HOMESTAKE DUSEL AND SANFORD LABORATORY NEWSLETTER

Dear Homestake Collaboration,

Welcome to the August monthly newsletter for Homestake DUSEL and South Dakota's Sanford Laboratory. We are always glad 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

August 31 – September 2: Internal Design Review - Lead, South Dakota

October 1-3: DUSEL S4 Workshop - Lead

October 4-6: LBNE Collaboration Meeting - Lead

Research Instrumentation and Equipment and Experimental Requirements

S4 awardees were announced in July. The project has communicated with all of the nine physics awardees and all of the six earth science awardees. Working with the DEDC, DUSEL will conduct the first Integrated Suite of Experiment (ISE) workshop in Lead 1-3 October. (For more on this, see page 5.) We anticipate maintaining communications with these and additional groups as the design for DUSEL advances.

Geotechnical Site Investigations, Assessments and Excavation Design

The Geotechnical Advisory Committee (GAC) and the Large Cavity Advisory Board (LCAB) held meetings in Lead July 6-10. The LCAB reviewed the geotechnical investigations, 3D Geological Model, and Geoengineering assessments performed by the Project. The LCAB issued their second report following their underground investigations and interviews with geological consultants and Project Staff. They expressed their satisfaction with progress and work performed to date. They were impressed with the quality and nature of the rock in the Yates formation at the 4850L and expressed their confidence that large span cavities could be readily engineered and constructed. An initial siting of the first large cavity (LC1) was established.

Amendments for the RESPEC geotechnical services contract were evaluated and approved by the Project to initiate coring and testing of the rock surrounding LC1 and adjacent areas. The geological mapping and rock evaluations of the 4850 and 4100L continue and will be completed by December 2009.

The Request for Proposals to establish contracts for the Excavation Design opened June 30 and six responses were received by the close date of July 28. Bids are being evaluated and documented by the project.

Drilling News

Ziggy Hladysz reports that it appears Connors Drilling has the first 6-inch core for lab testing. Below: Drill and generator underground at the drill station I at the 4850L.

Figure 1: Driller in background: Joe Vandersnick; Driller's helper In foreground: Jimmy Maggard, both from Connors Drilling

Surface Infrastructure Alterations and Upgrades

On July 24, HDR CUH2A presented their completed assessment report for 14 of the existing Homestake surface buildings and the surface campus infrastructure and utilities. These assessments documented the existing infrastructure conditions to help in determining the role of these buildings in the DUSEL surface campus. HDR is currently developing a proposal in response to a Request for Proposals (RFP) from the DUSEL Project to develop the preliminary design for the DUSEL surface campus infrastructure, which will include assessment of the remaining structures not evaluated during this first assessment phase.

DUSEL Project team members traveled to Fermilab to investigate ventilation design considerations with respect to operating in potentially oxygen deficient atmospheres. Other discussions included code compliance strategies, design for fire hazards, unplanned release of cryogens and delivery of cryogens to operating locations.

Infrastructure for Underground Operations and Research Space

On July 2, ARUP site assessment issued the Site Infrastructure Assessment Report, which estimates the level of completion of the scope elements for the DUSEL Project.

Further work was performed on the Basis of Estimate study by ARUP. A workshop was held at ARUP's office in San Francisco to discuss Project Risks, Cost Estimating, Project Scheduling, Procurement Strategies, Project Insurance, and Construction Management Options. The Draft Interim Basis of Estimate report was scheduled to be delivered July 31.

The Project released an additional RFP to establish contracts for underground laboratory design development. The underground laboratory design RFP was released on July 8 and proposals received by August 5. In addition to these two new contracts, the Project provided RFPs for preliminary design engineering services to the DUSEL Underground Infrastructure Contractor, ARUP, and the DUSEL Surface Infrastructure Contractor, HDR CUH2A. These existing contracts will be subsequently amended to fund preliminary design development activities. Contract awards are planned for late August and early September.

On July 27, DUSEL hosted Bob Svoboda, UC Davis, at the Berkeley Project offices to discuss the integration of the Long Baseline Neutrino Experiment into the DUSEL Preliminary Design. We reached agreement on milestones, required documentation, and coordination efforts.

SANFORD UNDERGROUND LABORATORY AT HOMESTAKE

Sanford Lab water level

The water level at the Sanford Lab at Homestake has held steady at 4,992 feet underground for much of August while electrical upgrades were being completed. A new substation was installed at the Ross Shaft. The last link is completing the installation of a 12 kV electrical cable down the shaft.

