Questions from the DUSEL S3 Panel for the Homestake Reverse Site Visit Team

Q - HoI.

The information item below from the Code of Federal Regulations describes an MSHA standard on underground escapeways in operating mines. Please discuss it in the context of your proposed site.

30 CFR § 57.11050: **Escapeways and refuges.**
ESCAPEWAYS--(Metal/nonmetal) UNDERGROUND ONLY

(a) Every mine shall have two or more separate, properly maintained escapeways to the surface from the lowest levels which are so positioned that damage to one shall not lessen the effectiveness of the others. A method of refuge shall be provided while a second opening to the surface is being developed. A second escapeway is recommended, but not required, during the exploration or development of an ore body.

(b) In addition to separate escapeways, a method of refuge shall be provided for every employee who cannot reach the surface from his working place through at least two separate escapeways within a time limit of one hour when using the normal exit method. These refuges must be positioned so that the employee can reach one of them within 30 minutes from the time he leaves his workplace.

A - Ho I.:

- The Ross Shaft re-entry program to re-commission the pumping systems will utilize the Ross cage hoist as primary escapeway and the skip hoist as secondary escapeway. In addition there will be two 4-person refuge chambers and one 12-person refuge chamber moved and located as crews advance level-by-level during re-entry and refurbishing.

- For development and operation of initial laboratory facilities at the 4850 level, the Yates shaft will be refurbished to provide additional primary and secondary escapeways, with both cage and skip hoists operational.

- Development of laboratory facilities at the 4850 level will include permanently installed refuge chambers capable of providing refuge for all laboratory personnel for extended periods of time.

- For development and operation of laboratory facilities below the 4850 level, the #6 winze cage hoist will be operational as the primary escapeway, and both the skip and ramp systems will provide secondary egress. In addition, plans are being considered to excavate a new 8 ft. to 12 ft. diameter borehole from the 4850 level to the 7400 level to install a dedicated lift for personnel access and egress.

- Development of laboratory facilities at the 7400 level will include permanently installed refuge chambers capable of providing refuge for all laboratory personnel for extended periods of time.

Q - HoII.

As the evolution of large projects has repeatedly indicated, funding profiles, and their integral, do not always match expectations. Decisions related to scope, staging, etc. may have to be made to keep the project within an available cost and schedule envelope. The choices might entail re-optimizing the funding routed between the different science/engineering projects, infrastructure capabilities, size/scope of laboratory space and access, etc.

a) How will the possible decisions alluded to above be made by your collaboration – that is, what is the process that you foresee governing such decisions?

b) How will the resulting impact to the scientific/engineering program be assessed and decided?

A – HoII:

We should expect some differences as to how these decisions would be handled depending on whether they relate to the MRFEC-funded construction project or to DUSEL operations, experiments, and user-support activities. However, with reference to the proposed Organization Chart for DUSEL Operations presented in the Homestake CDR Figure 6.3, a general approach would have the following elements:

For decisions of appropriate scale which result from variations in funding profiles, policies, or priorities of the funding agencies, the Laboratory Director would typically initiate actions within the DUSEL organization. The initial steps would be to gather information regarding the impact of the alterations in the funding or schedule profile. Each of the Deputy Directors for Research, Operations, and Education and Outreach would assess potential effects on science and capabilities. In addition, project-related issues would include the Project Manager to evaluate the impact. In the context of the construction project, under the direction of the Project Manger, the Systems Engineer would be expected to provide relevant information to the project's Baseline Change Control Board (BCCB) for actions according to the general process described in CDR Chapters 11.14.2 and 12.4.2.

The Deputy Directors, Project Manager, and BCCB should present the results of their assessment including options and recommendations, possibly with some iterations, to the Laboratory Director Once the alternatives and potential impacts on experiments from the standpoint of the Laboratory have been assessed and depending on the scale, scope, and impact of the changes, groups such as the User's Consortium, the Program Advisory Committee, the Integrated Safety Management Oversight Committee, and International Advisory Committee would be consulted. Representatives of these groups may also serve as members of the project's BCCB. The input from these groups would assist in the decisions made at the Laboratory Director level. At the agency-level, sufficiently

significant changes in scope might also include a cycle through their HEPAP/NSAC/AAAC advisory panels. The Laboratory Director would select a preferred option and close the decision with the agencies.

Q - HoIII.

In order to successfully launch DUSEL and to begin garnering the support it will need from all quarters, it will be critical that the field rally around the chosen site after S3 is complete. While a number of entities are important here, much of what will be required can only be enabled by the DUSEL collaboration(s) working constructively with the community.

If your site is chosen, what specific steps will you take to embrace members of the other teams? Positions of responsibility within the project, in management and elsewhere, must be made available to new collaboration members in order to attract them, and allow them to lend their skills to the next stages of DUSEL development in a manner that optimizes the design and development of a world-class Laboratory. Do you have specific plans for, or thoughts on, how to accomplish this? How will the current project leadership work with the field as a whole to try to unify the community behind the chosen DUSEL?

