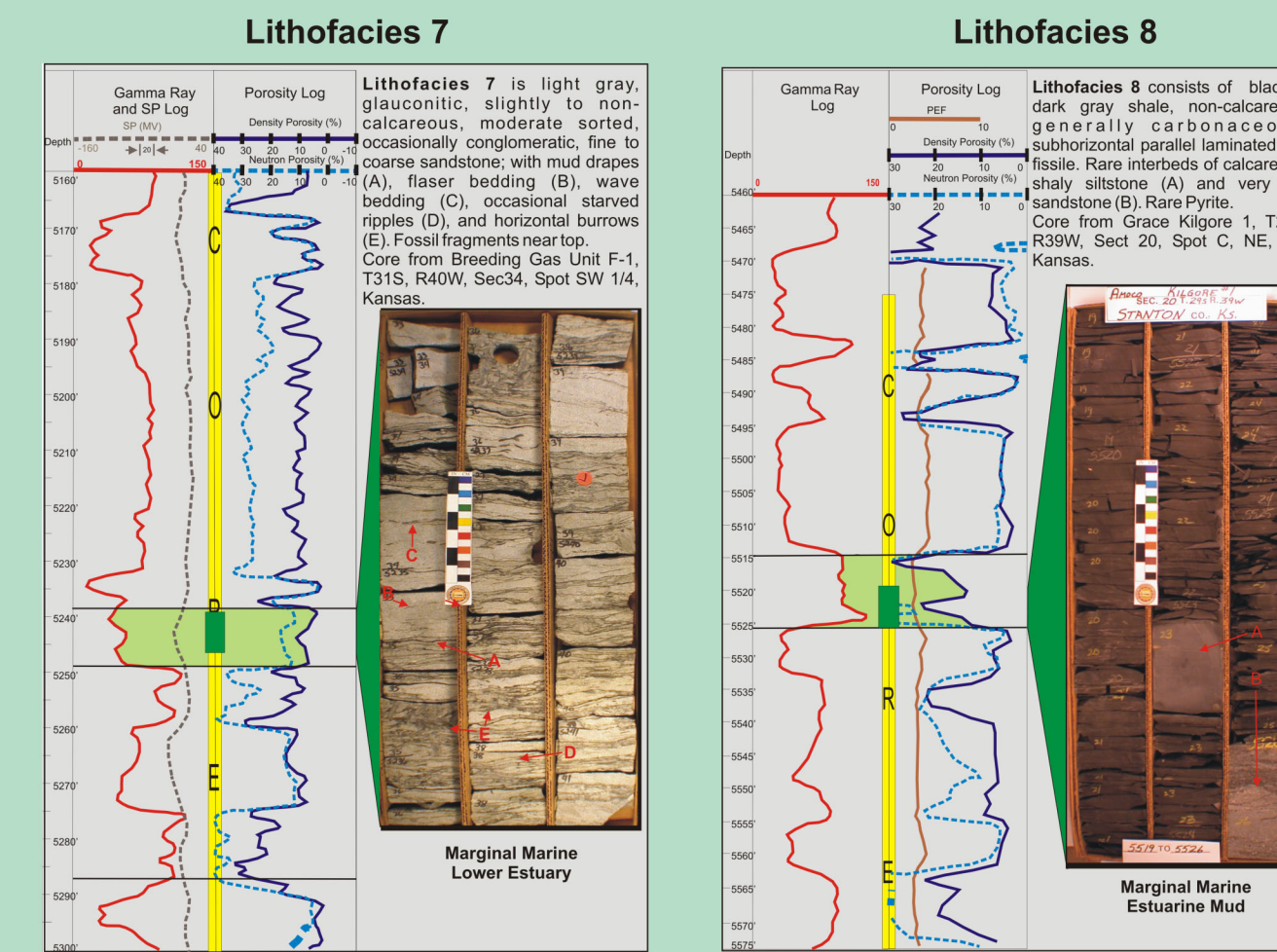
Open Marine Carbonate



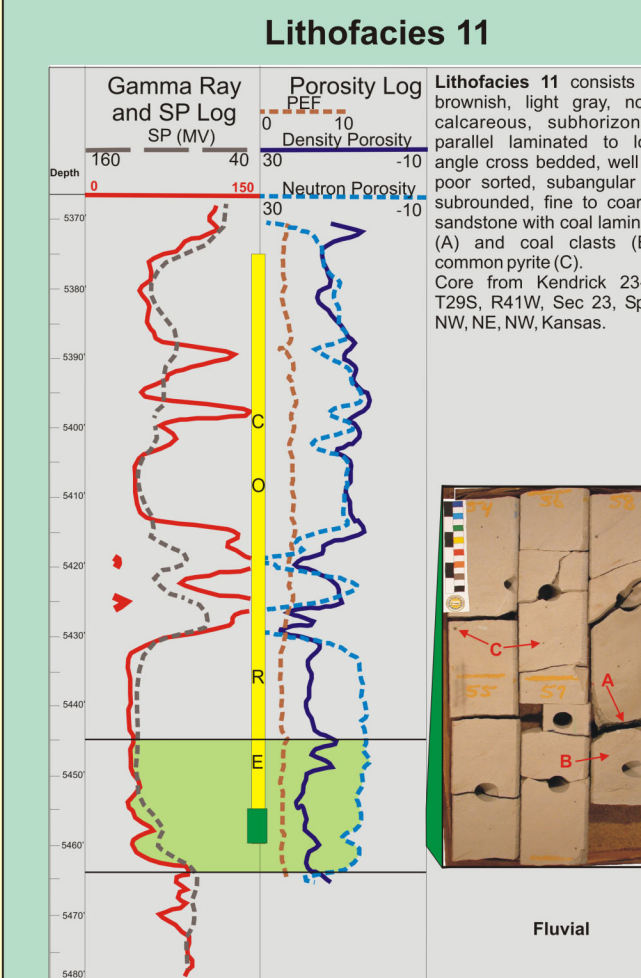
Open Marine Siliciclastic



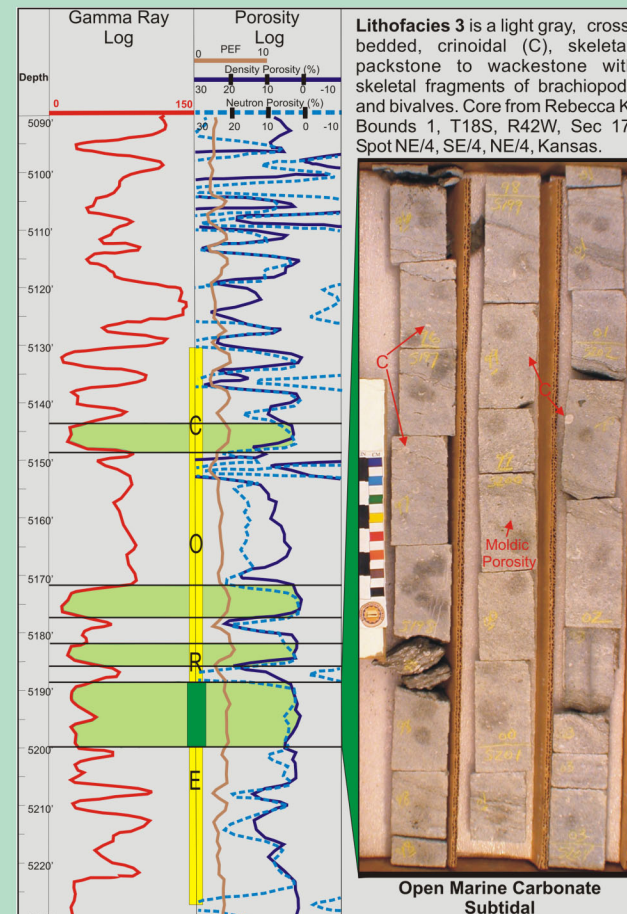
Marginal Marine



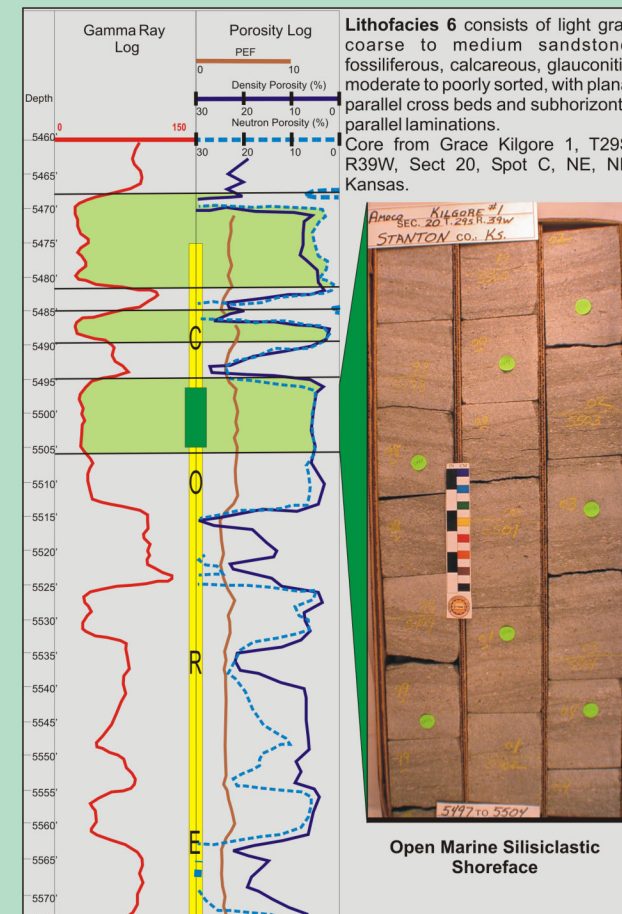
Fluvial



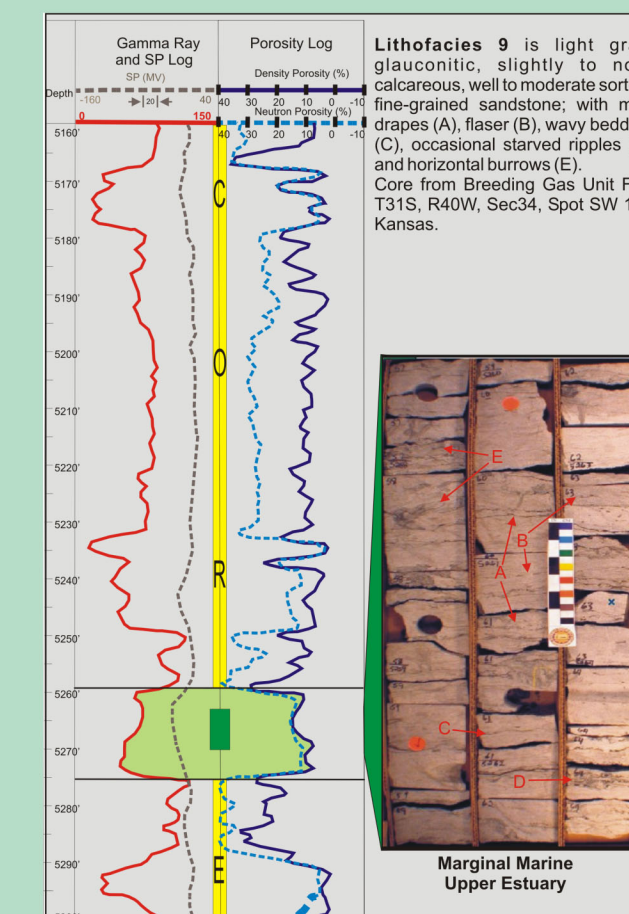
Lithofacies 3



