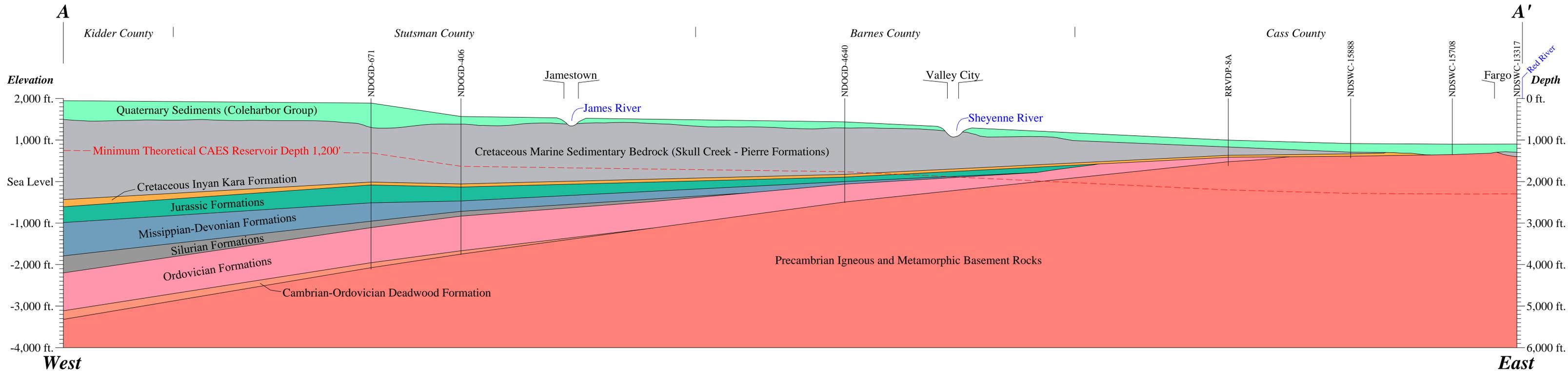
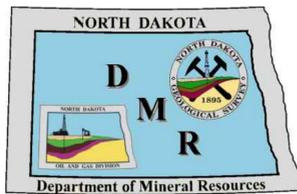


GENERALIZED GEOLOGIC CROSS-SECTION IN SOUTHEASTERN NORTH DAKOTA

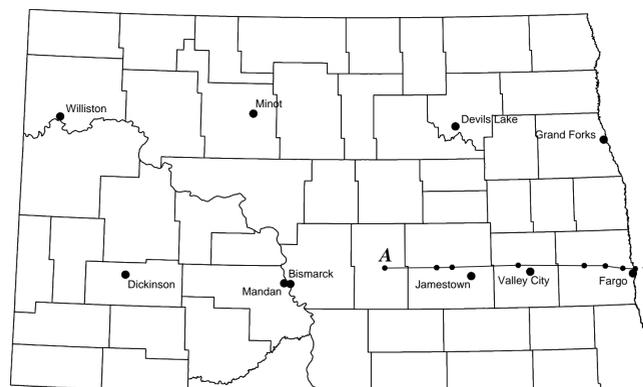
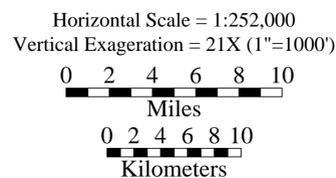
Fred J. Anderson

2012



EXPLANATION

This generalized west to east geologic cross-section depicts the subsurface geology of southeastern North Dakota near I-94 from west of Jamestown to Fargo and the Red River in the east. This cross-section has been vertically exaggerated 21 times (meaning that the vertical measurement has been stretched 21 times greater than the horizontal) in order to reasonably depict the architecture of the geologic strata in the subsurface. A theoretical Compressed Air Energy Storage (CAES) minimum reservoir depth line of 1,200 feet is shown, drawn from the approximated land surface, in order to indicate the geologic strata present at these depths. This cross-section was constructed using stratigraphic information from selected oil & gas drilling and subsurface mineral exploration tests along with selected water well logs in the Red River Valley. Land surface elevation is approximated between drillholes on this section. Elevation of the bedrock subcrop was extracted from existing data sources (Bluemle, 1983) and correlated to available drillhole records contained within databases of the North Dakota Department of Mineral Resources. The geologic units shown in this cross-section consist of (from oldest to youngest) basement igneous and metamorphic bedrock of Precambrian age overlain unconformably by sedimentary rocks of the Cambro-Ordovician Deadwood Formation, overlain unconformably by several sedimentary rock units of Ordovician age (i.e. Red River Carbonates, and Winnipeg Formation sedimentary rocks), overlain unconformably by carbonates of the Silurian age Interlake Formation, overlain unconformably by Mississippian and Devonian age marine units, overlain unconformably by Jurassic age sedimentary rocks (Pennsylvanian through Tertiary units are not present in this portion of North Dakota), unconformably overlain by sedimentary rocks of the Inyan Kara Formation and marine shales of the Pierre Formation. Quaternary age glacial sediments (undifferentiated on this cross-section) mantle the marine Cretaceous units and unconformably overlie Precambrian basement and marine Cretaceous sediments in the Red River Valley. There are several stratigraphic units that do not extend across the entire depth of the subsurface in southeastern North Dakota and effectively "pinch out" along the margins of the Williston Basin, which is due, in part, to the changes in depositional and erosional environments throughout geologic time and throughout the history of the structural development of the basin. Shallow Cretaceous and Precambrian basement in the Red River Valley are truncated in the shallow subsurface, resultant from the advance and retreat of glacial ice during Pleistocene glaciation. This generalized geologic cross-section has been constructed for use as an initial planning tool for members of the energy industry in North Dakota involved in the evaluation and potential development of CAES opportunities.



NDOGD-406
Drill Hole

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