A. – HoIII:

The Homestake Collaboration, its meetings and process have been open and transparent. Many DUSEL PIs and senior personnel have participated in Homestake workshops and planning meetings. We have a demonstrated history of communication and invitation for participation with other site leaders and senior personnel:

- Kimballton – Vogelaar and Bodnar are senior personnel on the Homestake Proposal.
- Cascades – Homestake welcomed Wilkerson and Haxton to join Homestake effort in June 2006, Wick declined and indicated that he was going to take an extended break from DUSEL work. Wilkerson has decided to focus on experiments. He has presented LOIs to the collaboration and participated in subsequent planning meetings.
- Henderson – Homestake and Henderson have exchanged personnel at workshops and meetings (Wilson, Zimmerman, Lesko, Roggenthen, Wang).
- Soudan – Lesko and Snyder visited Marshak and Cushman in July 2006 to investigate future collaborative participation in DUSEL/Homestake.
- Kimballton – Lesko and Roggenthen visited the Kimballton PIs and collaboration in June 2005 to investigate going forward together (see above).
- San Jacinto – Hank Sobel, one of the San Jacinto PI's, is serving on our PAC.
- PNNL – Homestake PIs held a conference call with PNNL DUSEL supporters in June 2005 to extend an invitation to collaborate. Wang and his Earth Sciences Division colleagues visited PNNL in 2004 and discussed DUSEL with Haxton and Long. They have maintained e-mail contact into the present.
- LANL – Homestake PIs visited LANL with Physics, Earth Science and Homeland Security groups in June 2005 and extended an invitation to collaborate. Hime has agreed to help coordinate scientific programs for Homestake and has resigned from SNOLab.
- FNAL – Homestake PIs have presented multiple seminars on Homestake and DUSEL

to the laboratory directorate, neutrino groups, and BNL-FNAL joint long baseline working group. Homestake's senior personnel, Milind Diwan was the co-covenor of this study group.

- Homestake PAC contains members from the Henderson Collaboration: Harry Nelson served on the PAC, Brian McPherson initially was seated but recused himself for the first PAC session.
- SNOLab – Lesko has been a long time user of SNO and SNOLab. He visited with Art McDonald and David Sinclair in 2005 and 2006 about underground users and requirements. SNOLab hosted two visits by Homestake engineering personnel to the site.
- Japan and Europe – Homestake actively investigated users for DUSEL, including seminars and site visits. Lesko was a user of Kamioka for ~6 years. At the February 2006 workshop in Lead, we had participants from Gran Sasso including Dark Matter and Nuclear Astrophysics experiments. Earth sciences have investigators from four organizations in Japan and Germany participating through Letters of Interest.
- Brookhaven is already working closely with Homestake: Diwan is a senior personnel and Nick Samios serves on our Board of Overseers.
- Oak Ridge National Lab is already an active participant in Homestake: Tommy Phelps has been very active in our planning and coordination efforts.
- At our February 2005 workshop, our Education and Outreach workshop established a senior advisory panel and invited recognized leaders.
- Earth science community joined with the physics community as early as 2000 through participation in the Bahcall/Lesko committee, through the organization of workshops in 2001, a visit to NSF (Wang with Haxton), AUCA/ARMA/NRC and NeSS meetings in 2003.
- Three committee members (Elsworth, Roggenthen, H. Wang) of the 2003 EarthLab report are actively participating in the Homestake collaboration. Homestake PIs and senior personnel participated in all S-1 workshops, in ARMA DUSEL panel, and organized AGU townhall and special sessions for DUSEL.
- The integration of earth sciences with the physics community over all sites is also enhanced through the lecture series organized during the 2005 Spring at UC Berkeley.
- The DUSEL session in the upcoming Canada-U.S Rock Mechanics Symposium organized (by Elsworth) for May 2007 will be the next venue for collaboration building across the community for multi-disciplinary studies.
- DUSEL participated (Fairhurst, Kuchta, Laughton, Roggenthen, Wang) in the SECUREarth workshop for the science plan of national energy and environmental research. Wang and his colleagues are exploring the use of DUSEL for carbon sequestration and transformation research at depths.

If Homestake is selected as the site for DUSEL we will continue to engage and welcome senior personnel and participants into the Homestake collaboration and, as appropriate into management and committee participation. We particularly welcome scientific input and participation in the planning components of the collaboration to assist with defining specifications, phasing, and planning for Early Implementation Program activities and Initial Suite of Experiments. We will continue our history of seeking out appropriate

leaders and participation from all sites teams and S-1 personnel. In the near term we would see adding senior personnel to the working groups and scientific teams. The Long Baseline Neutrinos, Engineering, Education and Outreach groups would benefit in the near term with expanded national participation, but all near-term science working groups would welcome participation.

