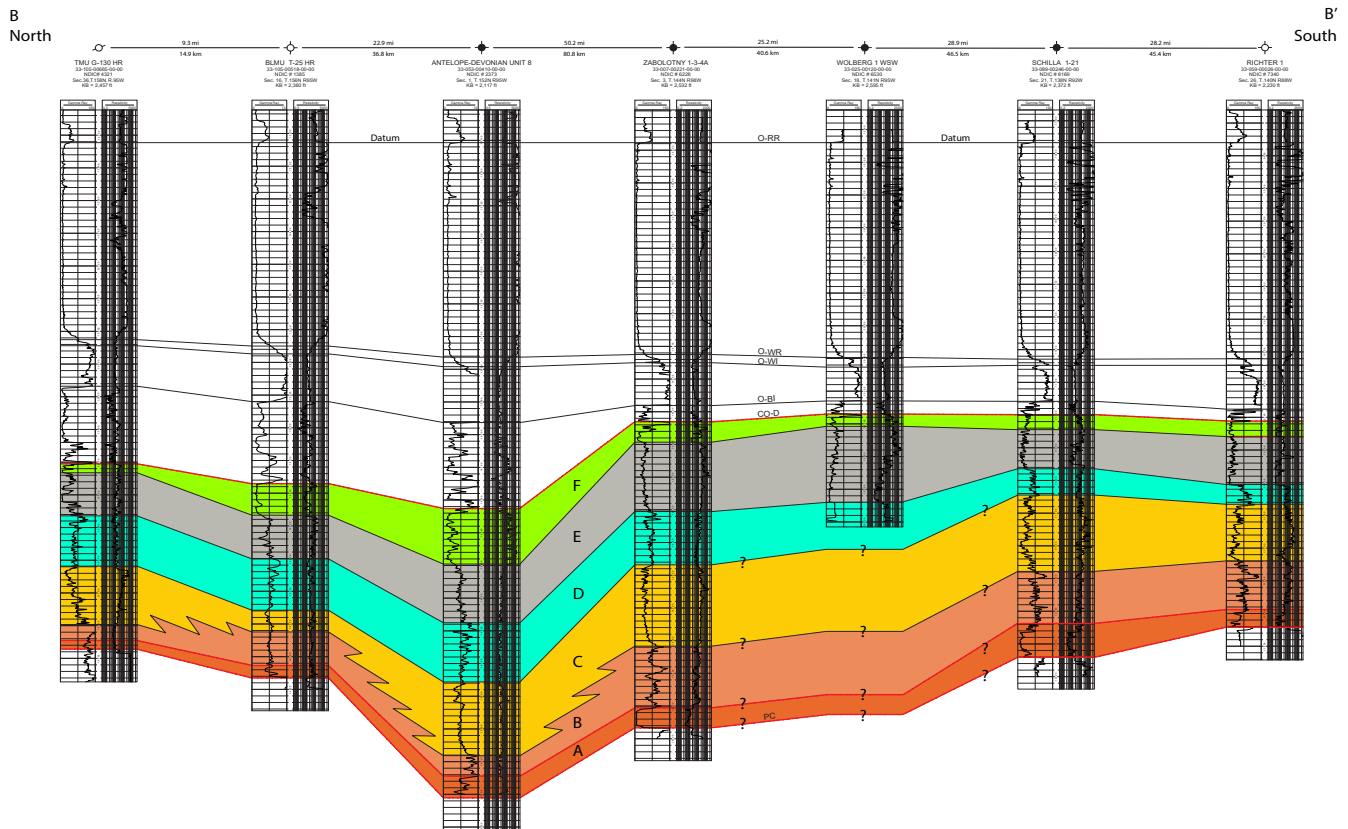


Stratigraphic Framework of the Deadwood Formation, North Dakota

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GEOLOGIC INVESTIGATION NO. 266
 NORTH DAKOTA GEOLOGICAL SURVEY
 Edward C. Murphy, State Geologist
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2022

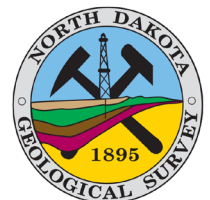


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DISCUSSION

The North Dakota Geological Survey (NDGS) is currently conducting studies of the Cambro-Ordovician Deadwood Formation (Deadwood) because of the increased interest in carbon dioxide sequestration in underground saline aquifers. This document presents the results of these studies, along with GI-265 (Bader, et al., 2022), to help establish a stratigraphic framework (Figs. 1-5) for the Deadwood. The Deadwood Formation consists of marginal and shallow marine sedimentary units; dominantly thick, porous, and permeable sandstone and limestone that are present at great depth and thus are excellent candidates for storage reservoirs.