Deep pumping

The South Dakota Science and Technology Authority has been finalizing a contract for installation of a 1500-horsepower submersible deep-water pump that will dewater Homestake to the 8000-foot level. When the 5000 Level is dewatered, Homestake pumps will be recommissioned. The deep-water pump will be lowered down Six Winze, an internal shaft that reaches to below the 8000 Level. This will complete the pumping system that will dewater the rest of the former gold mine.

Davis experiment disassembled

Sanford Lab infrastructure technicians began cutting up the steel tank that was the heart of the solar neutrino detector installed by Ray Davis in 1965. The disassembly of the Davis experiment is in preparation for installation of the LUX dark matter detector.

Figure 2: Engineering Project Manager Willy McElroy at the Davis Cavern with the Davis tank in background

Figure 3: Steel dismantle in Davis Cavern

Yates Shaft reentry

Technicians have inspected the Yates Shaft down to the 3050 Level. Ground conditions are good there, engineers report, and the pace of the re-entry into the Yates has been stepped up.

LUX surface lab coming soon

The LUX Surface Facility at the Sanford Laboratory is on schedule for occupancy by early fall. The facility will test the assembly and operation of the LUX dark matter detector prior to installation in the Davis Laboratory underground. The facility houses a class 1000 clean room for detector assembly operations.

EDUCATION AND OUTREACH

More on Davis-Bahcall Week

Mandi Durch, a Sanford Lab intern, was one of the Davis-Bahcall scholars during the week of July 5-11. Below, she shares her experience of the Sanford Lab-hosted event. Mandi currently lives in Newell, South Dakota and will study engineering at Montana State University this fall.

From the Sanford Lab, to Europe, to Princeton, learning was the theme. The Davis-Bahcall Scholars went on a five-week journey, learning about science, or more specifically, physics.

The trip started off in Lead, South Dakota at the Homestake Mine where we were joined by the other students (27 total) who had applied for the scholarships. Those students divided into two groups at the end of the Sanford Lab week and went to Chicago and Brookhaven. During Sanford Lab week, we listened to various lectures and performed two labs. We also brought an experiment down to the 2000 level.

The next portion of the trip was the European component. We left for Geneva, Switzerland where we toured the city and visited CERN. We had the opportunity to see the ATLAS experiment while touring CERN. We spent three days in Geneva and then took an overnight train to Rome, Italy. While in Rome, we toured the beautiful city and all of the tourist hot spots. We also visited the Frascati Laboratory and the Gran Sasso Laboratory. We were privileged enough to go underground at Gran Sasso and see the experiments being performed there. The last night in Rome was spent walking around the lit up city with the Gran Sasso tour guide.

The next morning, we were flown to Princeton, New Jersey where we met the Italian students. There was a pool party at the Italian-American club to get to know everyone. I even participated in a pie-eating contest! The next three weeks were full of thermodynamics, quantum mechanics, relativity, and a weekly lab. We also attended many lectures, including one by Neta Bahcall.

The first weekend was spent in New York City. Many of the Italian students had dreamed of visiting the city since childhood. Everyone split into groups and toured the many sights, including the Statue of Liberty, Brooklyn Bridge, Central Park, 5th Avenue shopping, Ground Zero, and the Empire State Building. The next weekend we took a bus to DC. We saw the Capital, the White House, the Lincoln Memorial, and many other sights. We also spent a day at The Smithsonian. After getting back from DC, there was a dessert social at the Dorothea House in Princeton with featured special guest, John Nash. The last few days were full of goodbyes. We had a sendoff and flew back to South Dakota full of more knowledge than we ever thought possible.

Figure 4: Davis-Bahcall and Italian students pose together at Princeton. The Princeton part of the program was organized by Professor Frank Calaprice, a DUSEL scientist, who first suggested adding South Dakota students to the Princeton-Gran Sasso exchange program.

Cultural Outreach

DUSEL Cultural Diversity Liaison George Campbell and Sanford Lab Communications Officer Bill Harlan continued their outreach to American Indian tribes with trips to Pine Ridge and Rosebud reservations. They were joined by Science Liaison Specialist Connie Giroux, who also is an enrolled member of the Rosebud Sioux Tribe. On Pine Ridge, the team met with officials of the Red Cloud Indian School and with a leader of an elders group. On the Rosebud Reservation they met with Tribal President Rodney Bordeaux and Sinte Gleska University President Lionel Bordeaux. The DUSEL

Collaboration and Sanford Lab continue to seek partnership and outreach opportunities among tribes in the region.

Figure 5: Gear Up Students. Background: Yates Shaft hoist room and Homestake Open Cut.

Seventy-three American Indian ninth graders from throughout South Dakota visited Sanford Underground Laboratory, where they toured the water treatment plant. They were participating in Gear Up, a four-year summer program to help prepare them for college. Earlier, the students had used water and filtering materials from Sanford Lab to build a water-treatment experiment.