The earth science and biology users of DUSEL have a challenge in organizing themselves into effective collaboration structures appropriate for a major user facility. The PAC and Homestake PIs have done an excellent job to begin this process, but there is additional work that needs to be done in order to establish earth science and biology collaborations. The establishment of the earth science and biology collaborations will be very important in the next two to three years.

As much of the above would indicate, a natural start toward developing mechanisms for a future inclusion process has been made. Also, scientists (from other sites or recent collaborators) have already become involved more specifically in planning for a particular experiment or experimental program, effectively increasing the focus of their efforts on planning for their scientific research to be done at Homestake. Of this group, a few individuals have expressed interest in Project and Management activities and we welcome this initiative.

Q – HoIV (a.1):
a.)1. Discuss any interchange you may have had with any community or local groups, including, but not limited to, Native Americans, who do not necessarily support establishing a DUSEL at your site, and your approach to engaging these groups in the DUSEL process and working constructively with them going forward.

A – HoIV (a.1):
Black Hills Vision, which describes itself as a regional economic development alliance of more than 100 Black Hills entities, including almost every city, all of the counties, many banks, the two major utilities, individuals, businesses and community organizations, sent a letter to the National Science Foundation dated February 23, 2005 signed by Chairman Michael Derby and 1st Vice Chairman Mark Merchen supporting the Homestake S2 DUSEL application. They wrote:

Black Hills Vision is unaware of "any" voiced local, regional or state wide opposition to Homestake becoming the NSF Deep Underground Science and Engineering Laboratory!

As recently as April 10, 2007 Mr. Merchen has confirmed that no group has approached Black Hills Vision formally or even indirectly to express opposition or concerns about the Homestake laboratory project. To date, the Authority is unaware of any active, organized opposition to the Homestake DUSEL.

Various members of the Homestake Collaboration have been involved for many years with tribal colleges and K-12 school systems serving Native American populations and have, in their interactions with various individuals and their institutions, been met with

acceptance and encouragement when the subject of the Homestake DUSEL is mentioned. It should be noted that in 2005, three of the four members of the South Dakota State Legislature who did not support funding an additional $19.9 million for the Homestake interim laboratory represented largely Native American populations in their districts. The reason expressed by one of the three was that, according to *The Rapid City Journal*, the project "didn't take into account Indian treaty claims to the Black Hills." However, no tribes, elected tribal leaders, tribal councils or tribal elders have expressed opposition to the members of the collaboration, including the South Dakota Science and Technology Authority which owns the site.

Neither the Authority nor members of the Collaboration have had any direct contact with anyone who has expressed opposition to the DUSEL at Homestake.

Q – HoIV (a.2):
2. Include in this discussion any interchange that members of the Homestake team have had with representatives of the Great Sioux Nation Tribes and/or the National Congress of American Indians pertaining to the transfer of the Homestake Mine to the South Dakota Science and Technology Authority and the possible conversion of the mine into an underground laboratory.

A – HoIV (a.2):
Although the Homestake Collaboration has not had any interaction with the National Congress of American Indians, there has been considerable interaction since 2000 between members of the collaboration and Native American institutions and individuals. Collaboration members have been building relationships with Native American institutions since the idea of a DUSEL at Homestake was first proposed. An American Indian elder offered traditional Lakota prayers at one of the first DUSEL-related workshops held in Lead, South Dakota. In addition to the tribes of the Great Sioux Nation, the collaboration members have also interacted with the Arapaho and Shoshone tribes in Wyoming. The following are but some of the many examples of interaction and cooperation.

- Dr. Jeff Henderson, MD, MPH, and an enrolled member of the Cheyenne River Sioux Tribe, submitted a Letter of Interest to the Homestake Collaboration on behalf the Black Hills Center for American Indian Health.

- Dr. Leland Bordeaux, Vice President of Academic Affairs at Sinte Gleske University participated in the Homestake Collaboration's Lead Workshop in February 2006 and has been supportive of Homestake DUSEL.

- Black Hills State University (BHSU) and its Center for the Advancement of Math and Science Education (CAMSE), which is directed by Dr. Ben Sayler, have been involved with interchanges over many years with Native Americans on the topic of the Homestake DUSEL.

- Two of BHSU's largest projects include a partnership with the Rapid City Area School District, which is attempting to reduce the achievement gap between Native American and non-Native American students. This is a five year math and science project funded by the NSF. The other is a state EPSCoR project with Sinte Gleske (Native American college), BHSU, South Dakota State University, South Dakota School of Mines and Technology and the University of South Dakota. CAMSE is playing a lead role in the education component of this project. The prime component is serving the Native American population and partnering with Sinte Gleske. CAMSE is working on teacher leadership on the Pine Ridge Reservation and the Rosebud Reservation. It has been Dr. Sayler's experience that everyone he talks to is interested in how the Homestake DUSEL can help their education system. He reports that his discussions about DUSEL have been met with considerable interest in, and support for, the Homestake DUSEL as an opportunity for learning and he has experienced no opposition.

