

HOMESTAKE DUSEL AND SANFORD LABORATORY NEWSLETTER

Dear Homestake Collaboration,

February is already here, along with our monthly newsletter for Homestake DUSEL and South Dakota's Sanford Laboratory. We always welcome 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.



*Reviewers, Participants and Observers pose in front of the Faculty Club, UC Berkeley campus - January 29
Photos: Courtesy of Roy Kaltschmidt, LBNL Public Affairs Office*

JANUARY 28-30 ANNUAL REVIEW

Most of January was devoted to preparing for and conducting DUSEL's first annual review. The review, chaired by Dr. Edward Temple, was held January 28-30 at the UC Berkeley Faculty Club. Over one hundred individuals participated in or observed the review.

On January 28th, Chancellor Robert Birgeneau welcomed the Review group to the Berkeley campus. He announced that Berkeley had just hired Professor Wick Haxton, who is anticipated to play a leading role in DUSEL's science programs at Berkeley.

The review provided the DUSEL team with an opportunity to present all aspects of their efforts to advance the DUSEL design and also to present their plan for the full design phase (preliminary and final design elements) to prepare DUSEL for National Science Board consideration. The Committee report is anticipated to be ready by the end of February 2009.

EXPERIMENTAL FACILITY CONCEPTUAL DESIGN

A. DUSEL Preliminary Design: The DUSEL Engineering group is continuing to refine the three major campuses within Homestake. One at the 300 level, 4850 level and 7400 level. The figure below outlines the current plans. The color scheme follows the current thinking for a possible phased excavation sequence. White being the baseline design for drifts and lab modules. Blue would be future lab modules. Yellow would be the first large cavity with the green outlining large cavities for future development.

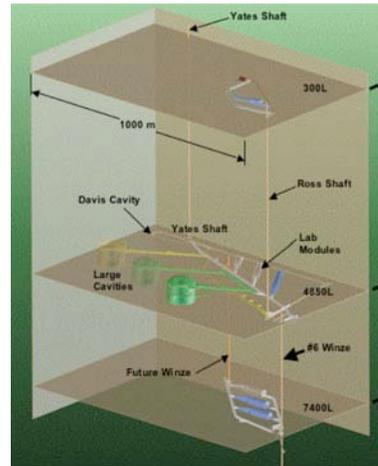


Figure A

B. The lab module shown below is being developed in consultation with various experimental groups. The modules currently planned are 20 meters wide by 20 meters tall at the apex of the arched ceiling. The length will vary between 50 meters to 150 meters. The figure below shows the possible layout of a cryogenic detector with a water shield and a solid state detector.



Figure B

C. The DUSEL Engineering group has also been looking at the possible excavation sequence of a large cavity. The figure below shows the drifts that may be required to excavate a large cavity.

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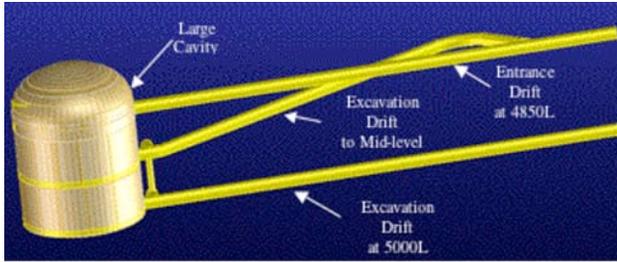


Figure C

GEOTECHNICAL UPDATE

The *Geotechnical Inspection Contract* was signed and executed with RESPEC. Work will begin at the 300 Level in February 2009.

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

DUSEL Experiment Development Committee (DEDC) & DUSEL's Suite of Experiments held several meetings in advance of the review, including a face-to-face meeting in Berkeley.

- a. **Large Cavities and Long Baseline Neutrino Programs.** The Large Cavity Advisory Board and the Geotechnical Advisory Committee held meetings in January and reviewed the supplemental funding request. This request is primarily aimed at funding large cavity design work. The GAC welcomed new members including Doug Tesarik (NIOSH).
- b. **Vertical Shaft Meeting:** The 2nd Vertical Shaft Meeting was held in Brookings, SD, on January 22. This meeting examined further collaborations specifically related to the use of vertical shafts at Homestake. Participants making presentations included representatives from the University of Tennessee, Indiana University, South Dakota State University, and potential industrial partners.
- c. **Machine Shop Tools:** The paperwork was completed for transfer of machine tools from Los Alamos National Laboratory to the National Science Foundation. The tools will be located at the Sanford Laboratory in Lead, SD, and should be a foundation for the general facilities as the laboratory develops.