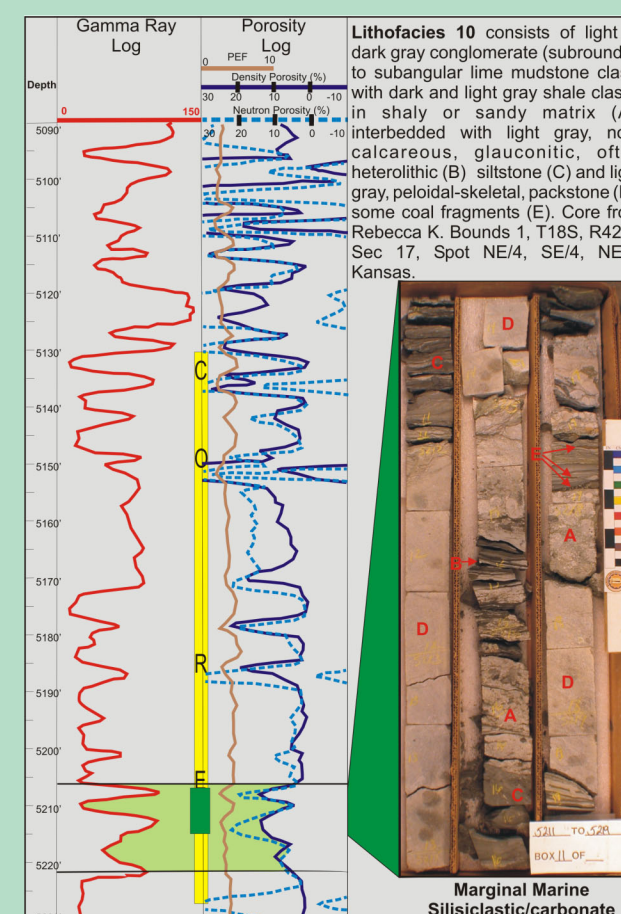
Lithofacies 6



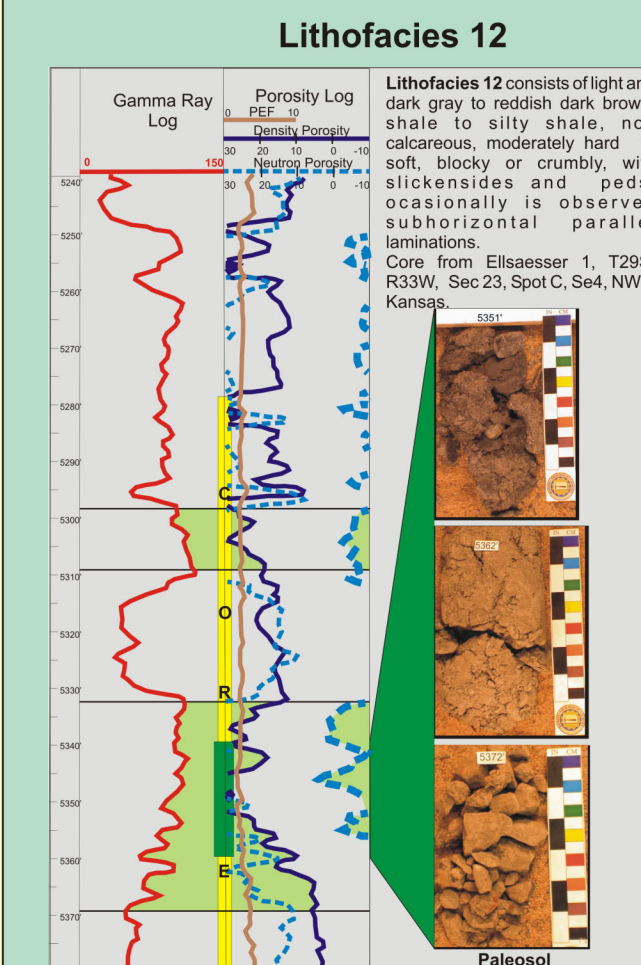
Lithofacies 9



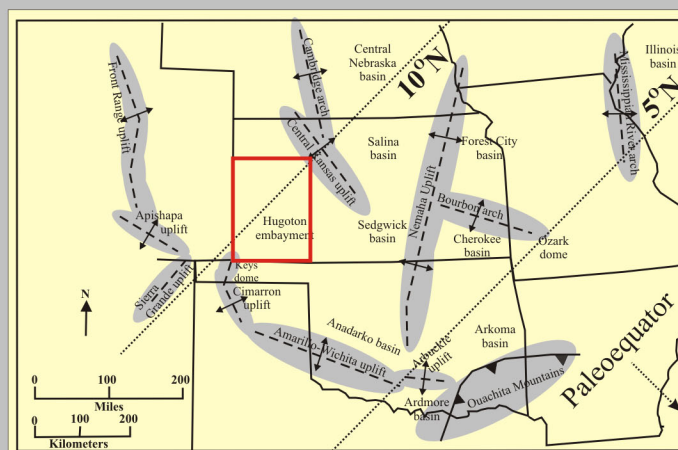
Lithofacies 10



Paleosol



Location Maps and Stratigraphic Chart of Study Area



SYSTEM	LITHOLOGY	SERIES	GROUP	SIGNIFICANT FORMATIONS
QUATERNARY		PLEISTOCENE		