The Deadwood Formation represents two depositional sequences deposited during a Late Cambrian transgression and Early Ordovician regression (Fig. 6, Bader, et al., 2022). The formation consists of six informal members, A-F (LeFever et al., 1987). In general, member A represents the lower sequence consisting of fluvial-deltaic and eolian units that give way to more marginal marine (member B) and nearshore progradational deposits (members C-F) of the upper sequence. The members are relatively easy to identify on geophysical well logs, and can be correlated across the basin in North Dakota (Figs. 1-4). Figure 5 shows the lateral extent of each member as envisioned by LeFever et al. (1987) and slightly modified in this document.

DEADWOOD MEMBERS

- F member – Sandstone with minor siltstone, mudstone and carbonate (coarser)
- E member – Interbedded sandstone, siltstone, shale, and some limestone (coarser)
- D member – Interbedded siltstone, mudstone, and sandstone west; limestone east (finer)
- C member – Lower sandstone unit and upper carbonate unit with sandstone interbeds (coarser)
- B member – Glauconitic to quartzose sandstones/siltstones interbedded with minor claystone and some carbonates (finer)
- A member – Quartzose and glauconitic sandstones west and limestone to east; basal conglomerate (coarser)

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- Blakey, R., 2013, North America paleogeography: <http://cpgeosystems.com/nam/html>.
- LeFever, R.D., Thompson, S.C., and Anderson, D.B., 1987, Earliest Paleozoic history of the Williston Basin in North Dakota, in Carlson, C.G., and Christopher, J.E., eds., Fifth International Williston Basin Symposium: Saskatchewan Geological Society, p. 22-36.
- Sarnoski, A.H., 2015, The stratigraphy and depositional history of the Deadwood Formation, with a focus on Paleozoic subsidence of the Williston Basin: University of North Dakota Theses and Dissertations, <https://commons.und.edu/theses/1957>.

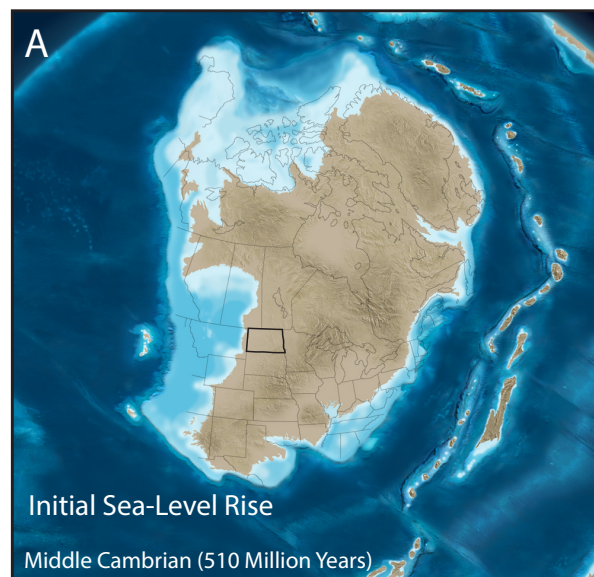
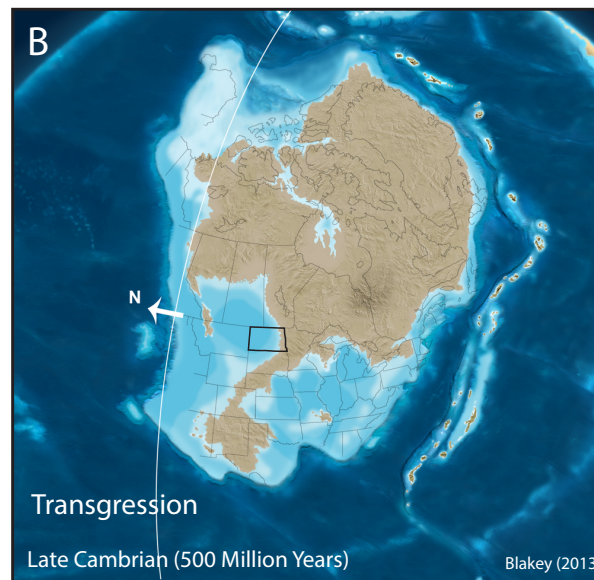
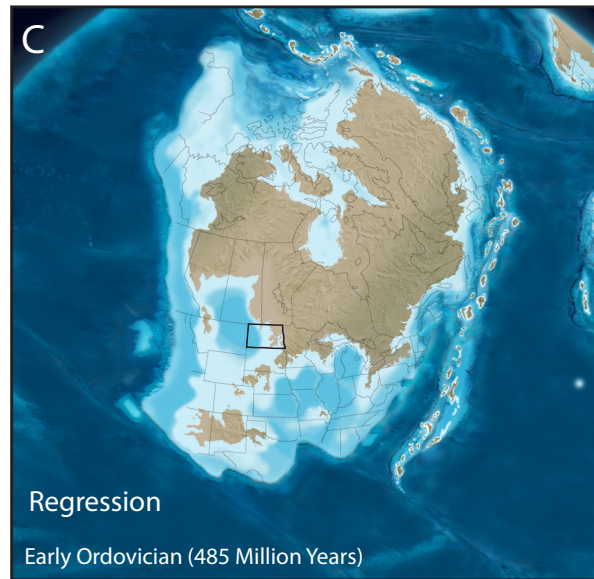


