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South Dakota Science and Technology Authority:

We propose the development of an educational outreach program for the Homestake Deep Underground Science and Engineering laboratory (DUSEL). The purpose of the outreach program is to provide awareness of the DUSEL, enhance the conceptual knowledge of science teachers in modern physics, and provide resources detailing the work at the DUSEL to the citizens of South Dakota. This multiple phase outreach program will be called the Homestake Outreach Program (HOP) and will be established by a group of South Dakota State University science educators, including Matthew Miller (chemical education), Larry Browning (physics education), David Cartrette (chemical education), Provi Mayo (chemical education), Robert McTaggart (physics), and Jay Shore (physical chemistry). Each of these individuals will provide specific expertise to HOP, from specific content knowledge regarding the actual science, to pedagogical knowledge and pedagogical content knowledge necessary to enhance the instruction of science at all ages in South Dakota.

The three phases of outreach will include: awareness, teacher inservice, and informational resources. Each of these outreach thrusts will be intended to reach specific audiences. Through these efforts, positive public perception will be generated for the underground laboratory. Additionally, the DUSEL potentially could become a national laboratory, and the simultaneous development of an educational component to enhance public knowledge of the underground laboratory during the establishment of the laboratory will be advantageous for consideration of the DUSEL as a national laboratory.

First, awareness of the impact and importance of work at the DUSEL will be created through the use of numerous activities designed to parallel work at the DUSEL. These activities will include the production of a video series, the development of a visitor center at the mine site, and traveling museum displays. The creation of a video series will document the changes at Homestake Gold Mine during the construction of the underground science laboratory. It is proposed that the videos be produced by HOP with

the help of multimedia productions on campus and South Dakota Public Broadcasting. These videos will be made available to teachers across South Dakota and possibly, be broadcast on public television. In this way, public awareness will be enhanced of the work being done at the DUSEL. The visitor center, tentatively referred to as the Homestake Outreach Program Visitor Access Center (HOPVAC), would provide on-site activities that demonstrate the variety of underground experimentation currently proceeding in the underground laboratory. Additionally, HOPVAC would be the center for any tour activities deemed possible within the facility. Examples of on-site activities could include real-time data acquisition for computer display. Visitors would be able to observe the data collected during underground experiments allowing tour guides to lead discussions regarding the scientific process. Therefore, visitors at HOPVAC would get a vision how science works rather than simply being told scientific results. HOPVAC will be specifically designed for educational purposes and will be promoted as a potential field trip for classes of all ages. Finally, traveling museum displays demonstrating science concepts studied at the DUSEL will be developed at HOPVAC. These traveling displays will be on public exhibit at regional museums such as the Washington Pavilion in Sioux Falls, the Children's Science Center in Rapid City, and the South Dakota Discovery Center & Aquarium in Pierre.

Teacher inservice workshops will be planned to provide educational opportunities for elementary and secondary teachers across the region. Teachers will be provided the opportunity to work at the DUSEL (the degree of involvement could vary) to gain a hands-on perspective of the science concepts being investigated in the underground laboratory. Through these hands-on experiences, teachers will strengthen current knowledge in science. Once teachers have had the opportunity to engage in the experimentation in the underground laboratory, time will be provided for interpersonal interactions to develop pedagogical methods appropriate toward inclusion of this content knowledge in the K-12 classrooms. Additionally, these meetings will allow K-12 educators to discuss curricular issues regarding when these concepts could be included in K-12 classrooms. Participating teachers would be expected to disseminate the activities developed and curriculum discussions at workshops in local school districts.

The third phase of the proposed educational outreach will be to provide informational resources about the work at the DUSEL. A webite will be developed and maintained by HOP personnel to provide a source of activities involving science projects at the DUSEL. Real-time data acquisition, as previously described, will be made available at the website for use in the K-12 classroom. Additionally, all videos produced to promote awareness will be accessible from the website. Finally, individual scientists working at the DUSEL will be interviewed regarding their work in the laboratory. The interviews will be videotaped and made accessible from the website. Finally, periodic distance learning opportunities will be offered on the DDN network. DDN programming will originate from the DUSEL allowing for actual observations of experiments being conducted in the laboratory.

Space requirements for HOP would include a building at the surface of the mine for the HOPVAC. This building would need to provide space for museum displays that would describe the past and present status of Homestake Mine, including Native American perspectives about the site. Additional space within the visitor center would require adequate space for video presentations and a classroom/computer center for real time data acquisitions. Another consideration for this classroom/computer center would be its construction, not at HOPVAC, but in the upper levels of the mine. This would provide exciting insights for visitors into the work at the DUSEL. Finally, DDN facilities will be needed for the broadcasting of distance learning programming. These facilities could be developed as part of HOPVAC, but in order to provide adequate descriptions of experiments, may need to be accessible at the same levels being developed for experimentation.

Access to the mine would be necessary at various times to document the progress of the DUSEL. Early in the construction phases, video documentation would provide important historical backgrounds into the past uses of Homestake Mine while documenting the progress of construction. A series of videos would allow for a continuous story-line to be developed explaining the progress of the DUSEL. Also, science investigators working in the underground laboratory will be asked to participate in the production of educational videos, allow HOP access to current work for DDN productions, and contribute to teacher inservices by allowing HOP and teachers to participate in their work.

We believe that by approaching an outreach program in this way, awareness will be created improving the perception of the DUSEL in South Dakota. This increased awareness will augment the participation of teachers in HOP workshops, further disseminating the work being done at the DUSEL. The periodic DDN and video productions will also generate increased interest in the development of the DUSEL. These media outlets will promote the science in the underground laboratory, but may also include diverse discussions of history, metallurgy, technology, architecture, and national resources. The result of these educational concepts will be the documentation of the growth of what we hope will become a renowned science laboratory in South Dakota.

Sincerely,

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