Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

John A. Hole
Department of Geosciences
4044 Derring Hall, MC 0420
Blacksburg, VA, 24061, USA
1-540-231-3858 Fax: 1-540-231-3386
hole@vt.edu
http://www.geol.vt.edu/profs/jah/

17 February 2005

Dear Bob, Bruce, et al.,

I have been working in a supporting role for a year towards attracting the DUSEL facility to southwestern Virginia. My expertise is in seismic imaging of the earth, analogous to medical imaging, at scales from meters to hundreds of kilometers. Although my prime research area has been the processes that shape continents, such as faulting and plate tectonics, I also perform site characterization for geotechnical, mining, and petroleum exploration.

In 2004, I led acquisition and interpretation of a seismic survey on Forest Service land over the top of the proposed Kimbalton – DUSEL site. The goal was to improve local and regional geologic characterization of the subsurface to >2 km depth. Although limited by budget and site access, this survey confirmed sub-surface structural relationships deduced from surface geological data. We continue to work with these data to characterize fracture patterns in the area.

If DUSEL were to come to Kimballton, I would be very interested in providing imaging expertise to both construction and research needs. Prior to and during construction, improved characterization of the 3-D volume of the underground facility will be required. This can be performed using a mix of surface, borehole, and underground seismic surveying. Once an underground facility exists, a wide range of geological and geotechnical research opportunities would exist. Each would require knowledge of the rock volume behind the wall, and changes in properties such as stress, fracturing, or fluids. I would be very interested in providing this imaging expertise for such experiments.

The types of experiments that would be of most interest to my own research would involve fault properties – only the Kimballton site has a known major (inactive, ancient) fault in its volume – and micro-earthquakes associated with stress systems and rock mechanics. In situ sub-surface observations of such systems provide important information not available at the surface. Second, a 3-D underground seismic observatory can help image deep in the earth at much higher quality than from noisier 2-D surface arrays. This site should be considered as a permanent seismic observatory. Finally, development of imaging technology is a strong part of my research program. Having full access to a volume of rock provides the capability of calibrating the seismic imaging technologies by drilling or excavating the volume. Many of these potential research projects could be collaboratively undertaken with my colleague Matthias Imhof of Virginia Tech, who has related but complementary seismic research interests.

I will continue to work with you to help make DUSEL at Kimballton a reality and success.

John Hole
Associate Professor of Geophysics