Figure 6. Cambro-Ordovician paleogeographic maps of North America showing transgression and regression of seaway during Deadwood deposition in North Dakota.

A
North

A'
South

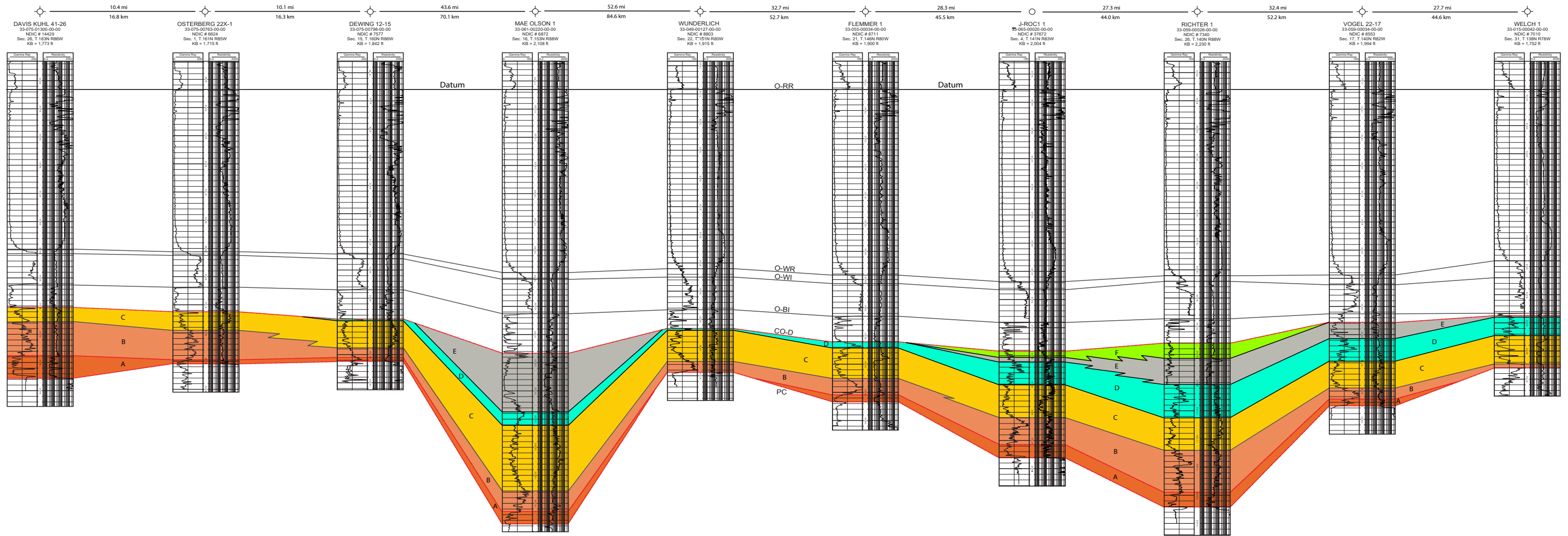


Figure 1. Cross-section A-A'

