# Homestake / DUSEL Update

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*UC Berkeley*
*25 January 2008*

# Current schedule for re-entry

| | |
|---|---|
| Jan ’08 | 2450 L reached in Ross shaft |
| Feb ‘08 | First water out of the mine (from reservoir at 1250 L) |
| | Yates surface equipment re-commissioned |
| | Water projected to reach 4850 L |
| March ’08 | Pump station installed in 2450 L |
| | Contract for Yates re-entry let |
| April ’08 | First access to 4850 L |
| | 2450 L pumping |
| | 3650 L pump station installed |
| | DUSEL Workshops in Lead |
| May ’08 | Leapfrog pumping installed to reach 4850 L |
| | Pumping at 4850 L commences |
| June ’08 | DUSEL Midterm NSF review |
| July ’08 | Personnel access to 4850 L |
| | First access to Davis cavern |
| | Commence cavern refurbishment |
| | Yates access to 4850 L (assuming no major surprises) |
| Sept ’08 | Begin installation of EIP experimental infrastructure |
| Dec ’08 | Begin commissioning of EIP experiments |

Alonso’s Milestone Schedule from January 2008

# Homestake Progress

- SDSTA hired Laboratory Director (9 October 2007) Jose Alonso (Berkeley)
- Hired Project Manager (Todd Seaman), hired four additional engineers, interviewing EH&S director and user liaison positions, additional admin. staff, …
- Yates Shaft work to be bid and initiated this year
- Sanford Lab Experimental Program to be advanced to engineering drawings

# Initial Suite of Experiments for DUSEL

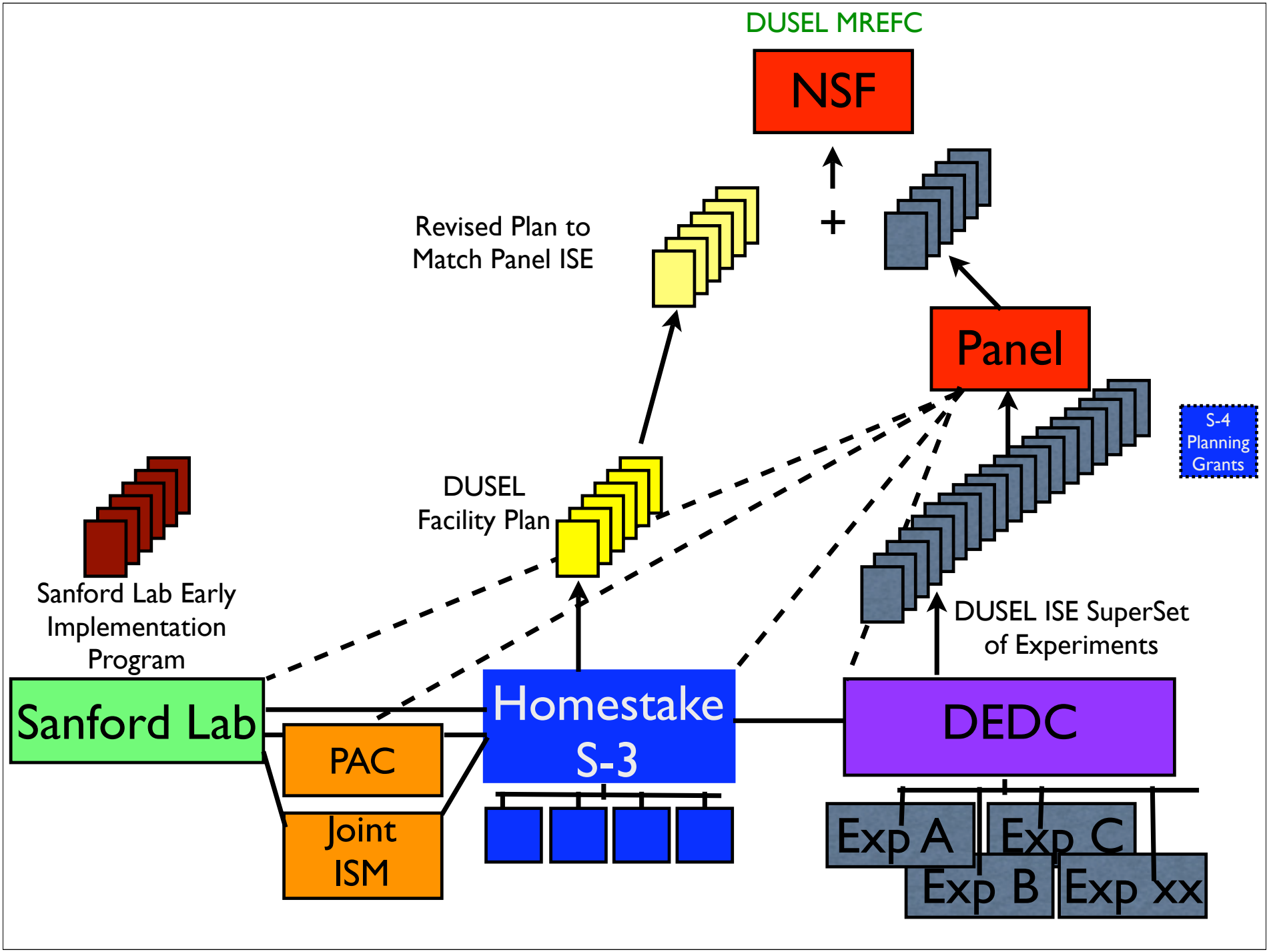
- Main DUSEL Construction to begin in FY 11 (earliest)
  - $250M for the facility
  - $250M for the Initial Suite of Experiments (ISE)
    - Funds to be made available in 2008 to bring the ISE to the same level of "readiness" as the facility, must be submitted together
    - Process to establish the ISE to be determined soon
    - Town Meeting 2 - 4 November 2007 began process
    - http://cosmology.berkeley.edu/DUSEL/Town_meeting_DC07/