The Cultural Committee also met with Tina Meranian, Director of Institutional Relations, and Fr. Peter Klink, President of the Red Cloud Indian School. The group toured the new church, additions to the high school, and the art show. They are building state-of-the-art science and Lakota language wings at the high school. Red Cloud Indian School now has a requirement for all students to take four years of math and science. Fr. Peter and Tina were both very interested in developing joint science programs with DUSEL and plan to visit Sanford Lab soon.

ENVIRONMENT, HEALTH & SAFETY

Summer Travel Safety

Drive safely! Take the scenic route. Plan your trip so that you can stop at historic landmarks, soak in the natural beauty or enjoy a picnic.

Get enough sleep before driving. Drowsy driving is a leading cause of accidents.

Keep your seatbelts fastened.

If traveling with children or pets, do not leave them in a hot car.

NEW STAFF

New DUSEL EH&S Director **Susan Von Stein** is a Chemical Engineer with over 15 years of work experience. She has worked primarily with extremely hazardous chemicals and has been Director of Environmental Health and Safety for three entities over the past 15 years. Susan has earned degrees in Chemistry, 2 degrees in Applied Mathematics, 1 degree in Chemical Engineering, and a MBA. For fun, she works out, rides her bicycle, studies to complete her law degree, enjoys living in the Wild West, taking photos of the beautiful scenery and taking standardized tests. Susan also enjoys teaching part-time. She has taught mathematics and statistics at the university level. What others say about Susan: she is admired for her gift of bringing order out of chaos, which is why she likes to develop management systems.

Susan looks forward to assisting DUSEL project goals and helping to develop EHS management systems to meet nation laboratory standards and to establish worldwide standards for underground laboratories. DUSEL is an exciting project with many interesting and challenging EHS components.

Favorite quote: *"Excellence is an art won by training and habituation. We do not act rightly because we have virtue or excellence, but we rather have those because we have acted rightly. We are what we repeatedly do. Excellence, then, is not an act but a habit." -- Aristotle*

Figure 6: Susan Von Stein

Mr. Bryce Pietzyk and Ms. Wendy Zawada, underground construction project engineers, joined DUSEL on July 6.

Bryce Pietzyk graduated from South Dakota School of Mines and brings over ten years of mining experience, with over seven of that underground. He

has worked in gold, salt, trona, and limestone mines throughout his career. He has experience in mine management, engineering, ventilation, and rock mechanics. For the past year, he has worked as a mining engineer for the South Dakota Science and Technology Authority.

In his new role, he will assist on site with long-term ventilation, infrastructure assessment, and other areas as needed. Bryce says, "I look forward to continuing my career at the former Homestake mine and permanently residing in the Black Hills of South Dakota."

Figure 7: Bryce Pietzyk with family at Spearfish, South Dakota

Wendy Zawada's previous work experience includes multiple functions within an underground mining environment for Stillwater Mining Company in Nye, Columbus and Big Timber Montana. She was responsible for underground mine design, mine ventilation, cost reporting and project management. She looks forward to being part of the DUSEL team. Wendy plans to upgrade and improve the ventilation system at Sanford and track DUSEL project schedules. Wendy shares, "The team here at Sanford is incredible and I'm very thankful for the opportunity to be a part of it!"

Figure 8: Wendy Zawada with five year old son, Jake

JOBS

DUSEL is seeking an Education & Outreach Director. Please refer to the ad at:
https://yourfuture.sdbor.edu/applicants/jsp/shared/frameset/Frameset.jsp?time=124810512964

Postdoc or Research Associate position with Neutrino physics group, Physics Dept., Stanford. EXO experiment search for neutrino-less double-beta decay in 136-Xe and discovery of the neutrino mass scale. EXO-200: state of the art liquid xenon detector being commissioned at the Waste Isolation Pilot Plant in New Mexico. Candidate will contribute to R&D on removal of Ba ion daughter from double-beta decay of 136-Xe and its identification using high resolution laser spectroscopy. Background in nuclear/particle physics or AMO/ion trapping and transport. Please send query with CV and publications list to Ms. Marcia Keating, Varian Physics, Stanford, CA 94305-4060 or (mkeating@stanford.edu).

Assistant Professor position, Osaka University: New Physics International Course (taught in English), Graduate School of Science as a part of Global 30 project supported by MEXT. Start November 2009–March 2012 with possibility of extension to 2014. Required: Ph. D., strong research and publication credentials. Deadline: September 14, 2009. Send materials and queries to: Professor Hideaki Takabe, Institute of Laser Engineering, Osaka University, Yamada-oka 2-6, Suita, Osaka 565-0871 or takabe@ile.osaka-u.ac.jp.

