

Athabasca Basin, Saskatchewan and Alberta; update on Stratigraphy

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Summary

Additional core logging, especially of core from the interior of the basin, permits better correlation between different parts of the basin and a re-evaluation of the stratigraphy, depositional environments, and development history especially of the Manitou Falls and Lazenby Lake formations. Proposed revisions to stratigraphic nomenclature are shown in the chart.

Main Points and Conclusions

Revisions suggested here to the EXploration TECHnology (Extech) IV terminology (Ramaekers et al.), are restricted to the Extech IV Sequences 2 and 3. Some of the lithologic differences between the eastern and western parts of the basin have been shown to be due to facies changes in the more distal parts of Manitou Falls units. This eliminates the need for some member names, and necessitates the reassignment of some of the members of the Lazenby Lake Formation as subdivisions of the Dowler Member of the Manitou Falls Formation. The additional data shows that pebbly units formerly mapped only in Lazenby Lake units can be traced across areas with some tectonic complications and poor exposure in the south-central part of the basin to the eastern side. This permits further simplification of the stratigraphic section, and shows how coarse sediment input into the basin shifted from more northerly and easterly sources in the Anenakew deposystem to more southerly sources in the Karras deposystem with time. It also indicates that the Lazenby Lake sequence as previously understood is not nearly so much a successor to the Manitou Falls sequence as its lateral equivalent. The Karras and Ahenakew deposystems proximally share a narrow transition zone less than 10 km wide that separates pronounced (for the Athabasca Basin) differences in lithology that are traceable over large parts of the basin on either side.

The middle sequence in the Athabasca Basin shows a transition to a paralic environment in the upper unit of the Lazenby Lake Formation and is probably fully lacustrine or marine by Wolverine Point time.

The upper sequence in the Athabasca Basin (Locker Lake (pebbly sandstones), Otherside (sandstones), Douglas (black mudstones, siltstones, fine sandstones) and Carswell (dolomitic and oolitic dolomites) formations) is a largely marine sequence. The basal sandstones of the

Locker Lake Formation are largely, if not completely fluvial and were sourced from the south. The transition to a paralic environment probably occurs within the Otherside Formation or the upper Locker Lake Formation where paleocurrent directions become highly variable. The sequence is probably largely to fully shallow marine well below the top of the Otherside Formation.

To match existing nomenclature in the Hornby Bay area the Athabasca Group should be elevated to a supergroup, and the informal sequences of Extech IV nomenclature elevated to group status.

References

Ramaekers et al., 2007, Revised geological map and stratigraphy of the Athabasca Group, Saskatchewan and Alberta. In Jefferson, C.W., and Delaney, G., (eds), EXTECH IV, Geological Survey of Canada Bulletin 588, p. 155-191.

		Extech IV nomenclature				Proposed revision		
Gro up	Formation	Member	members shown to be synonyms; reassignments	Gro up	Formation	Member		
Sequence 4	Carswell			McFarlane Group	Carswell			
	Douglas				Douglas			
	Otherside	Davy Birkbeck Archibald Marsin			Otherside	Davy Birkbeck Archibald Marsin		
	Locker Lake	Brudell Snare			Locker Lake	Brudell Snare		
Sequence 3	Wolverine Point	Claussen Brule Larter Shiels		McFarlane Group	Wolverine Point	Claussen Brule Larter Shiels		
	Lazenby Lake	Clampitt, upper	reassigned				Clampitt, upper	
		Clampitt, lower Hodge	reassigned reassigned			Dunlop	Clampitt, lower Hodge	
Sequence 2	Manitou Falls	Dunlop	raised to fm status	Manitou Falls Group				
		Warnes 'clay pebble'	Raibl 'clay pebble'; reassigned			Warnes		
		Warnes 'sandy'	Raibl 'sandy'			Collins	'Collins sandy'	
		Warnes 'pebbly'	Raibl 'pebbly'				'Collins pebbly'	
		Collins 'sandy'	Warnes, Raible 'sandy'					
Sequence 1	Read	Collins 'pebbly'	Warnes, Raible 'pebbly'					
		Bird	raised to fm status informally subdivided		Bird	'clay pebble' 'sandy'		
		'sandy'						
		Smart	grouped with pebbly mudst.		Smart	'cgl, pebbly mudst'		
Sequence 1	Beartooth	cgI' 'pebbly mudst'		Fair Point Gp	Beartooth	'sandy' 'pebbly mudst'		
		'thin cgl'						
		'coarse cgl' 'pebbly mudstone'				Lobstick	'thin cgl' 'coarse cgl' 'pebbly mudstone'	