

Non-marine and marine trace fossil assemblages within the Cretaceous Blackhawk Formation, Utah

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Summary

Analysis of trace fossil assemblages from subsurface (Shell Development Company, Core Hole No. 2.) and nearby outcrop data from Thompson Canyon, Grand County, Utah were employed to decipher the sedimentary processes, depositional environments and sequence stratigraphic surfaces of the Upper Cretaceous sediments of the Desert and Castlegate members of the Blackhawk Formation. Examination of the biogenic sedimentary structures and determination of the ichnofacies assemblages provides a higher order of stratigraphic resolution than physical sedimentary structures alone. Trace fossils were more readily identified from the core compared to the outcrop, but the outcrop exposures provide a greater opportunity to examine lateral facies relationships. Depositional environments and sedimentary processes were determined from physical and biogenic sedimentary structures, integrated with the lithofacies and trace fossil assemblages.

Ichnofacies relationships help to characterize diastems and other stratal discontinuities including *Glossifungites* surfaces within the core and outcrop. These can assist in delineating surfaces such as flooding surfaces and sequence boundaries that have significant correlation value. Parasequences and sequence boundaries within the Desert and Castlegate members were defined.

Discrete ichnofacies assemblages are defined for each depositional setting. Sediments representing marine environments range from distal offshore, through lower and upper shoreface. In the marine realm distinctions can be made between storm and fair-weather trace fossil assemblages based on the behavioral response of the individual trace fossils to changes in the oxygenation of bottom waters, energy conditions, rate of sedimentation. These all represent environmental stresses that impact the occurrence, abundance and diversity of the assemblages of traces. These in turn record the impact on the substrate.

Non-marine depositional environments range from tidally-influenced channel fill, abandoned channel fill and floodplain or marsh deposits. An unconformity marks the base of the non-marine sediments and is interpreted as a sequence boundary. Along this sequence boundary non-marine sediments are juxtaposed upon the marine sediments indicating a significant basinward shift in facies.