- In May 2007 a national two day conference funded by the NSF titled Effective Educational Practices in Mathematics for Native American Learners will be held at Crazy Horse Memorial in the Black Hills. The conference is being hosted by CAMSE and the Rapid City Area School district. Dr. Sayler is the PI for this project.

- In September 2007, the South Dakota Office for Indian Education, led by its director Mr. Keith Moore, will host the Indian Education Summit. This is a conference about serving Native American students and is funded by the NSF.

  Both of these conferences will provide the time and place to build upon current relationships with key Native American education leaders as well as to forge new bonds. The Education and Outreach component of the Homestake DUSEL can be discussed with these educators and administrators and open up two-way discussions of the opportunities and needs facing all parties involved.

- Black Hills State University's CAMSE has a partnership with three tribal colleges and the Shannon County (Pine Ridge Reservation) K-12 system. It has a contract to support the Tribal College Rural Systemic Initiative (TCRSI) with the Sisseton-Whapeton tribal college in northeastern South Dakota.

- According to Dr. Sayler, CAMSE has a strong relationship with Sisseton-Whapeton as well as Dull Knife College in Montana and the Wind River Tribal College Rural Systemic Initiative in Wyoming. All three of these have contracted with CAMSE for professional development of their teachers.

- Future plans include working with the American Indian Science and Engineering Society chapters at the South Dakota School of Mines and Technology and at Oglala Lakota College.

- Members of the collaboration, including Homestake Collaboration PI Dr. Bill Roggenthen, will continue to work with the GEAR UP Honors summer program, now

in its 14 year, at the South Dakota School of Mines and Technology which prepares American Indian students for success in college.

- Dr. Dan Farrington, Regional University Liaison Representative for the South Dakota Science and Technology Authority and member of the Homestake Collaboration, has been engaged in conversation with the Wind River Reservation in Wyoming regarding EPSCoR and DUSEL possibilities.

- Mr. Keith Moore, state Indian education coordinator referred to above, who is a Sicangu Lakota and member of the Rosebud Sioux Tribe, was invited to the Homestake Collaboration's Lead Workshop in February 2006.

- Mr. James Rattling Leaf, a member of the Rosebud Sioux Tribe and graduate of Sinte Gleske University (SGU) who led development of the geospatial initiative as well as serving as the Land and Natural Resource Developer at the Sicangu Policy Institute at SGU, participated in the Homestake Collaboration Workshop at the South Dakota School of Mines and Technology in November 2004 and has attended many education-related meetings with collaboration members. He is currently a visiting scholar at the South Dakota School of Mines and Technology.

- Dottie LeBeau of the Todd County (Rosebud Reservation) School District has expressed her support of the Homestake DUSEL, especially with regard to the educational opportunities it presents. She and Dr. Sayler have communicated. She is particularly interested in interactive/virtual curriculum, inquiry-based curriculum, activities that are culturally responsive and developing an earth science curriculum. She wrote to Dr. Sayler: "It would be wonderful to work with scientists to develop science curriculum, especially earth science. I am interested in the educational component to this project especially how our children on the reservation can access and make meaningful connections to learning about grandmother earth."

- Mr. Dennis Gaspar, Director of Federal Programs for the Todd County (Rosebud Reservation) School District has expressed his support for the Homestake DUSEL.

- Ms. Jan Martin, who was the Assessment Coordinator for the Todd County (Rosebud Reservation) School District and is now the State Director of Mathematics for the State Department of Education, has expressed her interest in the Homestake DUSEL.

- Dr. Sayler has been in communication over the years with Ms. Shannon Amiotte, Elementary Education instructor at the Oglala Lakota College in Pine Ridge.

Q – HoIV (a.3):
3. Address the Position Statement from the Defenders of the Black Hills opposing the development of the Homestake Mine into a laboratory.

A – HoIV (a.3):

Defenders of the Black Hills is an Indian Treaty rights group which has expressed its opposition to development in the Black Hills. The Position Statement was issued in January 2005 and calls for the "restoration of the sacred Black Hills to its healthy natural state" and declares that the "states known as South Dakota and Wyoming are illegally occupying the Black Hills" and are in violation of treaties "that the United States made with the Great Sioux Nation, the Fort Laramie Treaties of 1851 and 1868; and that the states of South Dakota and Wyoming are illegally occupying the Black Hills." As delineated in its Position Statement, the group considers operation of an underground science laboratory an action that would "continue the illegal trespass into the Black Hills."

The question as to the ownership of the Black Hills has been adjudicated in the courts, and the United States Supreme Court ruled that the federal government had illegally seized the land and awarded the Sioux tribes $105 million, which the tribes have refused to accept and is in an interest-bearing trust account.

The Position Statements has what appear to be two separate concerns with a laboratory at Homestake. One deals with infrastructure development such as housing and roads to support an increased population. The laboratory could create a need for more housing and roads. The second concern is the potential environmental liability to the residents of the state. The South Dakota Science and Technology Authority has pollution liability insurance in place.

