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South Dakota Science and Technology Authority
P.O. Box 8329
Rapid City, SD 57709

Re: Initial letter of Interest for conducting research within Homestake DUSEL

Dear SDCTA:

It is a pleasure to provide this initial letter of interest for conducting research in the Homestake facility. The details are provided below.

1. Title: *Close Range Remote Sensing For Mapping of Rock In Underground Excavations*
2. Partial list of participants: Joseph Dove (PI) and students, Virginia Tech. Currently having discussions with two companies interested in the project/technology development.
3. Brief description of research:

Homestake DUSEL provides an ideal setting for application of remote sensing to underground construction. The goal of the project is to develop cost effective equipment and methods whereby the distribution of rocks can be readily determined and mapped. It is also sought to develop predictive methods for rock properties based on measurements. A device will be designed and constructed to acquire images within the underground space of Homestake DUSEL. Combining this mapping with existing fracture network mapping software, a picture of the rock mass can be obtained with minimal human exposure to hazardous conditions. The results can be used as input to geomechanical models and/or visualized using a virtual environment.

4. Space requirements and specific or unusual technical issues: Requires access to sections of many different areas/levels of the mine for imaging and manual mapping. Access to active tunneling is preferred but not required.
5. Access required to the underground facility: Depending of funding status and the device development period, access could be required in 18 to 24 months.
6. Any other general requirements: No other requirements known at this time.

Should you need additional details of this research, please do not hesitate to contact me at jedove@vt.edu.

Best regards,

Joseph E. Dove, Ph.D., P.E.