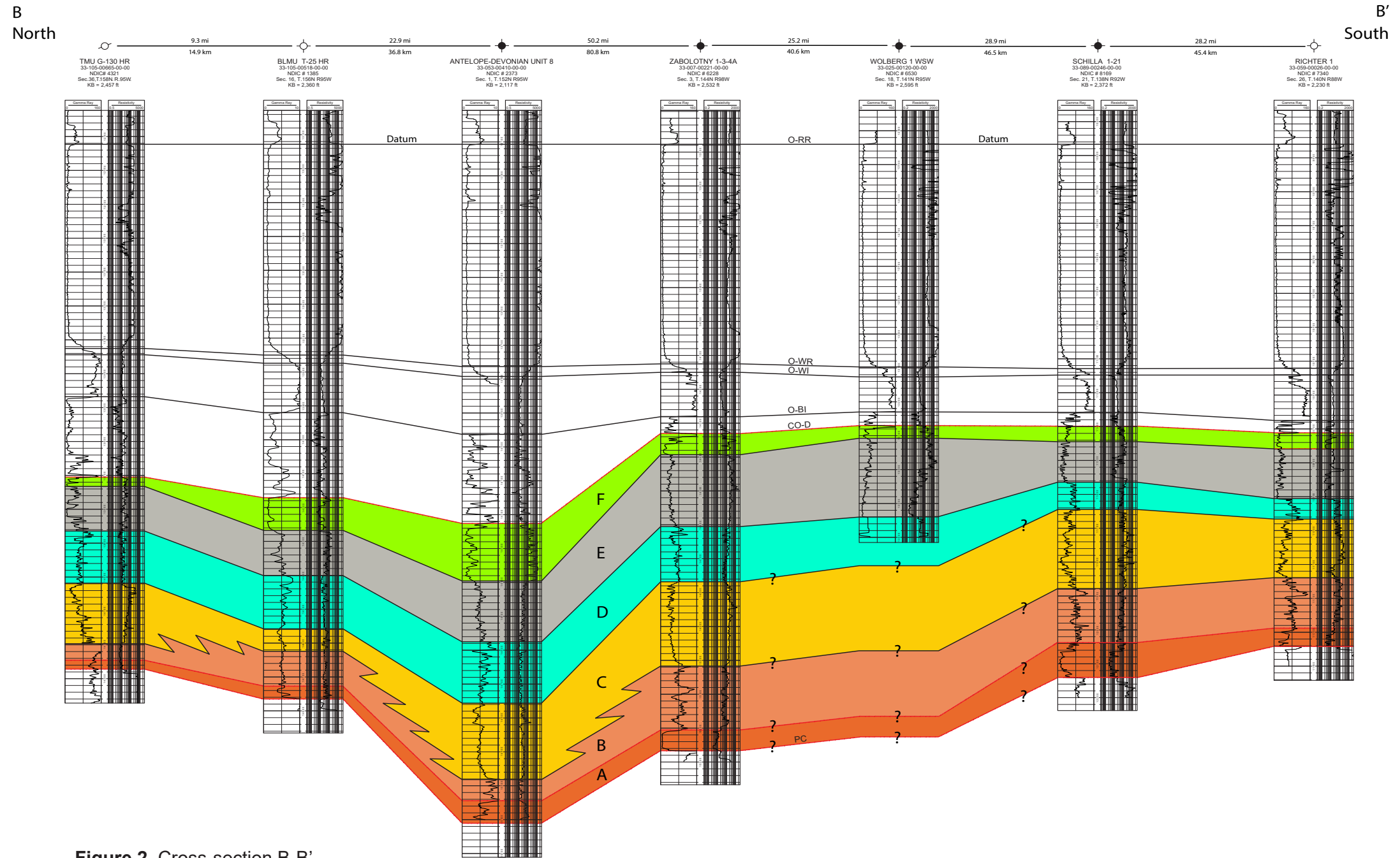


Figure 2. Cross-section B-B'

