ESTABLISHMENT OF A THERMOLUMINESCENCE FACILITY
AT THE UNIVERSITY OF PITTSBURGH

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The University of Pittsburgh has received a variety of
thermoluminescence laboratory equipment from Washington University. The
equipment transfer was facilitated by Dr. Robert Walker of Washington
University. We have used this equipment as the core of a laboratory in the
Department of Geology and Planetary Science to measure the natural
thermoluminescence (NTL) and induced thermoluminescence (TL sensitivity) of
meteorites and other materials of interest. Two interlaboratory comparisons
were conducted between the Pittsburgh lab and the thermoluminescence
laboratory at the University of Arkansas (Fayetteville) during 1991. The results
of the first interlaboratory comparison are presented here. The results of the
second interlaboratory comparison are forthcoming.

Two primary factors motivated the development of the Pittsburgh TL lab:
(1) Data reproducibility and credibility. A body of data can only be
credible if it is independently reproducible. If the data generated by two
separate TL facilities repeatedly agree with each other over a wide range of
meteorite petrologic types and chemical compositions, then the data produced
by each laboratory become more believable than they would be otherwise.
(2) Workload. Currently, the Arkansas lab is the only TL facility
devoted full-time to investigation of Antarctic meteorites. As the number of
collected Antarctic meteorites increases, so does the number of potentially
useful TL studies. With the establishment of the Pittsburgh lab, new avenues of
research can be explored more easily by researchers at both facilities in
addition to carrying out routine TL survey work.

Figure 1 is a plot of the NTL values of 16 meteorite specimens used in
the first interlaboratory comparison. Figure 2 indicates 2 sigma errors in these
data. 10 of the 16 samples plot within 2 sigma of the 1:1 correspondence line
between the Pittsburgh and Arkansas data and five of the remaining six plot
within 3 sigma. A possible reason for EET 87549 is that the intensity of the TL
counts measured was beyond the linear range of photomultiplier tube (PMT)
used in the Pittsburgh lab, causing the pulses registered by the PMT to be fewer
than the pulses actually reaching the PMT; the Pittsburgh value is therefore far
below the Arkansas value. While a correction factor for the deviation from
linearity can be calculated, it cannot be guaranteed to produce a reliable value
for EET 87549. Hence, the Pittsburgh value remains uncorrected. Many errors,
such as the non-linearity problem concerning EET 87549, were determined to
be readily corrected by use of optical filters and other technical modifications to
the Pittsburgh TL rig.

A second interlaboratory comparison has now been initiated.
Identification and correction of known sources of error, standardization of
operator technique, and technical modifications to the TL apparatus in
Pittsburgh since the first comparison study should improve the data agreement.

The results of the second interlaboratory comparison and preliminary data concerning Allan Hills region (Antarctica) ordinary chondrites will be presented by the primary author during the poster session at the conference.

Figure 1. Identifies meteorite specimens used in the interlaboratory comparison. All natural thermoluminescence (NTL) data are based on low temperature/high temperature peak ratios, except for achondrites and those with LT/HT peak ratios below 0.5. LEW 85300 is an achondrite. ALHA 79033 and ALH 85046 have LT/HT peak ratios below 0.5. The NTL values used for these meteorites are the true (not normalized) equivalent doses.

Figure 2. Same as figure 1, but indicating 2 sigma errors in the data.