DUSEL CONSTRUCTION PROJECT ENGINEERING

Work was performed in the preparation of various presentations for the NSF Review of January 28-30, 2009. In addition, presentations were made during the review and a Breakout was led in the area of Facility Design, Construction and Operation.

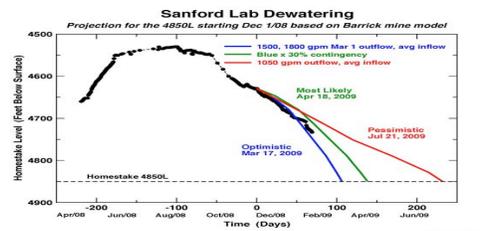
Site Infrastructure Assessment: Negotiations with ARUP/SRK to formalize a contract to perform the Underground Infrastructure Assessment work continued with an expectation that an agreement will be in place by mid February. Work is expected to commence with field inspections starting the first week of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

SANFORD UNDERGROUND LABORATORY AT HOMESTAKE

Dewatering and "Deep Six"

Sanford Lab engineers and operations staff have continued to improve the dewatering process, both on the surface and underground. Upgrades include:

- Adding 32 sand filters to remove iron from the mine water, nearly doubling the water-treatment capacity.
- Lowering a 150-horsepower submersible pump into the deep pool in the Ross Shaft, replacing smaller pumps.
- Adding three 700-horsepower pumps to the three big pumps already in use at the 1250, 2450 and 3650 levels. These pumps will be online by early March, providing extra capacity and greater reliability.
- Clearing the 4550 Level hoist room of old equipment to prepare for "Deep Six" -- a project to lower large, deep-water pumps down Six Winze to the 5150 Level. Six Winze is a shaft that drops from the 4550 Level all the way to the 8000 Level.



4850 Sanford Lab Dewatering Projection

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During January the Sanford Lab pumped about 2 million gallons a day out of Homestake, dropping the water level more than 43 feet to just below the 4700 Level. The "most likely" projection for reaching the 4850 Level is April 25.

SDSTA staff also lowered a Sea-Bird deep-water sampler down Six Winze to test water at three deeper levels. Dr. Bill Roggenthen of South Dakota School of Mines & Technology and John Scheetz, who runs the Sanford Lab water treatment operation, are studying the results. So far, these tests have yielded no surprises, and it is assumed that the current water-treatment regimen will handle water from below the 5000 Level.



Above: Sea-Bird in shaft



Sea-bird – Side view

Yates Shaft re-entry

RCS Construction of Rapid City, S.D. removed old utilities from the top 300 feet of the Yates Shaft, which will be the science portal to the Sanford Lab. RCS also began installing new water lines and continued rock bolting to stabilize the shaft. An SDSTA inspection crew rode the Yates cage to the 1100 Level to assess ground conditions -- the first

trek to that level since Homestake was sealed shut in 2003.

Cooler temps at the 4550 Level

Sanford Lab Ventilation Technician LeEtta Shaffner and Mining Engineer Bryce Pietzyk used a computer model to propose a change in the Sanford Lab ventilation system. Then Shaffner led a crew of eight to the 3500 Level, where they knocked out a foot-thick concrete wall. That opened an airway to the Oro Hondo Shaft.



Left: Bruce Pietzyk performs ventilation check at Yates air door

On top, technicians restarted an Oro Hondo fan that had been out of operation since 2001. The change dropped at the 4550 Level from 90 degrees to 71 degrees.

The cooler temperatures were important because crews are working at the 4550 Level to install deep-water pumps.



Above: Oro Hondo wall team

DUSEL Science support

SDSTA staff worked with the LUX Collaboration to design and plan renovations to a large Homestake warehouse for use as a surface staging and testing facility. A Technical Design Review was held at the end of the month. Final completion is projected for July.

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Lawrence Berkeley National Lab reviewed SDSTA designs for an improved high-speed IT network at the Sanford Lab. IT staff at SDSTA have begun assembling a new office automation and network system that will be independent of South Dakota's state network. It includes extra capacity for science collaborations.

Fiber optic cables also have been installed from the surface, down the Ross Shaft to the 300, 800 and 2000 levels to support early science. Fiber has also been installed from the Yates Hoist Room to the Yates Dry building. In addition, the Sanford Lab is now connected to Internet2 by South Dakota's high-speed REED Network, with a 10Gbps connection.

