

HOMESTAKE DUSEL AND SANFORD LABORATORY NEWSLETTER

aDear Homestake Collaboration,

Welcome to the March monthly newsletter for Homestake DUSEL and South Dakota's Sanford Laboratory. We would like to receive your input on news, links to news articles, upcoming workshops, conference notices, scientific updates, information concerning the Collaboration, and other highlights relevant to our shared goal.

Important Dates

March 25-27 – Directors' Homestake Visit – Rapid City and Lead, South Dakota

April 3 – EHS Committee meeting – Berkeley – Contact: George Campbell

EXPERIMENTAL FACILITY EXPERIMENTAL DESIGN

DUSEL Preliminary Design

The DUSEL Engineering group is continuing to develop engineering plans for large cavity excavations. They are currently evaluating two possible methods: The Bulk Excavation Method as shown in Figure 1 and the Benching Method as shown in Figure 2.

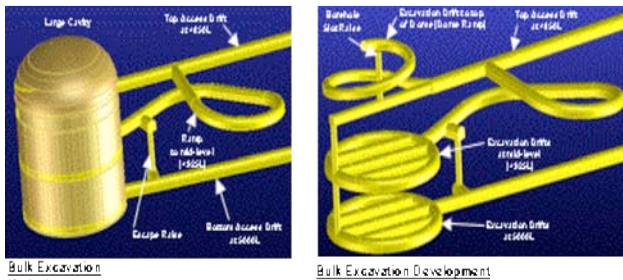


Figure 1: Bulk Excavation Method

The Bulk Excavation Method will have top access from the 4850 level, bottom access from the 5000 level and center access from the mid-level at 4925. Long hole drilling will take place from all three levels with blasting happening from the 4850 and the 4925 levels. Waste rock removal will be from the 4925 and 5000 levels.

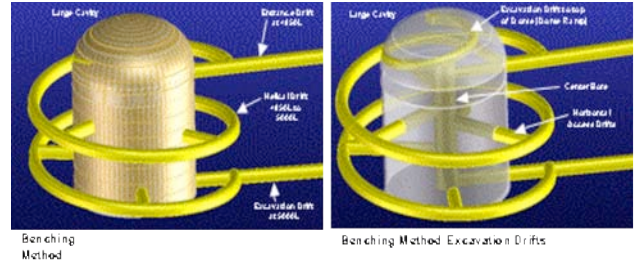


Figure 2: Benching Method

The Benching Method will have top access from the 4850 level and bottom access from the 5000 level. A helical drift driven around the perimeter with horizontal accesses every 20 vertical feet will provide both access and waste rock removal as the excavation proceeds from the top down.

MARCH 11-12 EIS MEETING - BERKELEY

Steve Meador, NSF, led the first planning meeting for preparation of an Environmental Impact Statement for DUSEL. Participants included Margaret MacDonell and John Peterson of Argonne National Laboratory who will manage the work for the EIS, and Kevin Lesko, Bill Roggenthen, Richard DiGennaro, Steve Marks, and Steve Dangermond, and other DUSEL project staff.

The meeting agenda included discussion of goals and status of the EIS process, current organization and management of relevant DUSEL information, implementation strategy, communication plans and identification of points of contact, document management, websites, schedule targets, and institutional expectations for contributions and participation.

For the EIS process, several specific steps are required for compliance with the National Environmental Policy Act (NEPA <http://www.epa.gov/compliance/nepa/>), beginning with a public announcement of the Notice of Intent, followed by Public Scoping Meetings and preparation of a Draft EIS. The target schedule for the NOI is in the summer of 2009, and Scoping Meetings in the late summer or fall.

Discussion at the planning meeting also focused on technical issues that are relevant to the EIS for DUSEL, including alternatives analysis for various design and engineering decisions (e.g., waste rock disposal, surface site plans and traffic patterns, life-cycle plans and decommissioning options, laboratory and experiment configurations), and other

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potential impacts to the environment, community, socioeconomics, air and water quality, historical implications, etc. The ANL team is responsible for research, generation of technical reports, compilation and preparation of all supporting and required documentation for the EIS process. Some involvement of the DUSEL and Sanford Lab will be needed, of course, to facilitate their work and contribute to the process. A site visit to Lead, SD by the EIS team is tentatively scheduled for early May.

GEOTECHNICAL UPDATE

The kickoff meeting for the RESPEC geotechnical contractors (the contract has been executed last month) was held at the RESPEC office. Plans are to start preparation work, issuing subcontracts and safety training in March. Site investigation at the 300L will take place in April. A series of meetings took place with Golder and Maptek representatives regarding the current geotechnical contract as well as the extended scope definition including the large cavities.

Site Infrastructure Assessment: Negotiations with ARUP/SRK to formalize a contract to perform the Underground Infrastructure Assessment work continued with an expectation that an agreement would be in place by mid February. Work is expected to commence with field inspections starting in March 2009.

Interactions with Sanford Laboratory's Early Implementation Program and DUSEL's Suite of Experiments

DUSEL Experiment Development Committee (DEDC) is organizing a trip to Washington to present DUSEL's experimental program, in particular the non-physics opportunities, to the Department of Energy and several directorates at NSF. Twenty-five S-4 proposals were submitted, including 8 non-physics proposals.

