

January 26, 2006

South Dakota Science and Technology Authority
Homestake Administration Building
630 E. Summit St.
Lead, SD 57754

To Whom It May Concern:

Thank you for the opportunity to submit a letter of interest with respect to the new Homestake Laboratory activities. While we are not keenly interested in actual use of the underground lab itself, we are concerned for the health and safety of those scientists and staff who will work for extended periods in such an environment. To that end, we propose that now is the time to establish a longitudinal study that will focus on the long-term health risks to individuals of environmental exposure at the 4850 level and perhaps intermediate levels.

Below please find our brief proposal outline. We are very experienced with studies of the type proposed and, indeed, we are currently engaged in the largest study ever undertaken among American Indians and Alaska Natives, the EARTH Study, a National Cancer Institute-funded longitudinal study of dietary, lifestyle, and cultural risk factors for cancer and a subset of other chronic diseases. Additionally, this proposed study would dovetail beautifully with those that will begin with our receipt of a \$1 million congressional earmark in the current fiscal year to establish the Great Plains Center for the Study of Atmosphere and Health.

Title: A Longitudinal Study of the Health of Homestake Laboratory Personnel Exposed to the Environment at the 4850 Level.

List of Participants (tentative): Black Hills Center for American Indian Health; University of Washington Schools of Medicine and Public Health (? University of California – Berkeley); South Dakota School of Mines and Technology; and Penn Medical Laboratories, Washington, DC (? Clinical Lab of the Black Hills).

Brief Description: Despite best efforts, workers working underground in a mine environment, and especially at the 4850 level within the Homestake Laboratory, will be exposed to dust and ionizing radiation. In both cases, significant adverse health effects are known to derive to individuals subject to these conditions over time. With respect to the first, increased chronic respiratory conditions, including elevated lung cancer mortality rates, have been firmly established among underground workers exposed to silica, cadmium, arsenic, and soluble nickel dust.¹ With respect to low linear energy transfer (LET) radiation exposure of the type found in deep underground mines, risks among occupationally exposed groups such as underground miners are generally consistent with those observed in the Japanese atomic bomb survivors.² That is to say, increased cancer at many sites, pulmonary fibrosis, thyroid disorders, and other mortal and morbid sequelae.

We propose to collaboratively develop a comprehensive, longitudinal study that will monitor for these adverse health effects among those working underground and especially at the 4850 level. If appropriately planned and implemented, such a study will serve many valuable purposes. Such purposes would include: 1) primary protection of individuals' health, including opportunities for prevention; 2) the ability, over time, to add significantly to scientific knowledge concerning what is known about the adverse health consequences to exposed groups of work at these levels in a non-active mine environment; 3) the ability to speak much more definitively about these risks than would be case with typical retrospective, case-control studies; and 4) the opportunity both to inform and rigorously evaluate the development of new protective strategies (e.g., air exchange, personal filters, etc.) that may be desired.

Such a study is typically not very complicated, even if a Manual of Operations would run hundreds of pages. There would be two primary foci: 1) personal health assessments of each underground worker at time 0 and some regular interval moving forward, and 2) a combination of personal and environmental monitoring for exposures of interest (e.g., dust, radiation, bacteria, mold, etc.). As for the first, each underground worker would fill out some computerized instruments that would describe their dietary and physical activity patterns, previous occupational and other exposures, personal health habits, personal and family prior medical history, and a few other instruments we would agree to get (e.g., quality of life, depression, eyesight and hearing, etc.).

Each personal health assessment would also include a physical examination consisting of basic measures (e.g., height, weight, blood pressure, pulmonary function, chest x-ray, eyesight, hearing, quick cognitive assessment, etc.) and laboratory (blood draw and clean catch urine). Of course, we would arrive at the lab measures by agreement, but probably to include a basic chemistry panel, complete blood count, lipid profile, liver function, renal function, thyroid status, pregnancy test for women of child-bearing age, and urinalysis for evidence of kidney disease or infection. In addition, some part of both blood and urine specimens would be put into long-term storage for later use. Of course, many details are being omitted in the interests of this brief LOI.

Rough Estimate of Space Requirements: In all likelihood no space underground. If the Laboratory is planning an active occupational medicine program to coincide with the new research activities (and even if not), then probably some space above ground will or can be used for a clinic or temporary exam station. Alternately, the computerized instruments could be completed in Human Resources and the physical examination performed at the clinic in Lead and/or the clinic/hospital in Deadwood, or any other agreed-upon location.

An Estimate of When Would Require Access to the Underground Facility: Technically, never, although with respect to personal and environmental monitoring, we would be working with others who are in charge of environmental safety to identify and put into position the agreed-upon monitoring devices. This would probably take place prior to the start of any full-fledged underground activity.

Any Other Requirements: This would not be an inexpensive study, nor would it be very expensive. Beyond the SDSTA, we would also look to NIH, EPA, NIOSH, CDC, and others for support of these efforts.

Thank you once more for the opportunity to submit this letter of interest. We are very concerned with the health of all in the Black Hills region, and we hope to have convinced you that a study of the type we propose is both feasible and warranted for a variety of excellent reasons and purposes. We would like to think that a focus on the health of the underground personnel

commensurate with the scientific focus on the actual experiments would help to lend a slightly more holistic cast over the Homestake Laboratory activities than might otherwise be the case. Please do not hesitate to contact me with any questions or comments, do take care, and all the best.

Regards,

/s/

Jeffrey A. Henderson, MD, MPH
President & CEO

References

1. Steenland K, Mannetje A, Boffetta P, et al. Pooled exposure-response analyses and risk assessment for lung cancer in 10 cohorts of silica-exposed workers: an IARC multicentre study. *Cancer Causes Control*. Nov 2001;12(9):773-784.
2. Little MP. Risks associated with ionizing radiation. *Br Med Bull*. 2003;68:259-275.