Benoit P.H., Lu Jie, Jull A.J.T. and Sears S.W.G. (1991c) Thermoluminsescence and C-14 of Non-Antarctic meteorites: Terrestrial ages of Prairie State finds. *Meteoritics*, **26**, 316-317.

Thermoluminescence and C-14 of Non-Antarctic meteorites: Terrestrial ages of Prairie State finds. P. H. Benoit,[1] Lu Jie,[1] A. J. T. Jull[2] and D. W. G. Sears.[1] [1]Cosmochemistry Group, Dept. of Chemistry and Biochemistry, University of Arkansas, Fayetteville, AR 72701, USA. [2]NSF Accelerator Facility for Radioisotope Analysis, University of Arizona, Tucson, Arizona 85721, USA.

Radiocarbon analysis has proved of great value for terrestrial age determinations for most non-Antarctic finds (<~40 000 years) as demonstrated, for instance, by recent work on Roosevelt Country meteorites (1, 2). In theory, the decay of natural thermoluminescence (TL) should also be useful for terrestrial age determinations, although the decay rate is a function of storage temperature (3). Comparisons of C-14 terrestrial ages and natural TL levels for Prairie State meteorites made a decade ago showed a suggestive but rather poor correlation (4, 5). Recently, new radiocarbon measurements were made using accelerator mass spectrometry, and we have also obtained new TL data for about half of these samples (6).

Our new TL data confirm the earlier data (4) within instrumental uncertainties (< size of the symbols in Fig. 1), but many of the earlier radiocarbon dates appear to have been in error. Fig. 1 shows the TL data plotted against the new AMS C-14 data. Also shown in Fig. 1 are the theoretical 2nd-order TL decay curves for 0 and 20 °C using the TL parameters for Lost City (3). The correlation between natural TL and ^{14}C terrestrial age is now much improved over the earlier work. The experimental data seem to follow the curve expected for an effective theoretical storage temperature slightly less than 20 °C. Only Brownfield deviates markedly from this trend. It has apparently experienced a higher average storage temperature than the other meteorites, or has had an otherwise unusual thermal terrestrial history.

We also report data on a possible new Prairie State meteorite which was recently brought to our laboratory. We are presently undertaking its characterization and conducting a search for historical documentation, but it was apparently found by paleontologist H. T. Martin in the Kansas region at about the turn of the century. Initial work seems to indicate that it is L or LL of type 5-6. The stone, although fairly rusty, possesses an extensive scalloped fusion crust surface. Its natural TL level is 7.6 + −0.1 krad, approximately equal to Keyes, which, in consideration of Fig. 1, indicates a terrestrial age of ~6000 yrs. New AMS C-14 data suggest a terrestrial age of 5600 + −1300 years. References: (1) Jull *et al.* (1991) *LPSC* **22,** 667. (2) Jull *et al.* (1989) *GCA* **53,** 2095. (3) McKeever (1982) *EPSL* **58,** 419. (4) Sears and Durrani (1980) *EPSL* **46,** 159. (5) Boeckl (1972) *Nature* **232,** 25. (6) Jull, Wlotzka, and Donahue (unpubl. data).

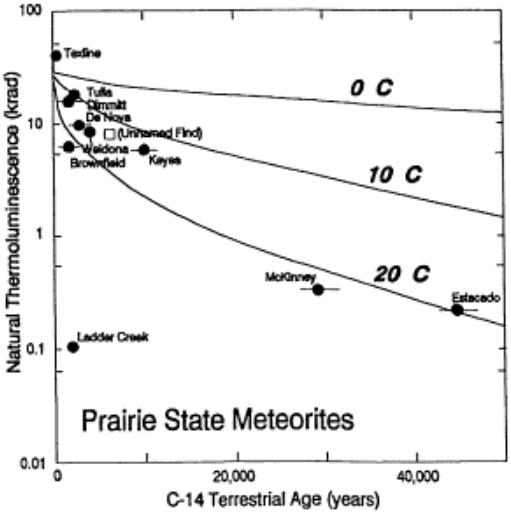

FIG. 1. Natural TL compared with terrestrial ages determined by AMS measurements for ^{14}C.