# Progress in Defining the ISE at Town Meeting

- ~ 200 scientists attended, white papers & road maps appearing on http://cosmology.berkeley.edu/DUSEL/
- Physics topical sections
  - Dark Matter Searches
  - $0\nu\beta\beta$
  - Long Baseline and PDK
  - Nuclear Astrophysics
  - "other topics", n-nbar, gravity low background counting, ...

# DUSEL Experiment Development Committee

- Committee established by S-1 and S-3 groups to help coordinate and assist collaborations prepare for S-4 and for inclusion in the DUSEL MREFC
- Hank Sobel, Steve Elliott, T.C. Onstott, Derek Elsworth, Larry Murdoch
- Focus will be on preparing community for S-4 proposals and for various DUSEL reviews occurring this year
- Point of contact for experimental collaborations


DUSEL MREFC
NSF
Revised Plan to
Match Panel ISE
Panel
S-4
Planning
Grants
DUSEL
Facility Plan
Sanford Lab Early
Implementation
Program
DUSEL ISE SuperSet
of Experiments
Sanford Lab
PAC
Joint
ISM
Homestake
S-3
DEDC
Exp A
Exp C
Exp B
Exp xx

# On-ramps, Off-ramps, funding avenues, and other dark alleys

- DUSEL R&D - to answer key technology questions and experimental issues <3 Dec 2007: solicitation due date>
- unsolicited proposals
- S-4: provide funds to prepare ISE CDR and PDRs to be integrated with facility PDR
  <Dec 2008, NSB review March/May 2009, FY2011 earliest start for MREFC>
- ISE: part of the MREFC construction account, needs to be reviewed with facility: capital equip not ops.
  <FY11 earliest start>

# Plans, Statements & Rumors

- Statement from NSF (Dehmer) that he was (paraphrasing) "pleased to see the excitement surrounding the inclusion of large cavities in the ISE"
- (paraphrasing) Coles "there can be some flexibility in the PDR definition for NSB review"
- ISE is to be defined by the community
  - 4850L "Engineering" Cavity (~ 100 - 150kt)
    - engineering, biology, physics collaboration
  - 300L R&D Cavity for LAr
    - engineering, biology, physics collaboration

# Large Cavities in Homestake

- previous presentations on this topic in
  - UNO collaboration
  - FNAL-BNL working group meetings
  - Conceptual Design Report
- a few slides

# Rock Properties

- In Situ Stress Estimation (NIOSH)

$s_v = 1.25\ h$ (vertical psi)

$s_{h1} = 2078 + 0.53\ h$ (dip direction psi)

$s_{h2} = 121 + 0.55\ h$ (strike direction psi)

- Laboratory Rock Properties (psi)

| Property | Homestake | Poorman | Ellison | Yates |
|---|---|---|---|---|
| $C_1$ | 20,150 | 13,630 | 11,340 | N/A |
| $C_2$ | 11,550 | 10,000 | 11,410 | N/A |
| $C_3$ | 13,270 | 12,270 | 8,150 | N/A |
| $T_1$ | 1,380 | 2,990 | 2,350 | N/A |
| $T_2$ | 1,140 | 820 | 590 | N/A |
| $T_3$ | 1,920 | 1,910 | 1,650 | N/A |

