

K1, K2, and K3 Unconformities and A and X Bentonites are Keys to Deciphering Burro Canyon-Dakota Stratigraphy in the San Juan Basin, New Mexico and Colorado

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K1, K2, and K3 unconformities and A and X bentonites are keys to deciphering Burro Canyon-Dakota stratigraphy in the San Juan Basin, New Mexico and Colorado. Identification and correlation of the K1 unconformity at the base of the Burro Canyon Formation, the K2 unconformity at the base of the Encinal Canyon Member of the Dakota Sandstone, and the K3 unconformity at the base of the White Rock Mesa Member of the Dakota Sandstone are critical for deciphering the stratigraphy of the complex Dakota and Burro Canyon lithostratigraphic units in the San Juan Basin.

Sub-crop maps reveal that the K1 unconformity at the base of the Burro Canyon Formation truncates the Brushy Basin Member of the Morrison Formation in most of the northeastern third of the San Juan Basin where the Burro Canyon is present. Sub-crop maps also show that the K2 unconformity at the base of the Encinal Canyon Member of the Dakota Sandstone is present only in the eastern third of the San Juan Basin. It truncates the Jackpile Sandstone Member of the Morrison Formation in the southeastern San Juan Basin and the Burro Canyon in the northeastern San Juan Basin.

Sub-crop maps on the K3 unconformity at the base of the White Rock Mesa Member (formerly referred to informally as the “main body of the Dakota”) of the Dakota Sandstone demonstrate that this is a very low-angle, angular unconformity that truncates a wide range of underlying units ranging from the Oak Canyon and Encinal Canyon Members of the Dakota Sandstone in the eastern San Juan Basin of NM and progressively cutting down lower in the stratigraphic section to the west. The K3 unconformity cuts through the Burro Canyon and the K1 unconformity westward in the northern San Juan Basin in NM and CO, cuts down into the Brushy Basin Member of the Morrison Formation in the western third of the basin, and cuts down as low as the Chinle Group in the Zuni Embayment of the San Juan Basin in the southwest, south of Gallup, NM.

The K3 unconformity gradually grades into a correlative conformity eastward, approximately at the base of the Cubero Sandstone Member of the Dakota Sandstone in the eastern San Juan Basin. The angularity of the K3 unconformity may be due to uplift west of the San Juan Basin during a pulse of the Sevier Orogeny or gradual subsidence of the Western Interior Seaway to the east, or both.

Good chronostratigraphic marker beds that are useful for subsurface and surface correlation within the Dakota Sandstone include the A bentonite in the Oak Canyon Member of the Dakota Sandstone and the X bentonite in the lower part of the Whitewater Arroyo Shale Member of the Mancos Shale. The A bentonite is only present in the eastern San Juan Basin where it has not been truncated by the K3 unconformity. The X bentonite is present almost basin-wide, being absent only in the Four Corners area where the White Rock Mesa Member constitutes the whole Dakota.