# FACIES OF THE HORQILLA FORMATION ACROSS THE PENNSYLVANIAN-PERMIAN BOUNDARY AT NEW WELL PEAK (BIG HATCHET MOUNTAINS, SW NEW MEXICO, USA)

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At New Well Peak (NWP) in the Big Hatchet Mountains, southwestern New Mexico (USA), the Pennsylvanian-Lower Permian (Wolfcampian) section is composed of an exceptionally thick, well-exposed succession of shallow marine carbonate limestone termed Horquilla Formation. At NWP, the Horquilla Formation is ~ 1 km thick, dips 20-30° to the SW, rests with erosional disconformity on the Mississippian Paradise Formation and has its top faulted out. Nearby outcrops indicate that the Lower Permian Earp Formation rests disconformably on the Horquilla Formation. The NWP section of the Horquilla Formation can be divided into three lithologically distinct intervals: (1) lower member of sandy limestones, calcarenites and oolitic limestones, ~ 200 m thick; (2) middle member of cherty, thick-bedded limestones, many with silicified *Chaetetes*, ~ 300 m thick; (3) and upper member of thin-bedded limestones with especially rich fusulinacean assemblages, ~ 500 m thick.

The upper member crosses the Pennsylvanian/Permian boundary. At NWP, the uppermost 250 m of the Horquilla Formation (sections A and B) consist of decimetre (mostly 0.3–0.8 m) bedded, gray to dark gray limestone, mostly micritic and fossiliferous. Silicified fossils occur in a few units. Abundant fossils observed on outcrop are crinoids, fusulinids and calcareous algae. Rarely, massive to indistinctly bedded limestone (3.3–4.5 m thick) and cherty limestone occur.

Limestones are dominated by muddy textures with bioclastic wackestone being by far the most abundant microfacies. Grainstone is rare, and more abundant within the uppermost 70 m. Limestones are characterized by a diverse fossil assemblage indicating a shallow, subtidal low-energy open marine setting with normal salinity. High-energy conditions indicated by grainstone were rarely developed. No transgressive or regressive trends are observed within most of the depositional sequences. Within the uppermost part a regressive (shoaling upward) trend is observed in some sequences (wackestone grading upwards into grainstone).

Limestones are interrupted by several covered intervals, which most probably represent reddish marly shale horizons 0.0– 3.7 m thick. These covered intervals allow a subdivision of the succession into about 30 depositional sequences.

At the base of covered intervals root structures have been observed on top of many limestone units. On top of one unit a paleocaliche is developed. These root structures and the paleocaliche indicate that the limestones were periodically subaerially exposed and that the covered intervals represent phases of low sea-level.

The Horquilla Formation was deposited in the Pedregosa basin, which extends from SW New Mexico to SE Arizona and into northern Mexico and which was separated from the Orogrande basin to the east by the Florida high.

In contrast to the Orogrande basin, where sedimentation was strongly influenced by syndepositional tectonics, carbonate sedimentation in the Pedregosa basin seems to have been mainly influenced by glacioeustatic sea-level fluctuations. Thus, carbonate sedimentation was periodically interrupted by sea-level drops causing subaerial exposure and deposition of reddish marly shale. Siliciclastic influx as observed in correlative successions of the Orogrande basin is completely lacking.