1 & 3 directions are parallel to the schistosity

2 direction is perpendicular to the schistosity

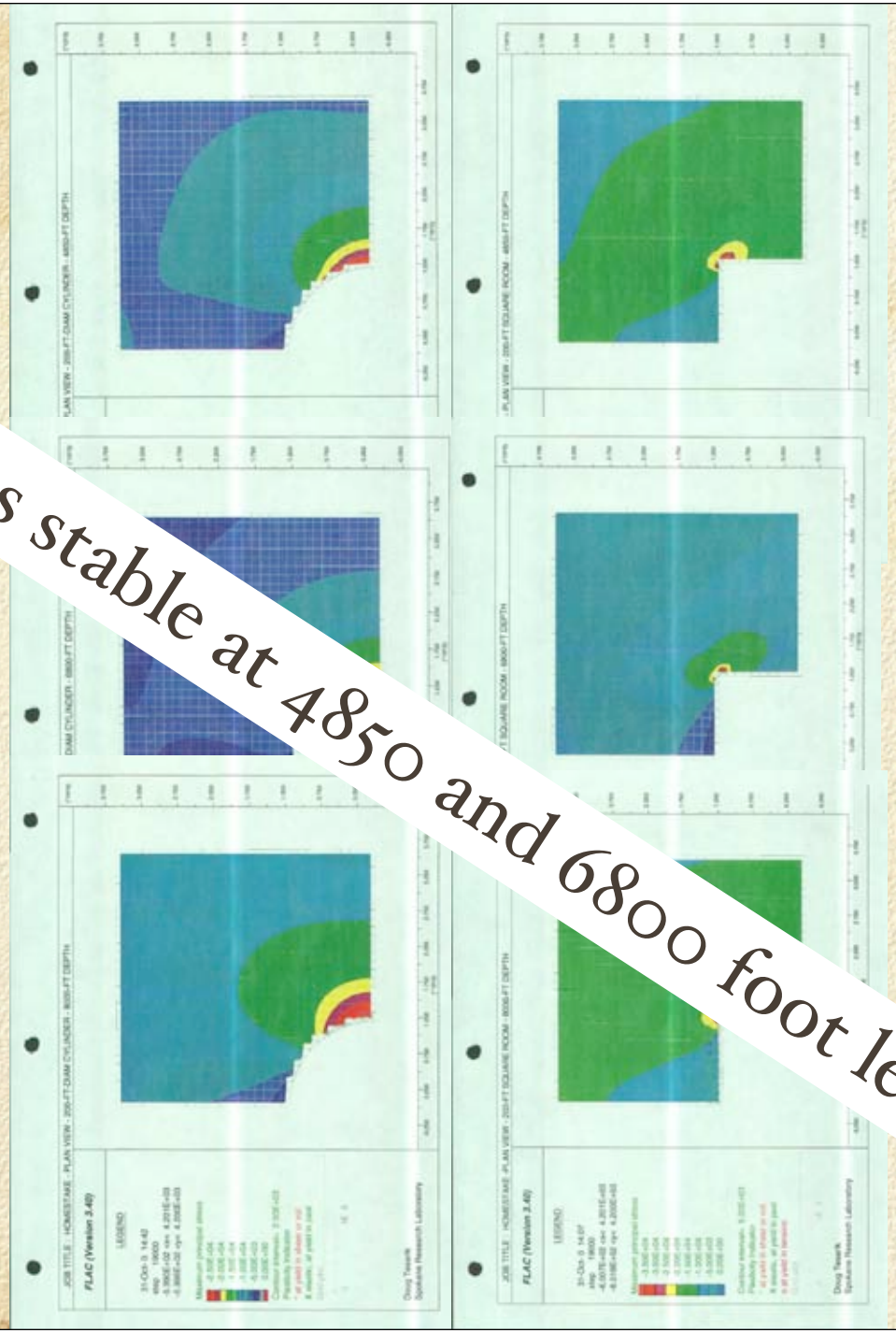
Johnson and Tesarik, 2000

~ 50 m cavities stable at 4850 and 6800 foot levels

evel
(max
stress=1.2x10
@ 1000)