The 2005 Position Statement is the only publicly disseminated literature from the Defenders of the Black Hills regarding the proposed laboratory. There was no opposition to the transfer of the property from Homestake /Barrick to the South Dakota Science and Technology Authority in April 2006.

The Defenders of the Black Hills organization has not had contacted the Authority or the Homestake Collaboration.

Q – HoIV (b):
b.) How extensively has the level of local support for a DUSEL been investigated by members of your team? Please elaborate.

A – HoIV (b):

Statewide

The South Dakota state legislature created the South Dakota Science and Technology Authority in February 2004 and appropriated money necessary for its operation, for indemnification of the Homestake Mine donor Barrick Gold Corporation and for closure of the facility at the appropriate time. The legislature has appropriated $34.2M to the Authority for the creation of an underground laboratory at Homestake.

During Science Day at the legislature in 2004 members of the Homestake Collaboration spoke to members of the legislature and the public about the variety of experiments that could be conducted at Homestake. Only positive responses were received.

Members of the Collaboration have been guests on South Dakota Public Broadcasting television and radio as well as on podcasts to discuss the laboratory and to answer questions from viewers and listeners. No opposition to Homestake was noted.

In the fall of 2005, Governor Mike Rounds called for a special session of the legislature to approve an additional $19.9 million for an interim underground laboratory. In the two weeks leading up the special one day session, the Governor held nine public meetings in communities across the state to explain his proposal and answer questions. The premise of a laboratory at Homestake was unanimously supported at these meetings. The special appropriation of an additional $19.9 million for an interim laboratory at Homestake passed both houses of the legislature by a total vote of 98 to 6, with one member absent.

More than 350 students from all over South Dakota were present in the capitol rotunda for a rally prior to the special session of the legislature. The students were enthusiastic about the laboratory and its potential to increase their educational opportunities in the fields of math and science.

South Dakota Science and Technology Authority Executive Director Dave Snyder has traveled across the state discussing Homestake and the DUSEL project in public forums for the past two and one half years. He has been given support and encouragement at every venue and has not encountered opposition of any type.

Black Hills area

The Homestake project is a major component of the Black Hills Vision strategy. The organization has committed $1M to the Homestake effort, which represents 33 percent of its collected funds. Black Hills Vision made a significant economic contribution in providing funding to Battelle International to assist in the organization and management plan of the interim laboratory. Additional reference: http://www.blackhillsvision.org/.

Local

The Lead Chamber of Commerce and the Deadwood Chamber of Commerce have each repeatedly expressed support for the Homestake DUSEL, including sponsoring dinners at the February 2006 Homestake Collaboration Workshop in Lead. The Homestake Visitor Center will continue offering above-ground tours of the Authority property for visitors during the summer months.

The Lead/Deadwood School District Superintendent and Mr. Greg King, school board member (and former chairman) who is the Property Development Manager for the South Dakota Science and Technology Authority, are pursuing options for partnership opportunities between the district and the Homestake DUSEL.

The fifth annual Neutrino Day was celebrated on February 23 2007 with a community open house at the YMCA in Lead.

HoV. Currently, there is a deep, broad knowledge of the site from those who worked in

the mine during operation. Please present a plan for transfer of their knowledge to a new generation of Homestake team members that will ensure continuity as people retire.

A - HoV:

We plan to initially hire into key positions people who have experience and knowledge of the facility based on their experience with previous mining operations at Homestake and elsewhere. Efforts of these people will be totally dedicated to the development and operations of the laboratory at Homestake without conflicting obligations to a mining operations company. An extremely important criteria for hiring experienced staff will be their willingness and ability to train the next generation of employees. Training will be a significant part of their responsibilities. Less-experienced employees will be hired concurrently to work with experienced staff to allow for rapid transfer of knowledge and skills. Staffing plans are in place to secure the broad-based knowledge needed for initial re-entry through the use of both staff and contract positions. In addition, we plan to initiate hiring practices having a strong emphasis on fundamental capabilities with aptitudes for training to ensure continued development of a skilled and knowledgeable work force. Expected pay scales at the laboratory should ensure that we can attract the highest qualified people from the region. We recognize that transfer of institutional knowledge is always a challenge. An integral component of training programs for staff development will include the following, under the direct responsibility of the Human Resources Manager to ensure implementation:

- Extensive, formal task training with written documentation and evaluation
- Mentoring
- Job Shadowing
- Cross Training opportunities
- On-the-Job Training

Q - HoVI. Please present a preliminary plan and rough cost for:

a) Expansion of the hoist to 25 t capacity

b) Expansion of the hoist to 25 t and 20 foot container

c) a) + b) plus expansion of the No. 6 Winze to 15 t

A - HoVI:

Feasibility studies and cost estimates were done by the Homestake Mining Company in 1997 and 2001 to evaluate upgrades to the hoists and conveyance systems at the Yates shaft and #6 Winze. The study in 1997 considered relatively modest alterations to the Yates production hoists to increase the capacities to handle loads between 15 to 18 tons, and to increase the capacities of the service hoists to 10 tons. In addition to some structural enhancements, alterations included several new components such as hoist ropes, brake systems, clutches and clutch linings, and improved hydraulics for the existing two ore skips and two cages. The estimated costs for the production hoist upgrades (escalated to 2007 dollars) were $583K and $953K for 15 and 18 ton capacities, respectively. Estimated cost to upgrade the personnel hoist to 10 ton capacity

was $953K.

