



**46th US Rock Mechanics/Geomechanics Symposium
Chicago ♦ June 24 - 27, 2012**

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ARMA E-NEWSLETTER

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DUSEL Gets Caught Up in Heavy SURF

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It has been an exciting year for the Deep Underground Science and Engineering Laboratory (DUSEL) with some sharp turns in the road. A detailed chronology is presented with the key meetings and milestones in decision-making below. But the changes can be simply illustrated through the shifts in how the project is now identified. Over the past 12 months, the DUSEL project at Homestake has been renamed the Sanford Underground Research Facility (SURF) and the DUSEL Users' Research Association (DURA) has retained its acronym but its moniker is now the Deep Underground Research Association!

What has driven these apparently cosmetic changes and what is their real significance?

A little over a year ago a National Research Council (NRC - the operating arm of the National Academy of Sciences) study was initiated to review the science that would be enabled by DUSEL. This activity had been planned for some time by both the National Science Foundation (NSF) and the U.S. Department of Energy (DOE). It was to be the final step in ensuring that the experiments proposed for the facility were indeed worthy of the significant investment DUSEL would entail. This review went well, and the resulting report was finally released in July 2011. The evaluations were favorable. (link: http://www.nap.edu/catalog.php?record_id=13204)

But this activity was significantly overshadowed by other organizational shifts occurring in the background.

The National Science Board – the top-level advisory body to NSF – voiced some concern over the potential function and operating cost burden of the evolving DUSEL project. The concern stemmed from the precedent that NSF had historically ceded the management of larger facilities to DOE. And related to cost was the issue of whether the future operating and maintenance costs burden for NSF would be required even though the benefits and responsibilities would accrue to DOE.

These views had been leaked in a prior *Science* magazine article in November 2010 (link: <http://www.sciencemag.org/content/330/6006/904.short>) provocatively titled “*Scientific Gold Mine or Dicey Money Pit?*” These views were finally voiced at the initial NRC meeting in December 2010 and were formally reflected in the President’s budget of February 2011. That budget confirmed that responsibility for DUSEL was shifted from NSF to DOE.

So that was the backdrop to recent developments in DUSEL. In this climate, the Preliminary Design Report (PDR) was completed on schedule in May 2011 (link: <http://www.dusel.org/html/designreports.html>) and submitted to NSF. However, since the responsibility for the project had already been shifted from NSF to DOE in the five months between the initiation of the NRC review and the completion of the report, the PDR passed through NSF directly to DOE.

In its final form, the PDR contained evaluations of a variety of cost-saving alternate designs for DUSEL. One significant “*reduced scope*” option was to limit the experimental space to be constructed at the 4850L; a second was to exclude the deep campus at 7400L. These configurations are illustrated on Page 2. The rationale for these alternate configurations was “*assuming only DOE resources (would be available)....to allow a reevaluation of facility requirements to support a world class program of underground science.*”

Further direction was provided when the Marx-Reichanadter Committee, a committee formed to explore options for underground experiments and to identify strategies for implementing a world-class program of underground science, convened in April 2011 to make recommendations of how the science could best be done – at a single facility such as DUSEL Homestake or spread among available facilities at existing laboratories worldwide. The final report in June 2011 (link: http://science.energy.gov/~media/hep/hepap/pdf/june-2011/Review_of_Underground_Science_Report_Final.pdf) included budget estimates for various combinations of experiments both at Homestake and also split among other laboratories. Unfortunately, this was for physics experiments alone and our Bio-Geo-Engineering (BGE) activities were notably absent. But this report did have budget estimates for the various alternate configurations and will be used to guide the DOE Office of Science in making budget decisions for FY2013 and beyond.

So where does that leave us?

In light of these events, DUSEL is now SURF and DuRA endures as DURA. NSF provided \$4.0 M to maintain operations at SURF-Homestake through the end of FY11 and continued to bridge the gap in FY12 until DOE received its budget, which includes \$15.0 M for operations in FY12. Preparation for the Majorana and LUX physics experiments continues at the 4850L in Homestake. And, as driven by some of our colleagues, nascent experiments on seismicity, deformation, fluid transport and biology also continue.

