For the series of shots at 25 kbar driving stresses, it was ob-
served that the elastic wave amplitudes for a given propagation dis-
tance were somewhat inconsistent from sample to sample. This effect
is illustrated in Fig. 27 where two different specimens, each about 2
mm thick, were impacted with an aluminum projectile. Although these
two samples appeared to be approximately in the same initial state with
respect to dislocation densities and chemical purities, there is a signi-
ficant difference in elastic precursor amplitude and structure in the
two cases. In addition, it was found that high-temperature annealing
did not appreciably affect the structure of the profiles shown in Fig. 27.

Another point illustrated in the figure is that the overall profile of
the wave corresponding to the higher Hugoniot elastic limit is more
spread out than in the other. This spreading behavior has been ob-
served on all of the specimens tested and, in general, increases with
increasing sample thickness. The magnitude of the effect appears to
be a function of elastic precursor amplitude, as illustrated in the
figure.

The way the profile changes with propagation distance is further
illustrated in Fig. 28. This profile was obtained from a sample about
15 mm thick. The rise time of the plastic wave for this sample is
about 4 times that for the thinner specimens. This suggests that the
profile may not be steady, even for large propagation distances.
Another important point illustrated in the figure is the transitional be-
havior of the wave shape between the elastic and plastic waves, indicat-
ing a third wave. Since static equation of state work does not indicate
a volume transition in LiF for the stress levels studied here, the cause
of the transitional behavior in the waveform is not presently understood.

The primary objective of future experimental work in lithium fluo-
ride will be to isolate the causes for the lack of reproducibility observed
in the present work and to establish a precursor decay curve for lithi-
um fluoride in an initially known state. Secondly, we will study the
profile of the plastic wave in more detail, with an emphasis on the con-
ditions under which the profile becomes steady and how it changes with
different driving stresses.