The study in 2001 considered major alterations to the Yates shaft to install a "super-cage" which could handle shipping containers up to 9' x 9' x 20' size and 25 ton load capacity, and also to install a smaller hoist and personnel lift. The nominal super-cage size was 13' x 22'. This configuration would also require major changes to the Yates shaft and headframe, hoists, and the drifts at the 4850 level. Estimated costs are as follows:

	2001-$K		2007-$K	
$	9,352	$	11,833	Refurbish Shaft (new steel construction) surface to 5000 Level
$	839	$	1,062	Engineering
$	1,145	$	1,449	New Headframe
$	9,939	$	12,576	New Service Hoist
$	3,677	$	4,653	New Auxiliary Hoist
$	439	$	555	New Hoist House
$	220	$	278	Development at 4850 Level - Slash existing drift to 12' x 12'
$	25,611	**$**	**32,406**	**Total ($K)**

For the Homestake DUSEL Conceptual Design, we have recommended relatively modest and cost-effective upgrades to the Yates shaft and hoist systems. As described in the CDR Sections 7.4.2 and 7.4.3, we plan to install a single super-cage (~13' x 13') to replace the two existing cages, and a smaller automated lift for personnel. Shipping containers and other large equipment which exceeds the super-cage size capacity may be slung under the cage, hanging vertically. This configuration was done routinely for mine operations to transport bundles of rail and pipe up to 30 feet in length. This will require minimal alterations to the Yates shaft infrastructure and will significantly enhance capabilities for larger-size loads of material and equipment and dedicated access for personnel. The estimated cost for modification of the shaft and installation the super-cage and personnel lift is approximately $14,800K, which is included in the current construction plan and budget for the Mining-to-Labs conversion and is covered by funding from SDSTA and the Sanford Gift.

Based on the results of the studies done in 1997 and 2001:

(a) Including upgrades to the 4850 Level drifts and major upgrades to the hoist and headframe, the load capacity at the Yates shaft could be increased to 25 tons for an estimated cost of approximately $16,000K. This includes the capability of handling standard 20' shipping containers slung vertically under our proposed 13' x 13' super-cage.

(b) With major upgrades to the Yates shaft to accommodate a larger 13' x 22' super-cage configuration for a standard 20' container, upgrades to the 4850 Level drifts, and major upgrades to the hoist and headframe for a load capacity up to 25 tons, the estimated cost is approximately $32,400K.

(c) The load capacity for our proposed Yates super-cage or for the #6 Winze could be increased to 15 tons for an additional estimated $600K each.

We should also recognize that other configurations are possible which could accommodate additional weight capacities and/or sizes, depending on the combined requirements. For example, we have the option to replace the cage with a crosshead and guide assembly in order to handle oversize loads which exceed the cage nominal size constraints. In addition, without the weight of the cage itself, the weight capacity for the hoist system using a crosshead assembly is increased by approximately 4 tons. Thus, other scenarios are feasible to develop economical, cost-effective design configurations which could handle special or specific requirements.

A key component of our design concept for the Yates super-cage is the planned development of surface infrastructure at the Yates Headframe building and at the nearby Sawmill building for inspection, cleaning, pre-assembly, testing, and re-packaging components as they are received from shipment. Development of the Sawmill building into a staging area with a clean assembly shop and construction of a Clean Transfer Station in the Yates Headframe building are also included in the construction plan and budget for the Mining-to-Labs conversion, with funding provided by the Sanford Gift. A description of this concept was included in the poster-presentations at the S-3 Review Committee Site Visit on March 11, 2007. We anticipate that a standard practice for movement of materials and equipment from the surface to underground will necessarily include a careful inspection of all parts to insure that any damage which might have occurred during shipment can be identified and repaired prior to taking those parts underground. Whenever possible, components and subsystems will be cleaned, pre-assembled and tested on the surface to minimize the work required to assemble and commission the systems underground. This is similar to procedures that are typically done at other underground research facilities such as SNOLab. We plan to develop and make available to users standard transport containers which match the size capacities and constraints for conveyance of parts from the surface to underground laboratories. The customized containers will have appropriate provisions to handle the atmospheric pressure differential between the surface and underground and also to maintain cleanliness, for example, using a “double-bagged” design, as needed. Consequently, we deem that the additional costs which would be incurred to install a larger 13’ x 22’ super-cage which could accommodate horizontally a 20’ surface-shipping container are not justifiable. Standard practice for effective underground construction and commissioning will likely require surface inspection and preparation following receipt of shipments and before parts and sub-assemblies are taken underground – for engineering, safety and security considerations.