Large Cavities and Long Baseline Neutrino Programs. Following the active interactions between the recently convened Large Cavity Advisory Board (LCAB) and the Geotechnical Advisory Committee (GAC) at the Annual Review, a plan was drafted to obtain the geotechnical data, create the geostructural model, and obtain necessary expertise to proceed with site-specific coring and drifting activities required to advance the design of the large cavities at the 4850L. The plan is being vetted by both the LCAB and the GAC. We

anticipate establishing new contracts with structural geologists, adding scope to existing geotechnical contracts, and identifying additional personnel within the geotechnical contractor organizations to begin this work in March 2009. The plan spans over approximately the next seven months with activities coordinated with the LCAB meeting in July in South Dakota.

Large Cavity Design Work continued in the area of design of Large Cavity excavation options. A presentation was prepared and delivered to the C6 group (Civil Construction Coordination for the Long Baseline Neutrino Experiment program) at UC Davis.

The Sanford Science Integration Group was established to foster coordination between science activities and operational people at Sanford Laboratory. This regularly scheduled meeting provides an opportunity to look ahead and anticipate science needs within the coming three months or so and ensure that the operational arm of the laboratory can accommodate those needs.

DUSEL 2010 Center: South Dakota recently established a DUSEL 2010 Research Center entitled, "The Center for Detecting Rare Physics Processes with Ultra-Low Background Experiments". The center, funded by the state with matching contributions from the university partners, adopted an organizational structure and identified near-term tasks.

DUSEL CONSTRUCTION PROJECT ENGINEERING

Laboratory Design and Infrastructure Requirement Definition Activities

a. Experiment Requirements

We have begun a re-evaluation of the infrastructure supporting access for personnel and scientific equipment, with a particular focus on the Yates shaft hoist and cage system. Potential requirements and cost versus benefit of various options are being evaluated based upon the following considerations:

- What is the largest assembly that can be taken underground? In particular, can a typical detector cryostat be transported intact? What is the frequency for transporting such objects? What additional underground infrastructure, such as machine shop and assembly space, will be required if a cryostat must be constructed underground?

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- Consider transportation of all equipment and material associated with a large detector experiment.
- Consider the impact of several large detector experiments being constructed simultaneously.
- Consider transportation of cryogenics for both routine ongoing needs (primarily LN) and for single large volume fill (LAR for long baseline neutrino detector, for example).

An initial assessment of LN use based upon a scaling from use at LNGS, and assuming that the Yates cage provides means of transport, suggests that this use may drive the hoist capacity requirements. However, this assessment must be refined. In particular, the dominant LN use at LNGS is for water Rn removal. Alternatives will be evaluated, such as vacuum degassing for Rn removal, and alternative means for cryogen transfer, such as dedicated cryo-piping from the surface.

b. Site Infrastructure Assessment

Efforts focused on collection of historical documents for review in preparation for Infrastructure Assessment to be performed. A web site was established as a storage site for electronic document storage and review. The web site was populated with electronic files for review. Contract negotiations continued with an expected final agreement to be signed in early March. The initial site visit to commence field investigations took place scheduled in early March.

SANFORD UNDERGROUND LABORATORY AT HOMESTAKE

Dewatering nearing 4850 Level

The water level at the Sanford Laboratory at Homestake dropped 65 feet in February, compared to 57 feet in January. By early March, the water was well below 4800 feet underground.

Dewatering is on target to meet or beat the newest "most likely" date for reaching the important 4850 Level -- April 18.

Snowmelt and spring rains could slow dewatering in the coming weeks, but Sanford Lab technicians had installed a second set of three 700-horsepower pumps by early March.



Sanford Lab Infrastructure Technician Bill Heisinger, a former Homestake miner, adjusts a 700-horsepower pump on the 3650 Level at Homestake

In addition, Sanford technicians and contractors began dropping pipe into Six Winze -- a shaft that drops from the 4550 Level to the 8000 Level -- in preparation for lowering two high-volume submersible pumps to the 5,250-foot level. These pumps will allow dewatering to continue below the 4850 Level.



Left: Dr Jose Alonso, Director of Sanford Lab at Homestake, inspects a jackleg drill on the 4550 Level. The jackleg is the iconic tool of hardrock mining. Technicians were using this one to install pins to hold dewatering pipes.

Yates Shaft re-entry

Two-tiered work decks were installed in the north and south compartments of the Yates Shaft, which will significantly speed rehabilitation of the shaft.

Rock-bolting and screening were completed in the top 300 feet of the Yates Shaft, and an inspection crew rode the cage down the Yates to inspect the 1100 Level.

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Contractors and Sanford Lab technicians pose on the new two-tiered work deck in the 4850 foot Yates Shaft



Left: South Dakota School of Mines Geology Professors Mike Terry (far left) and Colin Patterson with South Dakota Geological Survey senior geologist Kelli McCormick huddle on the 800 Level at Homestake. They will bring students here in March.

