

# Sedimentology, Chemofacies, and Stratigraphic Architecture of the Lower Cretaceous Burro Canyon Formation, Ninemile Hill- UnawEEP Canyon, Colorado

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## Abstract

Analysis of a well-exposed outcrop along Nine-Mile Canyon, located to the southwest of the Piceance Basin in Whitewater, Colorado, provides insight into the stratigraphic variability and heterogeneity of the fluvial deposits and architectural elements of the Burro Canyon Formation. Comparison of the stacking patterns of these elements to other previous studies of outcrop locations of the Burro Canyon Formation in the surrounding areas (e.g. Escalante Canyon and Mack Ridge) further defines the spatial and lateral distribution of the depositional characteristics. In order to address the stratigraphic variability of the lithofacies and chemofacies of the sequence, a detailed measured section, outcrop spectral gamma-ray profile, measured x-ray fluorescence profile, and thin-section analysis are used to identify the elemental abundance, mineralogy, and lithology of the sequence. The genetically related lithofacies are then grouped into architectural elements that form semi-amalgamated to amalgamated channel complexes. Then, the dominant indicator elements (proxies) are determined and related to environmental conditions. Using machine-learning techniques, chemofacies are defined based on the elemental abundances of the sequence. The approximately 80 foot-thick measured section predominantly consists of lithologies ranging from fine-grained to coarse-grained sandstones and green mudrock. Sedimentary structures dominantly include tabular-tangential cross-bedding, planar bedding, wavy bedding, massive bedding, burrows, and channel scour. The

dominant paleocurrent direction is  $145^{\circ}$  with a standard deviation of  $62^{\circ}$  based on 45 measurements of cross-bed sets. These sedimentary structures, combined with lithology, then group into lithofacies that form channel elements. As indicated by the stacking pattern of these elements, two distinct channel complexes are evident at the Nine-Mile Canyon location: a lower interval characterized by a low-sinuosity, higher net-to-gross, amalgamated braided fluvial system and an upper interval characterized by a lower net-to-gross fluvial system consisting mostly of floodplain deposits. The architectural elements defined by this outcrop study are then compared to other nearby localities that have been previously measured to interpret the depositional characteristics at Nine-Mile Canyon and to further constrain the lateral variability of the Burro Canyon Formation.