A further consideration which should be included in discussions regarding project scope in the context of overall systems design for accessibility and material transport is scheduling and availability of the hoist and conveyance systems. With Homestake being a dedicated facility for science, all decisions regarding priorities for access and services will be under the control of DUSEL management. At other underground research facilities, such as SNOLab, scheduling for both personnel and material transport must be coordinated with concurrent mining operations, generally with secondary priority to production requirements. Considerations for a parasitic DUSEL facility might have a

significant impact on decisions regarding preferred design configurations and capacity requirements.

Q – HoVII (a)

Three-part question related to environment:

Indicate what steps are being taken to monitor the stability of the Grizzly Gulch tailings dam and protect the collar of Shaft #5 from a potential accidental inundation by tailings if the dam were to give away. In addition, how is the Open Cut's slope stability monitored and how is its drainage controlled to protect the mine from debris flows or flooding through the bottom of the Cut?

A - HoVII (a):

Both the Grizzly Gulch tailings dam and the Open Cut are owned by Barrick/Homestake Mining Co. which has sole responsibility and liability. The remediation efforts and bonding arrangement between HMC and the State of South Dakota including a 38M$ bond for 100 years and requirement of monitoring stations along the slopes of the Open Cut and in nearby substation, etc. can be viewed at:
http://www.state.sd.us/denr/Boards/2006/bme0506mins.pdf

Grizzly Gulch Tailings Dam:

- The preliminary risk assessment in 2006 for the Homestake Conceptual Design evaluated risks associated with the proximity of #5 shaft to Grizzly Gulch. The conclusion of the study rated the Likelihood of Occurrence to be at Level 2 – *Unlikely*. A discussion of the risk assessment is presented in CDR Chapter 11.6.3.15.
- The Homestake Mine Grizzly Gulch Dam Emergency Preparedness Plan with the Inundation Failure Study was submitted to South Dakota DENR in August 2006. **This study and map of 06/17/05 indicates water would never reach #5 shaft if there were a failure.** Based on this information, the likelihood of occurrence is *Remote*, and even less significant than reported in the CDR Risk Assessment. A map of dam failure limits is shown in Figure 1.