DUSEL/Sanford Lab science support

The fiber network was extended to five instrument stations on the 2000 Level (first deployment of the comprehensive fiber network).

Engineers also finalized designs for conversion of Homestake warehouse into a surface staging facility for the LUX dark matter experiment and for later use as surface lab space.

In early March about 40 members of the LUX Collaboration met at the Sanford Lab at Homestake to plan surface and underground infrastructure and facilities.

Background measurements also continued in February and early March. Regis University researchers reconfigured sensors on the 2000 Level to measure neutrons, in addition to muons. The University of South Dakota team measured radon and gamma radiation on the 2000 Level and the 4550 Level.

EDUCATION AND OUTREACH

About 20 biology students from Black Hills State University participated in an underground sampling expedition.

Geologists from the South Dakota School of Mines and Technology scouted the 800 Level as a site for field exercise for geology students, planned for March. The students will survey the level and develop a research proposal.

More than 80 applicants for Davis-Bahcall scholarships for summer study were narrowed down to 30 finalists to be interviewed in March.

The Sanford Underground has joined Argonne National Laboratory, the NSF, NASA and other science organizations on Twitter -- a booming Internet social networking site. Go to www.twitter.com and search for Sanford Lab to "follow" the project.



Sanford Lab Safety Officer Tom Regan, left, explains a tiltmeter on the 2000 Level to other Sanford Lab staff

The DUSEL Education Center Design team continues to work toward a preliminary design of the Sanford Center for Science Education programs and facility infrastructure. With support from both NSF and private donations, the Center plans to be a world-class facility with multiple programs in the areas of:

- Onsite interpretation (an interpretive center with exhibits on the surface and underground)
- Offsite interpretation (virtual DUSEL)
- Educating educators
- Engaging and serving scientists
- Establishing and administering research experiences

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- Creating content
- Reaching out to and engaging historically underrepresented audiences

Before DUSEL construction commences, Sanford Laboratory, primarily with funding from SDSTA, is pursuing targeted early education activities that will act as prototypes and build capacity for the future. These early efforts include partnerships with South Dakota state government, regional universities, early science collaborations, and other groups. Recent activities include:

- Talks to state and local educator groups by Dr. Jose Alonso and Dr. Peggy Norris
- Discussions with Long Baseline and LUX collaborations at their recent collaboration meetings
- Establishment of a working group to look at possibilities for an interdisciplinary REU site at Sanford Laboratory beginning in 2010
- Beginning this summer, the establishment of a DUSEL/Sanford Laboratory Quarknet Center at Black Hills State University under the direction of faculty member Dr. Kara Keeter.

In addition, the South Dakota Virtual DUSEL effort, centered at Dakota State University and South Dakota State University, has been busy establishing partnerships and applying for cyberinfrastructure funding to set up a core environment for the mine infrastructure upon which future science and engineering education modules can be based.

Dr. Peggy Norris presented the vision for the Sanford Center for Science Education, sought input, and discussed early education opportunities with three key audiences: the Long Baseline Neutrino Collaboration, the Lead Chamber of Commerce, and a group of leading K-12 and university educators from the northern Black Hills.

Dr Kevin T. Lesko presented an invited paper to the European underground science group ILIAS in Dresden Germany (February 16-19). This group is at the end of their six-year contract, but is seeking to submit a new multi-year contract to enhance coordination and communication among the European underground science groups.

During National Engineers Week (February 15-21) Todd Seaman (Sanford Laboratory), Ziggy Hladysz and William Roggenthen (SDSMT) made a panel

presentation in Rapid City to the South Dakota Engineering Society.

William Roggenthen presented on DUSEL and its Integrated Suite of Experiments to the South Dakota state convention of the Lions Club.

Meetings were held with Tribal Elders, American Indian Leaders including Gerard Baker, Superintendent at Mount Rushmore.

SAFETY: At Sanford Lab: A direct phone line has been set up which will provide a recorded message regarding adjusted Lab hours or other information due to inclement weather conditions. The number can be accessed by phone from any location: 605-722-0002.

Supernova Workshop-September 2009. For more info:
<http://www.physics.ucla.edu/hep/supernova/>

Newsletter Editor: Melissa Barclay

Contributors: Kevin Lesko, Bill Harlan, Dave Plate, Syd DeVries, Ben Saylor & Peggy Norris.

Special thanks to Bill Harlan for excavation images on pp. 3-4.

HOMESTAKE DUSEL CONTACT INFORMATION

Lawrence Berkeley National Laboratory

Richard DiGennaro: 510-486-5516

RSDigennaro@lbl.gov

Project Office: Dianna Jacobs

510- 486-7191

DJacobs@lbl.gov

South Dakota Science and Technology Authority

Ron Wheeler, Executive Director

Laurie Gehner, Executive Assistant

605-722-8650

South Dakota School of Mines and Technology

William Roggenthen: 605-394-2460

William.Roggenthen@sdsmt.edu

University of California at Berkeley

Kevin T. Lesko: 510-486-7731

KTLesko@lbl.gov

Melissa Barclay: 510-486-5237

mwbarclay@lbl.gov