To take advantage of the likely availability of the SURF facility, an NSF pre-proposal for a Center for Research in Underground Science and Technology (CRUST, a Science and Technology Center) was submitted in May. And although not successful at this first submission, this is the initial step in pursuing both individual and collective opportunities at NSF as part of the evolving programs related to DUSEL/SURF.

We continue to believe that with the need for energy resources for our economic growth and lifestyles, for the opportunity to build our knowledge and experience in scientific and engineering inquiry, and to achieve these objectives through an in situ facility such as DUSEL/SURF, tracking further developments will be essential. We look forward to your continued engagement in this activity.

- Continued on Page 2 -

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ANNOUNCEMENTS

**Further News on
Underground Research
Laboratory (URL) Facilities**

Submitted by Joe Wang, LBNL

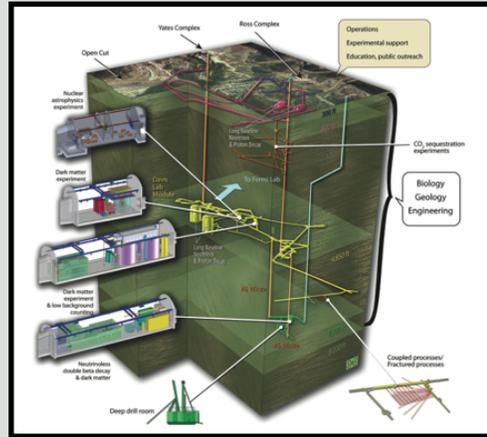
As a means of furthering interest and support for URL Facilities, a Workshop on Underground Research Laboratories was convened on 17 October 2011 at the 12th Annual ISRM Congress in Beijing. There was broad international participation documenting activities in the U.S., Belgium, Canada, China, Finland, France, Italy, Japan, Spain, Sweden and Switzerland. From North America, the Workshop contributors, presenters and Congress speakers included Tom Doe, Maurice Dusseault, Derek Elsworth, Marte Gutierrez, Peter Kaiser, Chris Laughton, Jonny Rutqvist, Peter Smeallie, Azra Tutuncu, and Joe Wang. This was the kick-off meeting for a new ISRM Commission (link: <http://www.isrm.net/gca/index.php?id=1040>) that will attempt to network the activities of the various laboratories and promote these exciting venues for research. The agenda with titles and other speakers from Asia and Europe can be found at

<http://www.isrm2011.com/upload/shortcourse/VSS5.pdf>

Currently, members of DURA are participating in the organization of a new ISRM Commission on URL Networking, Coupled Processes, and Petroleum Geomechanics. International conferences will be held by the Commission within the next four years before the 13th ISRM Congress, to be held in 2015 in Montréal, Canada.

Some recent DURA presentations of physics and bio-geo-engineering activities can be found in (link: <https://indico.fnal.gov/conferenceTimeTable.py?confId=5107#20120119>).

**TECH
Note**



Schematic of the SURF facility at Homestake (PDR Report of April 2011).

DUSEL Timeline 2000 to present.

Year	Activity
2000	Homestake mine closure announced First meeting of Earth science and physics communities
2001	Underground science meetings; Earth science, physics and geomicrobiology workshops
2002	NSF visit to Homestake ARMA/NSF Workshop NESS meeting in Washington DC ~200 BGE participants
2003	EarthLab Report ARMA-NSF Report ARMA-NSF 1 st Workshop at ISRM Congress - Johannesburg
2004	NSF S-process announcement S-1 Workshop 1 (Berkeley) S-1 Workshop 2 (Blacksburg)
2005	S-1 Workshop 3 (Boulder) S-2 Site submissions [Cascades, Homestake, Henderson, Kimballton, San Jacinto, Soudan, WIPP, SNOLab] S-1 Workshop 4 (Minneapolis) S-2 Site selections: Henderson and Homestake
2006	S-2 Workshops
2007	S-3 Submissions (January) ARMA-NSF 2 nd Workshop at ISRM Congress – Lisbon S-3 Selection (July) Homestake Post S-3 Town Meeting (November – Washington DC)
2008	DUSEL Experiment Development Committee Formed (DEDC, with 3 BGE and 3 physics members) NSF Project Review (July) DUSEL-DEDC Meeting (September – Lead, SD) S-4 Solicitation (October)
2009	NSF Project Review (January) S-4 Solicitation closes (January) S-4 Awards ~71 BGE senior investigators and ~230 physics senior investigators DUSEL-DEDC Meeting (October – Lead, SD)
2010	DEDC transitions to DURA (March, with 2 new BGE members on the Executive Committee. 131/1000 DURA members as of February 2011) NSF Project Review (April) NSF Reverse site visit for BGE Projects (August) DUSEL-DURA 1 st Meeting (September – FermiLab, IL) NRC Review (December-June)
2011	PDR Review (March) and Submission (June) Marx-Reichanadter Committee (April-June) ARMA-NSF 3 rd Workshop at ISRM Congress – Beijing (October) ISRM Commission on URL Networks (October)
2012	DUSEL-DURA 2 nd Meeting (January – FermiLab, IL)



