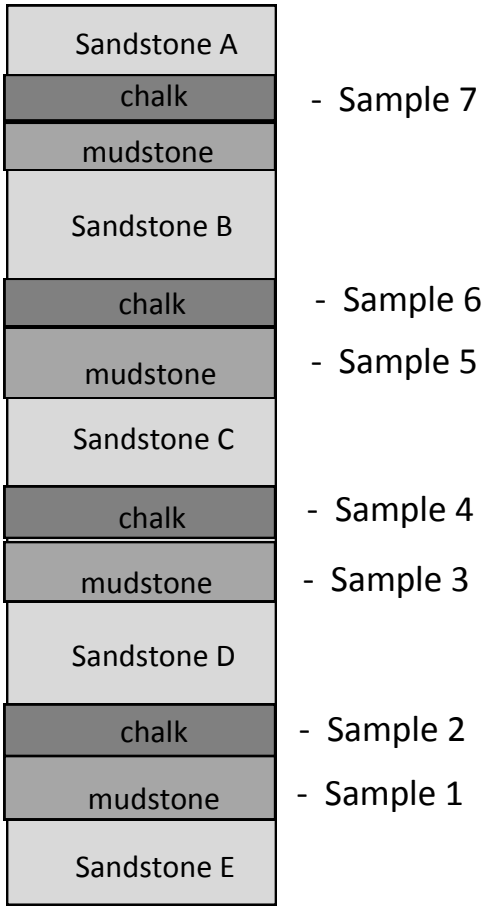
Looking for Oil: Biostratigraphy of Miocene Turbidites
Big Red Exploration Well 109

The evolutionary changes in life on earth provide the means to accurately date the sedimentary rocks deposited in the oceans. In this case, a series of turbidite events brought thick beds of sand (sandstone) into the oceanic environment. One of these sandstone beds may connect with a larger sand unit (the "Big Black" Sandstone) that produces oil and gas. The "Big Black" Sandstone has been dated elsewhere as 9.0 million years old. Your job is to use the nannofossils to date the sedimentary beds in Big Red Well 109 and determine which of the sandstone beds is approximately the same age as the "Big Black" Sandstone. The core from the well that is being drilled is provided below with the location of the seven samples you must analyze. For each sample, use the fossil distribution chart and the Biostratigraphic Zonation Scheme to assign each sample an appropriate zone. Once you have assigned each sample an appropriate zone, use this information to answer the following questions:

1. What are the zonal assignments and ages for each of the seven samples?
2. What are your best estimates for the age of each of the five Sandstones (A-E)?
3. Which sandstone is most likely to correlate with the "Big Black" Sandstone and why?

Core from Big Red Exploration Well 109



Miocene Calcareous Nannofossil Biostratigraphy Zonation Scheme

Epoch	CN	Zone	
Miocene	10	*Amaurolithus tricorniculatus*	+ *A. tricorniculatus* (4.55 Ma)
			* *A. primus* (5.6 Ma)
	9	*Discoaster quinqueramus*	
			* *D. quinqueramus* (8.6 Ma)
	8	*Discoaster neohamatus*	
			+ *D. hamatus* (9.4 Ma)
	7	*Discoaster hamatus*	
			* *D. hamatus* (10.7 Ma)
	6	*Catinaster coalitus*	
			* *C. coalitus* (10.9 Ma)
	5	*Discoaster exilis*	
			+ *S. heteromorphus* (13.6 Ma)
	4	*Sphenolithus heteromorphus*	
			+ *H. ampliaperta* (15.6 Ma)
	3	*Helicosphaera ampliaperta*	
			* *S. heteromorphus* (18.2 Ma)
	2	*Sphenolithus belemnos*	
			* *S. belemnos* (19.2 Ma)
	1	*Triquetrorhabdulus carinatus*	
			+ *S. ciperoensis* (23.8 Ma)

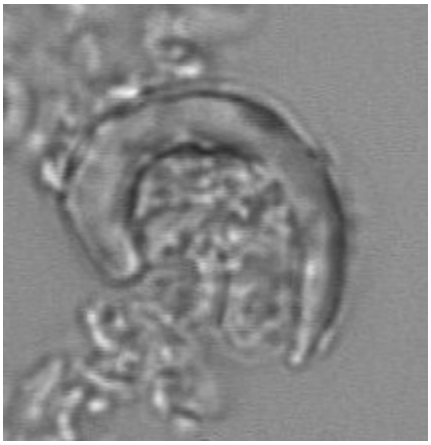
Key: * - First Occurrence + - Last Occurrence Ma - millions of years

Important Miocene Calcareous Nannofossil Species

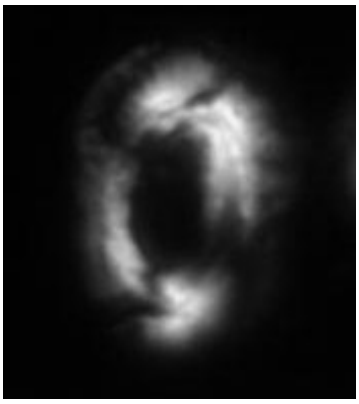
Sphenolithus ciperoensis

Sphenolithus belemnos

Sphenolithus heteromorphus



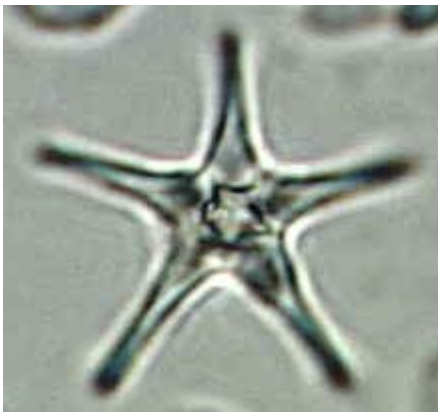
Amaurolithus primus



Helicosphaera ampliaperta

Catinaster coalitus

Discoaster hamatus



Discoaster quinqueramus

Amaurolithus tricorniculatus

Species Distribution Chart of Miocene Samples, Big Red Exploration Well 109

Sample	*Amaurolithus primus*	*Amaurolithus tricorniculatus*	*Calcidiscus macintyrei*	*Catinaster coalitus*	*Coccolithus pelagicus*	*Discoaster bollii*	*Discoaster exilis*	*Discoaster hamatus*	*Discoaster quinqueramus*	*Helicosphaera ampliaperta*	*Sphenolithus belemnos*	*Sphenolithus ciperoensis*	*Sphenolithus heteromorphus*	*Sphenolithus moriformis*	*Triquetrorhabdulus carniatus*	*Triquetrorhabdulus rugosus*
8	1	1	1		1				1					1		1
7			1		1				1					1		1
6			1		1	1								1		1
5			1		1	1		1						1		1
4			1	1	1	1	1	1						1		1
3			1	1	1		1							1		1
2					1		1			1			1	1		
1					1					1	1		1	1	1	