C
West

C'
East

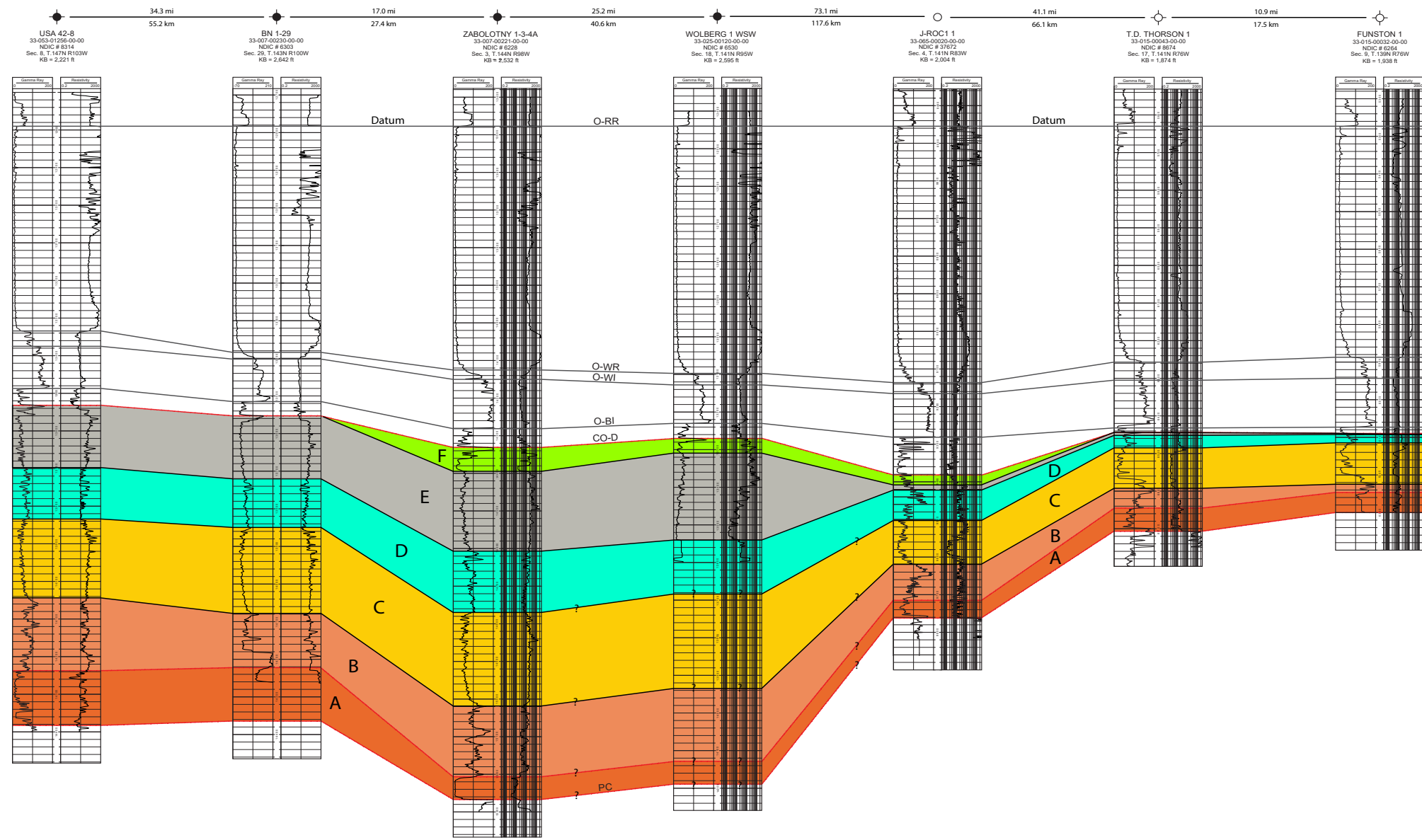


Figure 3. Cross-section C-C'