6800 Level
(1.4x10$^4$ c 1000)

8000 Level
(2.5x10$^4$ c 2500)

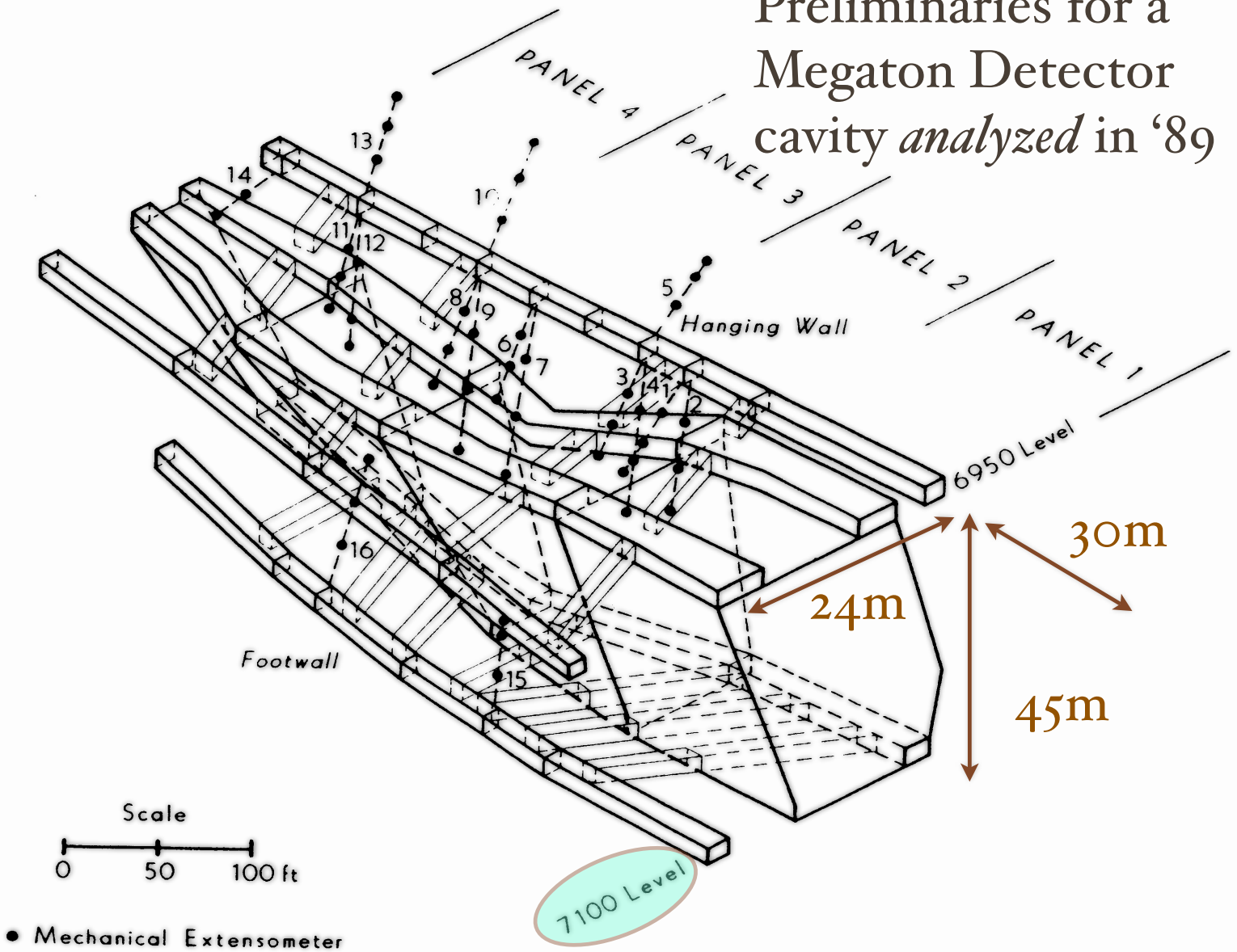


(1.75x10$^4$
c 2500)

(2.25x10$^4$
c 2500)