Early science at Sanford Lab

Early science progress at the Sanford Lab includes:

- **The Transparent Earth.** Dr. Bill Roggenthen of SDSMT and Dr. Steven Glaser of the University of California at Berkeley are considering expanding their array of sensors. A Tiltmeter pedestal was stabilized on the 2000 Level.
- **Deep Underground Gravity.** Instruments continued to acquire data on the 300, 800 and 2000 levels. (This project is associated with LIGO.)
- **Hydrometry.** Dr. Larry Stetler of South Dakota School of Mines & Technology and Dr. Jim Volk of Fermilab installed the first two arrays of the Hydrostatic Water Level System on the 2000 Level.
- **Radioactivity.** Dr. Dongming Mei of the University of South Dakota and Dr. Fred Gray of Regis University were onsite in January to begin background characterizations.
- **Biology.** The first peer-reviewed microbiology paper based on Sanford Lab/DUSEL research was accepted by the Journal of Industrial Microbiology and Biotechnology. The research team included groups from South Dakota School of Mines & Technology, Idaho National Laboratory and the U.S. Department of Agriculture.

Also in January, researchers from South Dakota universities and the Sanford Lab received approval to create the South Dakota DUSEL Research Center.

<http://www.state.sd.us/News/showDoc.aspx?i=10294>

EDUCATION AND OUTREACH

Dr. Peggy Norris, recently of Lawrence Berkeley National Laboratory, set up shop at the Sanford Lab in January as deputy director for education and outreach. Dr. Norris spent most of her first month working on the DUSEL Review and networking with scientific collaborations. Her "home institution" is Black Hills State University, but she also has ties to the SDSTA and DUSEL. One of her early priorities is coordinating E&O activities across the spectrum of Sanford Lab/DUSEL organizations.

Dr. Norris also is on the selection committee for the new Davis-Bahcall Scholarships. The program is administered by the South Dakota Department of Education, with a grant from 3M Corporation. More than 80 students have applied for 10 openings. The selected students will spend a week in July studying at the Sanford Lab, a week in Italy at Gran Sasso National Laboratory and three weeks at Princeton University.

South Dakota Gov. Mike Rounds and Dr. Frank Calaprice of Princeton created the Davis-Bahcall Scholarships, named for Dr. Ray Davis and Dr. John Bahcall. <http://www.summerscience2009.com/>



Left: Dr. Jose Alonso presentation at Pierre, South Dakota

The Sanford Lab's "Deep Science for Everyone" lecture series continued in January, with a presentation at Pierre, the state capital. Dr. Jose Alonso spoke to about 200 people, including students, state officials and state legislators.

The SDSTA also hosted the first media tour to the 4550 Level. South Dakota Public Television later devoted an hour-long edition of "South Dakota Focus" to the Sanford Lab and the DUSEL project. Gov. Mike Rounds, SDSTA Executive Director Ron Wheeler and Dr. Alonso participated in a panel discussion. (Watch video excerpts at <http://www.sdpb.org/tv/sdfocus/index.asp>).

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Television stations in South Dakota and the Associated Press also did stories on the trip underground, and local media have begun using the Sanford Lab's "Weekly Water Report" on the water level at Homestake.

SDSTA staff

The South Dakota Science and Technology Authority reluctantly accepted the resignation of Engineering Director Todd Seaman, who guided the Sanford Lab through many engineering challenges. Chris Zimmer, the new engineering director, brings strong mining experience to the job, including Homestake experience.

UPDATE FROM THE DUSEL EXPERIMENT DEVELOPMENT COMMITTEE (DEDC)

In a successful annual review of the Facility and Project by NSF, the science plans evolving from the various S4 submissions were aired and greeted enthusiastically by the panel of reviewers.

The preparations for the review were made possible by materials supplied from the various proposed experiments and experimental groups. Thanks to all who contributed materials.

An overview of the evolving science plan is apparent from supporting presentations from the meeting.

http://www.ems.psu.edu/~elsworth/temp/plenary_DEDC_DEDC_final.pdf

http://www.ems.psu.edu/~elsworth/temp/breakout_DEDC_Experiments_final.pdf

WINTER SAFETY

Certain injuries are more common in the winter due to fun cold-weather activities. Activities like ice-skating, sledding, snowboarding, and skiing lead to the most accidents. Be aware of your surroundings. Use sunscreen as snow can reflect up to 85% of the sun's ultraviolet rays. Dress in warm layers to avoid frostbite.

Drive safely! In icy conditions, slow down and allow plenty of room to stop. Turn on lights for increased visibility. Don't pass snowplows and sanding trucks.

Certain illnesses are more common when the seasons change. Colds and flu are particularly

prevalent during the winter season. People who sleep and eat well are less likely to get sick.

Stay warm! Stay well!



Happy Presidents' Day!

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Special thanks to Bill Harlan for photos on pp 2-4.

Group photo by Roy Kaltschmidt, Public Affairs, Lawrence Berkeley National Laboratory

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