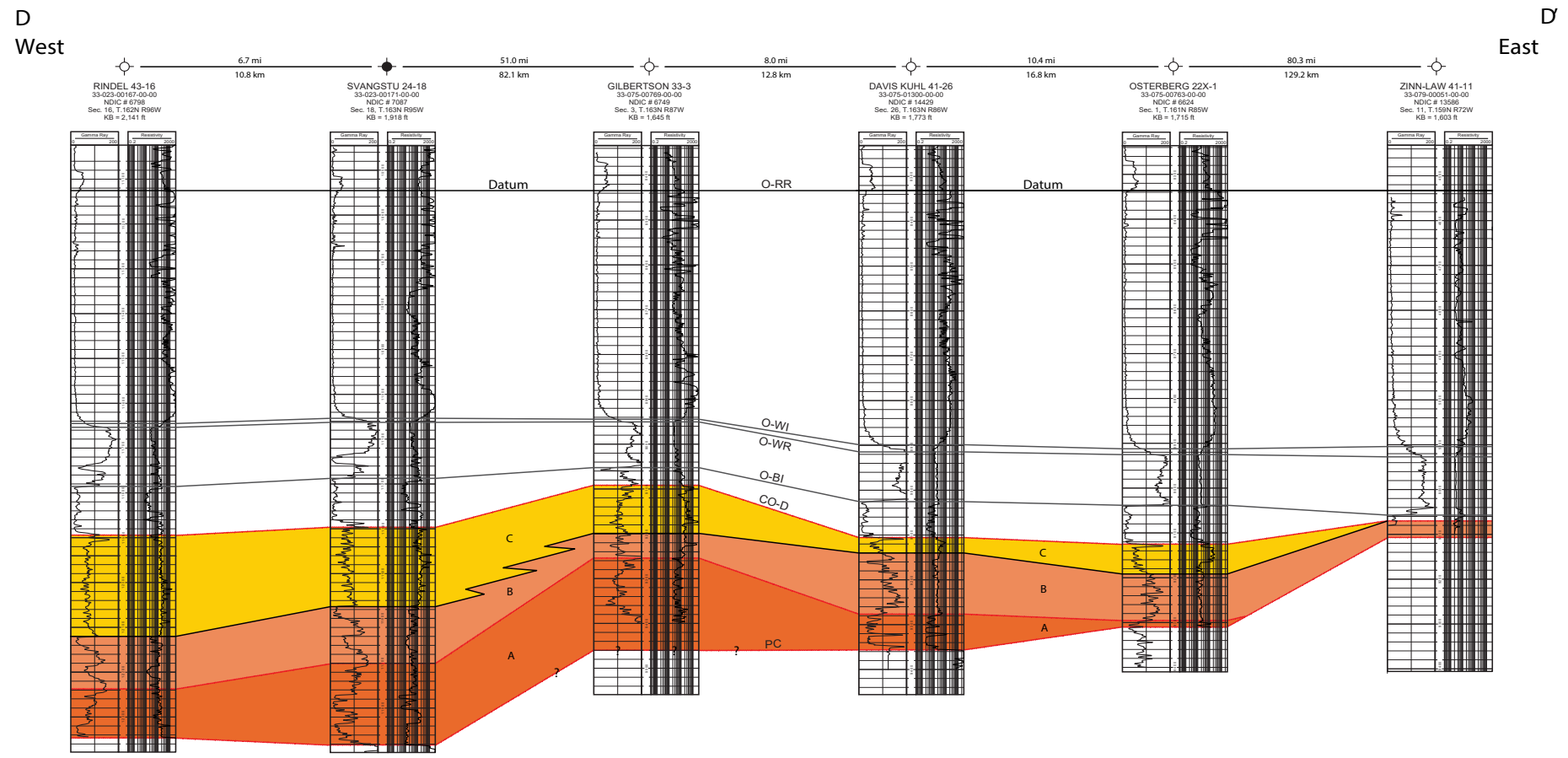


Figure 4. Cross-section D-D'