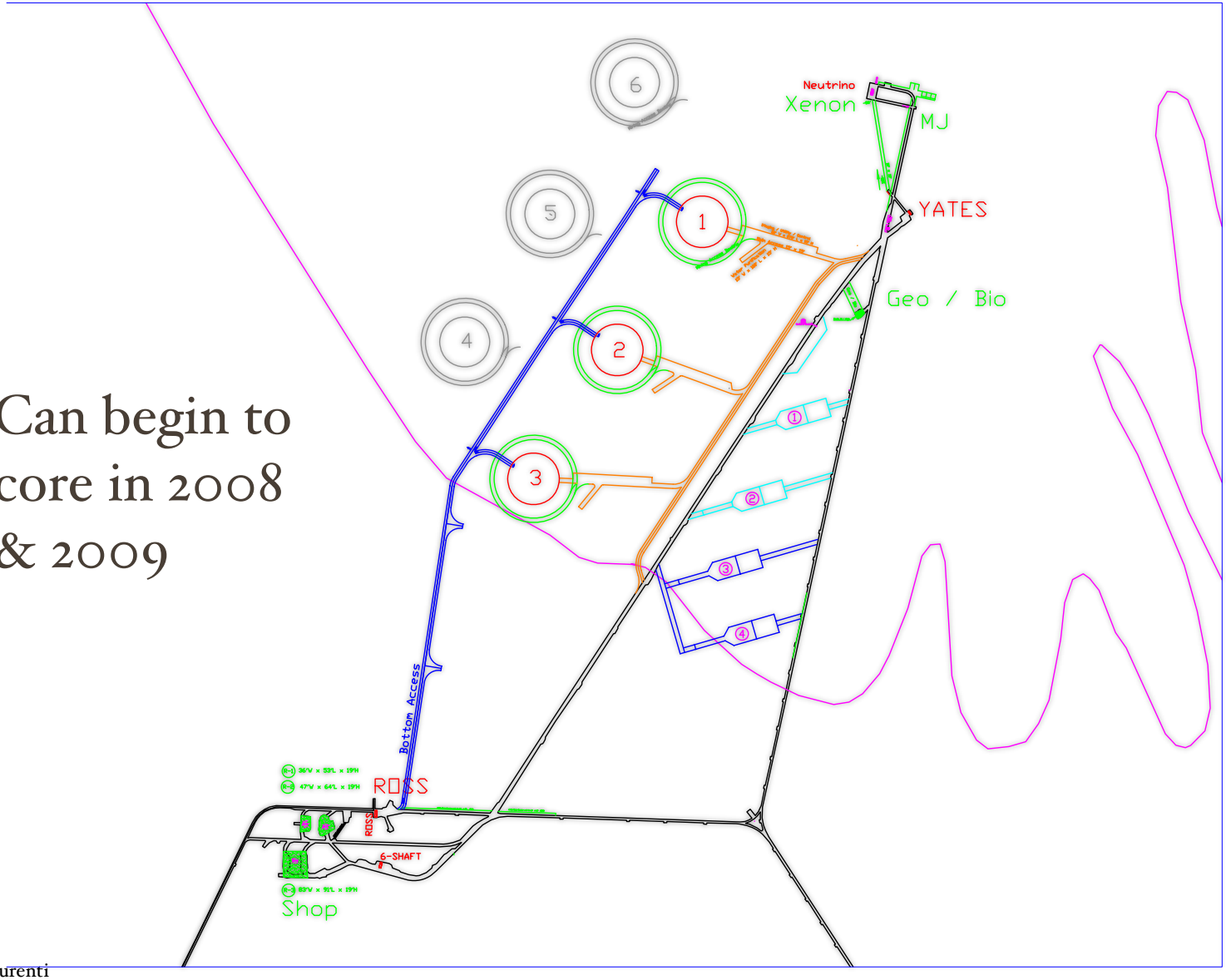
(3.5x10$^4$
00)

# Preliminaries for a Megaton Detector cavity *analyzed* in '89




Pariseau, W.G. and F. Duan (1989) "Finite Element Analyses of the Homestake Mine Study Stope: An Update". Proc. 3rd Intl. Symp. on Numerical Models in Geomechanics. (NUMOG III). Elsevier Applied Science, London and New York, pp 566-576.

# Megaton Cavity Excavation Concepts




Can begin to core in 2008 & 2009

# Bottom Line

- Communities getting started now in organizing and preparing the Project Books (look at S-3 solicitation for guidance of what might be expected)
- Process to identify the ISE being established: Large Cavities and long baseline neutrinos and pdk have strong & growing support, especially for an initial deep and near-surface cavities
- Workshops in Lead, SD, 21-28 April important assembly point, but not exclusive
- Help in engineering, PM, WBS, etc. being offered by Center for Underground Science and Engineering (CUSE)

# Homestake Facility Team Expectations

- Long baseline Neutrinos and nucleon decay will be included in the DUSEL MREFC as an important component of the Initial Suite of Experiments
- R&D on cavity engineering and design to begin in 2008 in the Sanford Laboratory (R&D proposal submitted along these lines)
- The ISE would include at least one ~150ktonne Cavity and instrumentation for a water Cherenkov detector as a start to programs, with subsequent cavities to be constructed, while the first is delivery physics results

# references

- http://www.lbl.gov/nsd/homestake/
  - including CDR information
- http://www.lbl.gov/nsd/homestake/Posters.html (information presented at the NSF review)