

Mr. David Snyder, Executive Director
South Dakota Science and Technology Authority
P.O. Box 8329
Rapid City, South Dakota 57709

December 8, 2005

Dear Mr. Snyder:

This letter of intent describes proposed work at the Homestake DUSEL that will help characterize the hydrology of the underground laboratory. Several of us at South Dakota School of Mines and Technology, including Dr. Perry Rahn (Professor Emeritus) and Dr. Larry Stetler (Associate Professor of Geological Engineering) believe that valuable information might be lost while the water level is rising in the mine, unless we act quickly to put pressure-sensitive transducers in the mine and capture valuable data that describe water inflows.

We propose to explore several models for what could be happening as the mine fills with water: (1) The rock is almost completely impermeable and the rising level simply reflect the rate at which adits, shafts and backfilled chambers are becoming saturated; (2) The rising water reflects the recovery of a well that is being pumped -- that is, the classic mirror image of a drawdown curve of a pumped well in a permeable media; or (3) The rate of rise is governed by hydrogeologic input in the form of fissures or hydraulic conduits in the schist, quartzite, and intrusive rocks.

It will be extremely worthwhile to know the hydraulic properties of these types of hard rocks at this scale. Characterization of the mine's hydrology will establish the foundation for future experiments at the mine that could involve flow in fractured rocks.

Additional collaborators will be sought at other institutions such as New Mexico Tech and the Lawrence Berkeley Laboratory, for future proposals.

If you have any questions regarding this proposal, please feel free to contact me. My office phone is (605) 394-2473 and my e-mail address is arden.davis@sdsmt.edu

Sincerely,

Arden D. Davis
Chair and Professor
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