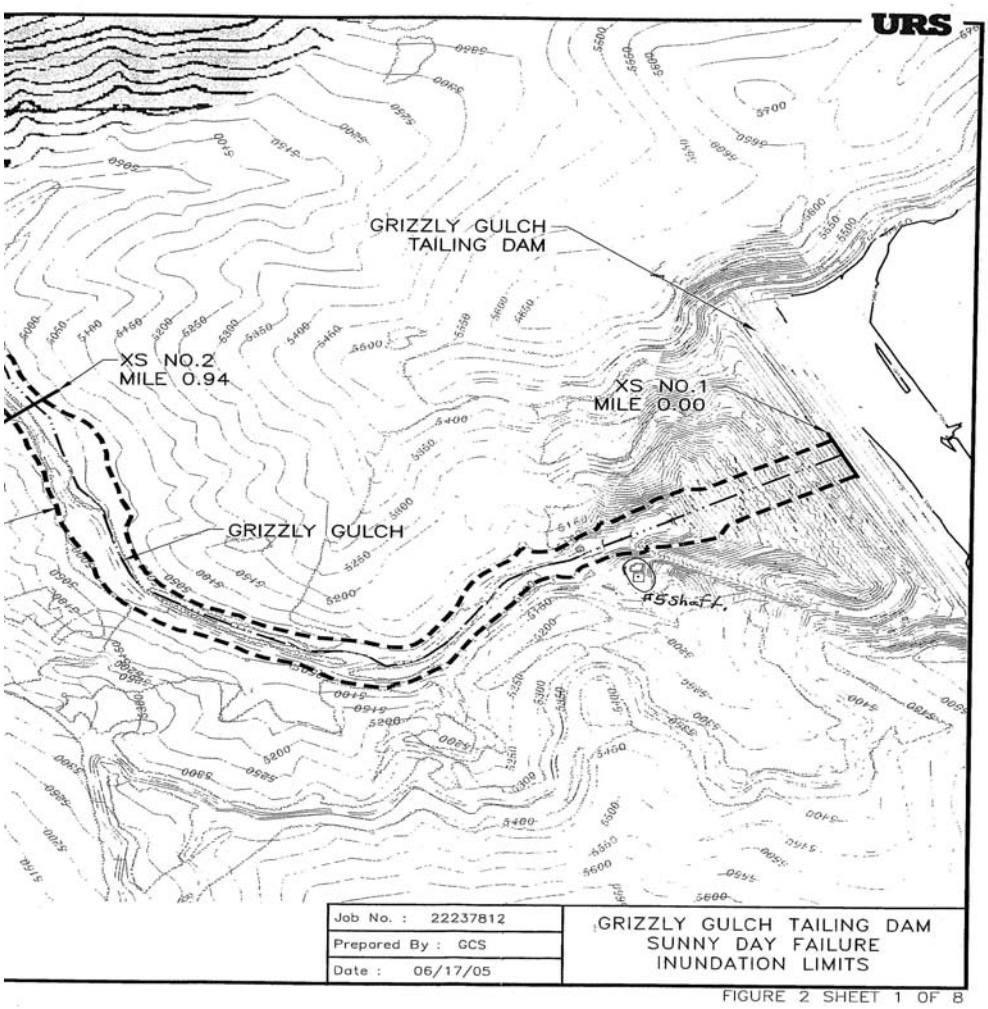

Figure 1. Map of Grizzly Gulch Tailing Dam Failure Inundation Limits.

- Homestake/Barrick conducts monthly piezometer readings to monitor any dam leakage, and monthly formal physical inspections of the Grizzly Gulch Tailings Dam.
- Homestake/Barrick has hired an independent consultant (URS) to conduct annual inspections.
- Homestake/Barrick has executed a water management plan for the Grizzly Gulch facility.
- Mine Safety Health Administration conducts at least two inspections per year as part of the regulatory requirements for Barrick.
- South Dakota Department of Energy and Natural Resources conducts at least one inspection per year.
- Lawrence County Emergency Management includes this site response in their emergency response plan.
- The freeboard at the dam is designed to withstand two 100 year rainfall events, plus the Probable Maximum Flood, which is defined as 42.71 inches of precipitation in 96 hours. No surface drainage water comes into the tailings pond as divergence canals are located on the perimeter of the ponded area.

- A concrete diverting structure above the #5 shaft or a positive closing seal activated by water flow has been considered for installation, if needed, however will not be required based on conclusions of the risk assessments.

Open Cut

- Homestake/Barrick has a bi-annual inspection of the monitoring system with laser/survey points in place. In addition, visual checks are conducted on a monthly basis. Periodic independent experts' studies are conducted as required.
- Homestake/Barrick has an approved 100-year bond in place for the Open Cut site.
- Homestake/Barrick has a Storm Water Pollution Prevention Plan which has been approved by the State Department of Environment and Natural Resources (DENR) for the Open Cut area. Not all surface water is diverted from the open cut but Homestake/Barrick has a water management plan at the Open Cut areas.
- There are no open holes or direct access into the underground workings from the open cut. Water from open cut area enters underground by seepage through rough rock filled or covered former workings. All accessible openings in and around the perimeter of the Open Cut have been plugged or otherwise closed to prevent entry or impact from weather related events. No debris can enter the underground from the Open Cut. Any rock failure in the Open Cut will not impact the underground workings.

Q – HoVII (b):
Is there a contractual commitment by Homestake/Barrick to construct a treatment plant for the leachates of its reclaimed properties? Would there be a joint use of the water treatment plant that has been transferred to the Authority to serve both Homestake's reclamation needs and the Authority's need for treating the dewatered mine water and, if necessary, of mine discharge water?

A – HoVII (b):
Water Treatment

- Homestake/Barrick continues with reclamation work on properties independent from SDSTA property includes, but is not limited to, Yates Waste Rock Facility, Grizzly Gulch Tailings Dam Facility, Open Cut and East Waste Rock Facility including the Blacktail Water Treatment Plant, Gold Run Park and Slurry areas.
- As far as we know, the possibility of Homestake/Barrick's constructing a water treatment plant for the Grizzly Gulch tailings dam is still in the planning stage and no contractual commitments have been made by Homestake/Barrick.
- There have been discussions between SDSTA and Homestake/Barrick concerning the possibility of joint use of the SDSTA's Water Treatment Plant, in lieu of construction of a new Water Treatment Plant at Grizzly Gulch by Homestake/Barrick. There is no contractual commitment concerning this possible joint use.

Q – HoVII (c): Considering the 1959 and 2002 wildfires that threatened the mine's infrastructure and the adjacent towns, what measures does the Authority intend to take to reduce such prospects around the mine area?

A - HoVII(c):

- The June 2002 Grizzly Gulch fire mitigated much of the fire hazard surrounding the property donated to the SDSTA as much of the perimeter areas to the South were burned in the fire. Following the 2002 fire, Barrick/Homestake instituted extensive logging and other activity in and around the property to mitigate all excess fuel, especially ladder fuels, on areas of the property that was not burned. This effort was completed on the property donated to SDSTA prior to the transfer of the property to the SDSTA. It has also been completed on the areas adjacent to the SDSTA property. The work included very complete removal of trees and fuels under and near any power lines.
- Barrick/Homestake and the SDSTA recently completed an agreement on the joint control of trees and fuels under and near jointly used power lines.
- A policy to annually inspect the forested areas of the SDSTA property and to determine needs for potential fire mitigation has been established.
- Barrick/Homestake continues to monitor and mitigate as necessary their property adjacent to the SDSTA property.