

LOI 1:

1) PROPOSAL TITLE: Establishing Baseline Data for Microbial Populations of the Homestake Mine Before and After Dewatering

2) List of participants (partial):

Sookie Bang-SDSMT

Bruce Bleakley-SDSU

James Staley-University of Washington, Seattle

Susan Pfiffner-University of Tennessee

Mike Lehman-USDA-ARS

Ben Saylor-BHSU (education & outreach)

3) Brief Description of proposed program:

-Before major construction and dewatering are conducted at Homestake as the mine is converted to a research facility, it is important that selected measures of the microbial populations in the mine be taken, so that any changes in microbial populations after dewatering and construction can be noted. It is also important to assay microbial populations in the mine so that presence of any microorganisms that pose public health threats can be monitored. If hazardous microorganisms are found, measures could be taken to remove the health threat. It will be important to assure safe working conditions for all occupants of the mine, including making sure that there is no threat to their health from microorganisms in the mine.

Some of the measures of microbial populations would include:

- a) Inventory and characterization of biofilms on different surfaces in the mine before and after dewatering. Some initial work has been done (Bleakley) on biofilm materials found in selected mine locations before the pumps were turned off.
- b) Characterization of microbial populations present in water seeps before and after dewatering
- c) Characterization of airborne microorganisms in the air of the mine, and in the different waters of the mine, before and after dewatering.

-Methodological approaches would include traditional pure culture work; fluorescence microscopy employing fluorescent in situ hybridization (FISH); and molecular approaches to extract, purify and characterize DNA from biofilms, waters, and other selected mine environments so that the non-culturable microbial population can be assayed.

**Hypothesis:** Changes in microbial populations would be noted as dewatering in the mine proceeds, and construction takes place.

Results would be published in scientific journals; and also made available to the general public by educational outreach.

4) Rough estimate of space requirements and specific or unusual technical issues involved in proposal: Some laboratory facility would be useful in or near the mine to allow some processing of samples, to allow some of the microbial work to be done soon after sampling. Some samples would be transported back to campuses or other research facilities for processing and study. Monitoring of air, water, and surfaces at one or more “hot spots” in the mine where water seeps occur would be likely. These sites would also be likely foci for work in geology, engineering, and other disciplines.

5) Estimate of when access to underground facility would be required: In order to get baseline data for assaying initial microbial populations before dewatering and construction, access to selected areas of the mine would be needed as early as possible, ideally sometime in 2006. Access would be required from that initial point on for the duration of the study. Monitoring for microorganism posing potential health threats should be continuous and probably require on site analysis that could be done in a microbiology laboratory that is part of the mine.

6) Other general requirements or questions for the experiment, research, or outreach activities: None at present time.