ARMA News

Summer Time in Chicago

Although it is mid-winter, it is never too early to consider making your plans to attend the 46th U.S. Rock Mechanics/Geomechanics Symposium. This year the event will be held in Chicago, from 24-27 June 2012. This symposium is shaping up to be one of the most exciting from a technical standpoint, as well as an opportunity to catch up and share professional experiences with friends and colleagues.

We have had a record response to our call for papers. We accepted 548 abstracts from those submitting and await arrival of the full set of papers. The abstracts originated from 35 countries. The themes for the papers (see list in the sidebar) and the breadth of topics promises a lively and varied range to meet ARMA members' interests.

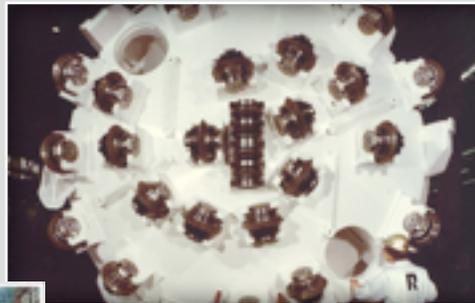
There is an impressive lineup of featured speakers. The Fourth Annual MTS Lecture will be given by Dr. Jay Melosh of Purdue University. Dr. Melosh, a member of the U.S. National Academy of Sciences, will present his recent research on the giant impact origin of the Moon, the meteoric impact that extinguished the dinosaurs, and the exchange of microorganisms between terrestrial planets. He may even explain how Asteroid 8216 Melosh got its name. Other invited speakers making major plenary lectures include Luis Alfaro, Paul LaPointe, John Rudnicki and R. Paul Young.

Two informative workshops will be presented, with titles "Geomechanics Solutions for Environment and Technical Challenges in Unconventional Resources" and "ISRM-ARMA Workshop on Petroleum Mechanics Testing." Short courses always provide new insights or refreshed knowledge; the Symposium will provide two possibilities: "Floor Stability in Underground Coal Mines: The Illinois Experience" and "Monitoring and Modeling Seismic Rock Mass Response to Mining."

Chicago has three unique facilities that should prove of special interest. There will be tours of Chicago's Tunnel and Reservoir Project (TARP), the FermiLab facility outside Chicago, and an urban underground limestone mine. And for your enjoyment, there will be an "Architectural River Boat Cruise," tours of the world famous Museum of Science and Industry, and a dinner cruise on the "Spirit of Chicago" boat.

Finally, organizers are pleased to announce that in addition to the traditional ARMA Awards for the best paper presented, there will be a new award, presented at the banquet, for the best student paper (where the student is the lead author). The traditional awards for "best posters" will, of course, be continued.

If you have ideas, comments, or suggestions relating to the Symposium, please contact organizers through info@arma.org.