TERTIARY		PLIOCENE		OSALLA
CRETACEOUS		UPPER	WOLF CAMP	WOLF CAMP
		LOWER	WOLF CAMP	WOLF CAMP
JURASSIC		UPPER	WOLF CAMP	WOLF CAMP
		LOWER	WOLF CAMP	WOLF CAMP
PERMIAN		LEONARDIAN	WOLF CAMP	WOLF CAMP
		WOLF CAMPIAN	WOLF CAMP	WOLF CAMP
PENNSYLVANIAN		VIRGILIAN	WOLF CAMP	WOLF CAMP
		MISSOURIAN	WOLF CAMP	WOLF CAMP
MISSISSIPPIAN		ATOKAN	WOLF CAMP	WOLF CAMP
		MORROW	WOLF CAMP	WOLF CAMP
ORDEVICIAN		MERAMECIAN	WOLF CAMP	WOLF CAMP
		OSAGIAN	WOLF CAMP	WOLF CAMP
CAMBRIAN		KINDERHOOKIAN	WOLF CAMP	WOLF CAMP
		MIDDLE	WOLF CAMP	WOLF CAMP
PRECAMBRIAN		UPPER	WOLF CAMP	WOLF CAMP
		LOWER	WOLF CAMP	WOLF CAMP
				IGNEOUS AND METAMORPHIC BASEMENT ROCKS