Fall DUSEL S4 Workshop

October 1-3: The DEDC (DUSEL Experiment Development and Coordination) committee is organizing a fall workshop for DUSEL science. The purpose of the meeting is based on the announcement of S4 awards, recent access to 4850L, and need to coordinate the experimental program for the MREFC. The three-day meeting will take place October 1-3 in Lead, SD. The meeting will be universally open to all, including S4 PIs and potential S5 proponents. The purpose is to focus on the upcoming science program at DUSEL. In particular:

1. Foster and develop experimental programs at DUSEL.
2. Hear status updates from agencies, the facility, and from large cavern activities.
3. Understand the timeframe needed for deliverables for the MREFC.
   a. Allow S4 awardees, S5 proponents and others opportunity to meet.
   b. Search for commonalities that may influence the MREFC.
   c. Explore E&O interactions
4. Explore S5 possibilities
   a. Ideas beyond S4
   b. Longer term development

5. Explore locations for specific experiments utilizing the Vulcan database and go underground to site these experiments and to inspect the facility.

Please mark your calendars. Contact: Daniela Leitner and Tullis Onstott, Workshop co-chairs. tullis@Princeton.EDU, DLeitner@lbl.gov or visit: http://www.lbl.gov/nsd/homestake/workshops/fallworkshop09/Program.html

Special Session on Underground Science at the Fall Meeting of the American Geophysical Union

There will be a special session at the Fall AGU meeting designed to bring together researchers working at underground labs, including DUSEL. The meeting will be held in San Francisco December 14-18, 2009. Title and session description are outlined below. For more information about the meeting, and info about submitting an abstract to the session: http://www.agu.org/meetings/fm09/

H18 Rocks, Fluids and Life: Insights from Underground Research Laboratories

An international network of underground research laboratories plays a key role in research into earth processes by providing access to a broad range of geologic, hydrologic, and microbiologic settings. When it is launched over the next few years, the Deep Underground Science and Engineering Laboratory (DUSEL) at the former Homestake Mine in South Dakota will provide new opportunities for international collaboration on experiments at depths down to several kilometers that will last as long as several decades. The purpose of this session is to present results from previous and ongoing experiments at underground research laboratories and deep boreholes, as well as conceptual designs for an initial suite of experiments at DUSEL. The goal is to promote a timely exchange of concepts and methods that have worked well underground and discuss those experiments or technologies that have not worked and why. We particularly encourage papers that describe new results, proposed experiments, or innovative technologies in hydrology, geophysics, geochemistry, isotope geochemistry, particle physics, astrophysics, microbiology, rock mechanics and engineering, petrology, radiation biology, and related fields.

Supernova Physics & DUSEL workshop at UCLA

David B. Cline (UCLA) and George Fuller (UCSD) are organizing a workshop called "Supernova Physics and DUSEL," to be held at UCLA September 16-17, 2009.

Topics will include:

* Supernova dynamics; neutrino spectral swap; quantum kinetics, transport
* Neutrino properties and supernovae: extraction of neutrino properties including mass hierarchy and Θ_{13}
* The detection of neutrinos and anti-neutrinos at DUSEL (water detectors, liquid Argon detectors, supernova relic neutrino)
* The DUSEL Lab and supernova detector design/strategies

Registration is open and an agenda will be available soon. For more info: http://www.physics.ucla.edu/hep/supernova/index.html

Newsletter Editor: Melissa Barclay
Contributors: Kevin Lesko, Bill Harlan, Peggy Norris, Mandi Durch, Susan von Stein, Bryce Pietzyk, & Wendy Zawada.
Photo Credits: Fig. 1: Walter Weinig, Golder Associates; Figs. 2,3,5: Bill Harlan; Fig. 4: Alessandro Puca.

HOMESTAKE DUSEL CONTACT INFORMATION

University of California at Berkeley
Kevin T. Lesko: 510-642-0147
KTLesko@berkeley.edu
Melissa Barclay: 510-642-2244
mbarclay@berkeley.edu
South Dakota Science and Technology Authority
Ron Wheeler, Executive Director
Laurie Gehner, Executive Assistant, 605-722-8650
LGehner@sanfordlab.org
South Dakota School of Mines and Technology
William Roggenthen: 605-394-2460
William.Roggenthen@sdsmt.edu

New address – We are still moving in …

UC Berkeley
DUSEL Project Office
2440 Bancroft Way, Suite 303
MC 1295
Berkeley, CA 94720-1295
Fax: 510) 642-2258