ANNOUNCEMENTS

Topics of ARMA Symposium Papers

- Carbon sequestration
- Characterization of formation properties
- Coal mining
- Coupled processes / chemo-poro-thermo-mechanics
- Drilling and wellbore stability
- Enhanced geothermal systems
- Fracture mechanics
- Hard rock mining
- High-Porosity Materials
- Hydraulic fracturing and monitoring
- In-situ stress measurements / modeling
- Novel lab / field testing
- Numerical / analytical / constitutive modeling
- Reservoir geomechanics / compaction
- Rock mass characterization
- Rock physics and geophysics
- Sand Production
- Scaling: length and/or time
- Slope stability, foundations, dams
- Stability / support of underground openings
- Surface / open-pit mining
- Unconventionals (shale gas, oil shale, CBM, hydrates)



ARMA News

News from the ARMA Publications Committee

The ARMA Publications Committee was established in 2009, and comprises one Board-appointed chair (presently, Bezalel Haimson) and thirteen ARMA member volunteers. The major activity of the committee to date has been the publication of the quarterly e-Newsletter.

While the committee largely does its business by email communication, it meets as a group once a year at the ARMA annual symposium. Meetings were held first in Salt Lake City (June 2010), and again in San Francisco (June 2011). At the last meeting, it was decided to conduct a membership survey, in order to gain more information on who reads the newsletter, how its quality is perceived, what improvements are suggested, etc. The online survey was conducted later in the summer (facilitated by Dr. Moo Lee, Committee member), and the response was overwhelmingly positive. ARMA members indicated that they were pleased with the format and level of information that was provided in the newsletter (see the October 2011 e-Newsletter).

The Committee members make a valuable contribution by reviewing technical content and proofreading submitted articles. However, one continuing difficulty has been with actively soliciting technical notes or other items of interest to ARMA membership for publication in the newsletter. The greatest challenge to the committee is to personally appeal to potential contributors to prepare articles on exciting new ideas or projects. One frequent comment made by committee members is that, at this early stage of the newsletter, they would like to see an initiative by ARMA Board members to themselves submit or solicit technical papers of interest to membership. For the last several months, Peter Smeallie and his associate Jim Roberts have supported the Committee's efforts, concentrating on ARMA news articles and submission reviews, but this effort should be enhanced.

Bezalel Haimson, Chair

ARMA Student Chapter at Colorado School of Mines

The ARMA Student Chapter at CSM in collaboration with the Unconventional Natural Gas and Oil Institute (UNGI) organized three campus-wide lectures in Fall 2011. Distinguished lecturers were Dr. Omer Aydan from Tokai University Ocean Institute in Shizuoka, Japan, Philip Nelson of USGS, and Prof. Mark Zoback, Stanford University, current President of ARMA. Topics covered in their lectures ranged from the "State of In-Situ Stress in the Earth's Crust" to "Opportunities and Challenges Associated with Shale Gas Development".



Students showed the ARMA presence (evidenced by the logo on the gift water bottles) at Celebration of Mines event on September 2, 2011.



ARMA President Mark Zoback and Immediate Past President Azra N. Tutuncu with students and officers of the ARMA CSM Student Chapter after the ARMA/UNGI Lecture Series, November 17, 2011.

ANNOUNCEMENTS

ARMA Proceedings Available Online

ARMA members should be aware that the Proceedings of the ARMA Symposia have been posted for research and review purposes at the OnePetro website. (Accessible via the ARMA website: <http://www.armorocks.org>; click on the OnePetro icon. If you use "Advanced" access, you can use the built-in search function for specific topics, authors, papers, or dates of publishing.) This site is maintained by the Society of Petroleum Engineers as a service to a number of related professional societies and organizations. OnePetro provides the collections of 16 societies, including ARMA and the International Society of Rock Mechanics (ISRM). Abstracts of the papers are provided at no cost, and if the full paper is selected, there is a modest charge to download the material; prices vary for corporate, academic or individual access. It should be noted that under a revenue-sharing model, ARMA receives a modest split of any fees that are collected for purchase of ARMA materials.

Of the 53 ARMA Symposia that have been held between 1956 and 2011, 38 sets of Proceedings are currently available at OnePetro. A deliberate effort is underway to complete the collection. A number are in hand and awaiting clearance on copyrights or permission to publish statements from conveners or compilers of the papers. There is a smaller number where the Proceedings have not been collected, and further efforts are underway to locate those documents and to present them for processing.

Members are encouraged to make use of this resource. If you have difficulty in accessing the material, the OnePetro project manager, Joe Scott (E-mail address: jscott@spe.org) can be helpful.

