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THE T CROSS COAL BED (PALEOCENE, NORTH DAKOTA):
THE IMPORTANCE OF REEVALUATING HISTORIC DATA IN GEOLOGIC RESEARCH

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The T Cross coal bed is significant as a widespread marker in the Williston Basin and formational boundary unit between the Ludlow and Slope Formations in the Paleocene of western North Dakota. Each new study has built upon previous work involving the T Cross without reevaluation of its original usage. This review and reevaluation of the original observations regarding the correlation of the T Cross coal bed show that its current usage and importance as a marker is difficult to verify on the basis of existing information.

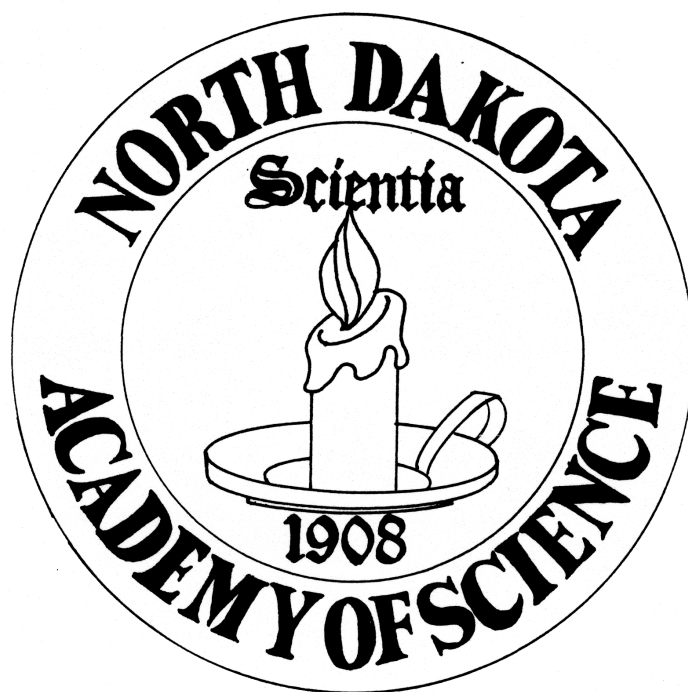
The T Cross coal bed was named by Hares in 1928 (1) in one of the more extensive and detailed coal surveys performed by the U.S. Geological Survey in North Dakota. The focus of this work was coal land classification. Almost all of the work in North Dakota was done during the field season of 1911 by two geologists and untrained helpers. The coal bed derives its name from the "old T Cross ranch" where the bed was measured and described from exposures along Bacon Creek about 300 m west-southwest of the still-standing ranch house in sec. 20, T. 133 N., R. 104 W. The thick (7.3-8.5 m) coal bed, in this area of poor exposures and low relief, was noted earlier by Leonard in 1908 (2) in his extensive study of the coals in the valley of the Little Missouri River in southwestern North Dakota. Leonard did not name this bed but stated that the bed "perhaps be correlated with bed F, but [that] this could not be determined with any degree of certainty" (bed F appears to be equivalent to the Yule coal bed of Hares). In his summary of the T Cross coal bed, Hares (p. 47) stated: 1) that the T Cross is a thick coal in the area of T Cross Ranch, 2) the bed thins substantially to the north (T. 134-135 N., R. 105 W.), and 3) it extends to the latitude of Yule (sec. 25, T. 136 N., R. 105 W.). Note that elsewhere Hares' stated that this coal thickens instead of thins in township T. 135 N., R. 105 W. These summary statements are not, however, supported by Hares' geologic map (pl. 14) and township-by-township coal descriptions. The T Cross coal bed is not mapped as occurring in the river bluffs of the Little Missouri in townships north of T. 134 N., nor is the coal occurrence discussed in appropriate sections of the text. Reasons for these rather obvious discrepancies in stated versus documented occurrence are not clear, but Hares' published text and annotations to field maps indicate uncertainty in the correlation of some coal beds outside of their most representative outcrops. These problems in bed correlation and general interpretation of the stratigraphic framework led Hares to a determination of the thickness of the Ludlow Member (after Hares) that is approximately 58 m less than the amount established by his own criteria in recognizing formational contacts.

On the basis of reevaluation of Hares' unpublished and published geologic data, subsequent surface and subsurface stratigraphic work, and new field observations in western Slope County, the T Cross coal thins, and may split to the north from the T Cross Ranch occurrence, and thus cannot be reliably correlated into T. 134 N. Assuming Hares' observations on the T Cross in T. 134 N., R. 105 W. are correct, a T Cross correlation from the T Cross Ranch occurrence is possible. On the basis of Hares' own observations, however, from T. 134 to 135 N., the correlated stratigraphic horizon of the T Cross coal (of Hares) occurs within the interval of the Upper-Coal-Pair and Oyster lignite (nomenclature after Moore [3]). Use of the name T Cross by later workers for a coal in T. 135 N., R. 105 W., is substantially lower in the section than used by Hares, and apparently has no validity or attendant significance. For example, the lower brackish tongue of the Cannonball Formation has been associated with the T Cross coal bed in T. 135 N., R. 105 W. to the point of defining the relationship as the "T Cross bed" (3,4). Hares' occurrences of the T Cross and "Ostrea" localities south of this township do not indicate this association.

The problems associated with properly utilizing the name T Cross for coal correlation in Slope County are complex and not resolvable without additional subsurface and surface studies that specifically address this interval of the section. The coal bed name "T Cross" has been widely used in building a framework for other field observations in the lower part of the Fort Union Group of the Williston Basin. T Cross usage subsequent to Hares' is based largely on unsupported assumptions and face value considerations that may have led to significant error in correlation. Markers, as important components of a stratigraphic framework, require review of their historical basis and special consideration to justify new applications. Future researchers need to know the strength of the stratigraphic control before the information can be generalized for other purposes. This research is part of a program supported by the U.S. Bureau of Mines and NSF (EAR-8804881).

1. Hares, C.J. (1928), U.S. Geol. Surv., Bull., 775, 110 p.
2. Leonard, A.G. (1908), No. Dak. Geol. Surv., Fifth Biennial Rept., p. 29-114.
3. Moore, W.L. (1976), No. Dak. Geol. Surv., Rept. Invest., 56, 40 p.
4. Clayton, L., et al. (1977), No. Dak. Geol. Surv., Rept. Invest., 59, 14 p.

**Proceedings
of the
NORTH DAKOTA
Academy of Science**



81st Annual Meeting

April 1989

Volume 43