

Productivity and Environmental Conditions Following the Permian-Triassic Mass Extinction: Lower Triassic Rocks from the Western Canada Sedimentary Basin

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Core:	Avg. %TOC	Avg. %TIC
16-8-86/20W6	4.32	12.60
16-33-84/18W6M	3.32	8.00
B-24-B/94-H-16	4.33	3.85
C 20-H/94-H-16	4.79	3.55
C 74-E/94-H-16	3.96	7.43
C 78-I/94-H-9	3.44	10.60

Following the recovery of primary producers in the early Griesbachian, offshore and basinal facies were dominated by anoxic conditions and high primary productivity, which led to the deposition of organic-rich silty shales, as reflected in TOC values ranging from 5-10% (right). Oxygen was periodically introduced to more shoreward facies by turbidity currents or a fluctuating redoxocline, which reduced the preservation potential of organic matter and led to average TOC values from 2-3% for rocks deposited in these environments. Lower shoreface and shallower environments were stirred by waves, which introduced oxygen and led to the preservation of very little organic matter and provided a refugia for Early Triassic fauna (the "habitable zone" of Beatty et al. 2008).

Primary productivity recovered rapidly from the Permian-Triassic mass extinction, and remained robust during the remainder of the Early Triassic. Enhanced values of Ba, Cu and Zn beginning in the early Griesbachian (earliest Triassic) at 2 previously-analyzed outcrop localities from the WCSB (Opal Creek, AB locality and Cadomin, AB locality) as well as from trace element, %TOC and %TIC data from a Dienerian-Smithian drill core (A8-7-85/18w6) from the Pedigree-Ring Border-Kahntah River area in the north-central WCSB suggest that primary producers recovered quickly and were robust through the remainder of the post-extinction interval. Average %TOC values for Griesbachian-aged rocks from other cores from the Pedigree-Ring Border-Kahntah River area range from 3.32 – 4.79 % (left), and provide further evidence of a quick return to vigorous productivity during the Griesbachian.

Depositional Model for Lower Triassic Rocks of the WCSB

