

**Deformational History of the Valley Spring Domain of the  
Northeastern Llano Uplift, Devil's Waterhole, Inks Lake State  
Park, Burnet County, Texas**

by

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Structural mapping, geochemical and metamorphic analyses, and U-Pb dating of Valley Spring Domain (VSD) units within the Devil's Waterhole (DW) of Inks Lake State Park reveal that the northeastern Llano uplift was deformed and metamorphosed synchronous with the southeastern Llano uplift. No early deformation or metamorphism is recognized, as previously proposed for the DW area, in the VSD in the northeastern Llano uplift. The VSD deformation and metamorphism are consistent with the interpretation that the Llano uplift is a collisional core.

Detailed structural mapping of Devils Waterhole (DW) of Inks Lake State Park, reveals five foliations (S1-S5) and four associated fold generations (F2-F4) in migmatitic host rock and a 1253  $\pm$  3/-2 Ma foliated sill. The structures are compatible in style, sequence, and orientation and are the same in the host rocks as the foliated sill.

The DW is surrounded by a deformed gneiss, the  $1232 \pm 4$  Ma Inks Lake Gneiss (ILG). The style and sequence of the structures at DW are comparable to structures in the ILG, thus deformation in the northeastern Llano uplift is constrained to post  $1232 \pm 4$  Ma.

Deformation at DW occurred synchronous with amphibolite to granulite facies metamorphism. The metamorphic mineral assemblage in pelitic units coupled with the presence of leucosomes parallel to S1 through S3 indicate that early structures were forming in higher temperature conditions than the later structures (S4/F4 and S5/F5). Higher temperature metamorphic conditions are recorded in DW than in the southeastern Llano uplift. U-Pb dating of metamorphic zircons from two amphibolite gneiss samples from DW yield ages of  $1129 \pm 3$  Ma, which is compatible with timing of metamorphism in the southeastern Llano uplift.

Geochemical analyses of two DW amphibolite gneiss samples were compared to samples in the surrounding Inks Lake Gneiss and the VSD. The two DW samples appear to be related to two meta-igneous amphibolite gneisses from the southeastern uplift near Honey Creek (Zumbro, 1999). All samples from the VSD show a tectonic signature consistent with an arc.