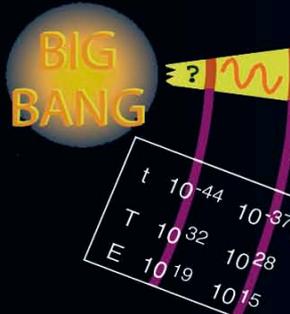
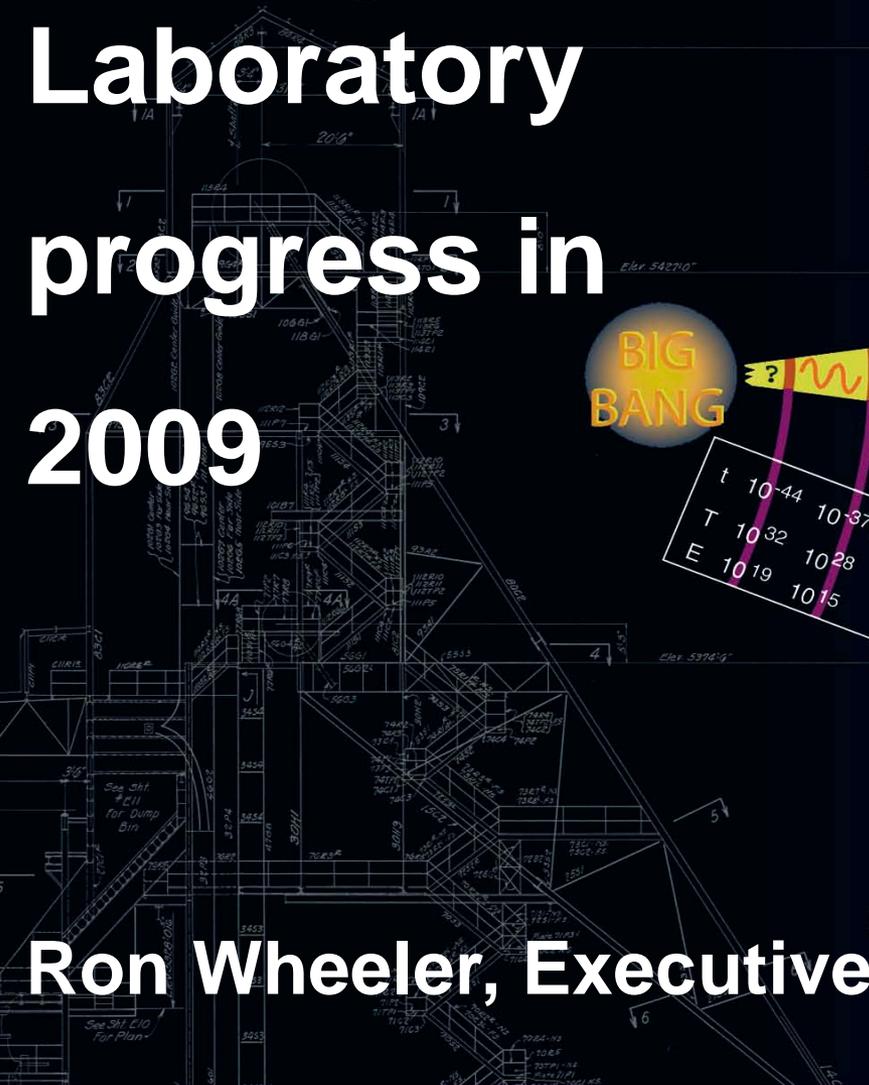
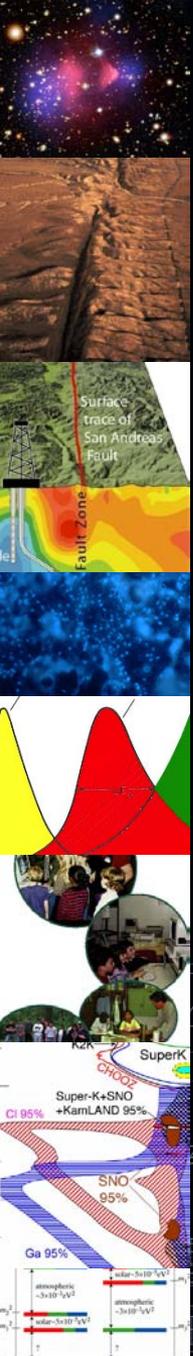


Sanford Underground Laboratory

progress in 2009



t	10 ⁻⁴⁴	10 ⁻³⁷ s
T	10 ³²	10 ²⁸
E	10 ¹⁹	10 ¹⁵

10 ⁻¹⁰ s	10 ⁻⁵ s
10 ¹⁵	10 ¹²
10 ²	10 ⁻¹

10 ² s	10 ⁹
10 ⁹	10 ⁻⁴
3x10 ⁵ y	10 ⁹ y
3000	15
3x10 ⁻¹⁰	10 ⁻¹²

possible dark matter relics

cosmic microwave radiation visible

Ron Wheeler, Executive Director

Practice Safety Always.

GENERAL NOTES

Insp. By: _____

Rivets: _____ Open Holes: _____ Unless Noted

Height Dimension: _____ Length Dimension: _____

WORDEN-ALLEN CO.
MILWAUKEE, WIS.
Description: *Steel Fabrication*

Location: 4500 So. Durston
Elev. Homebase: 17000' ±
Details of Erection: *Drawn*

Figure Courtesy PDG and LBNL

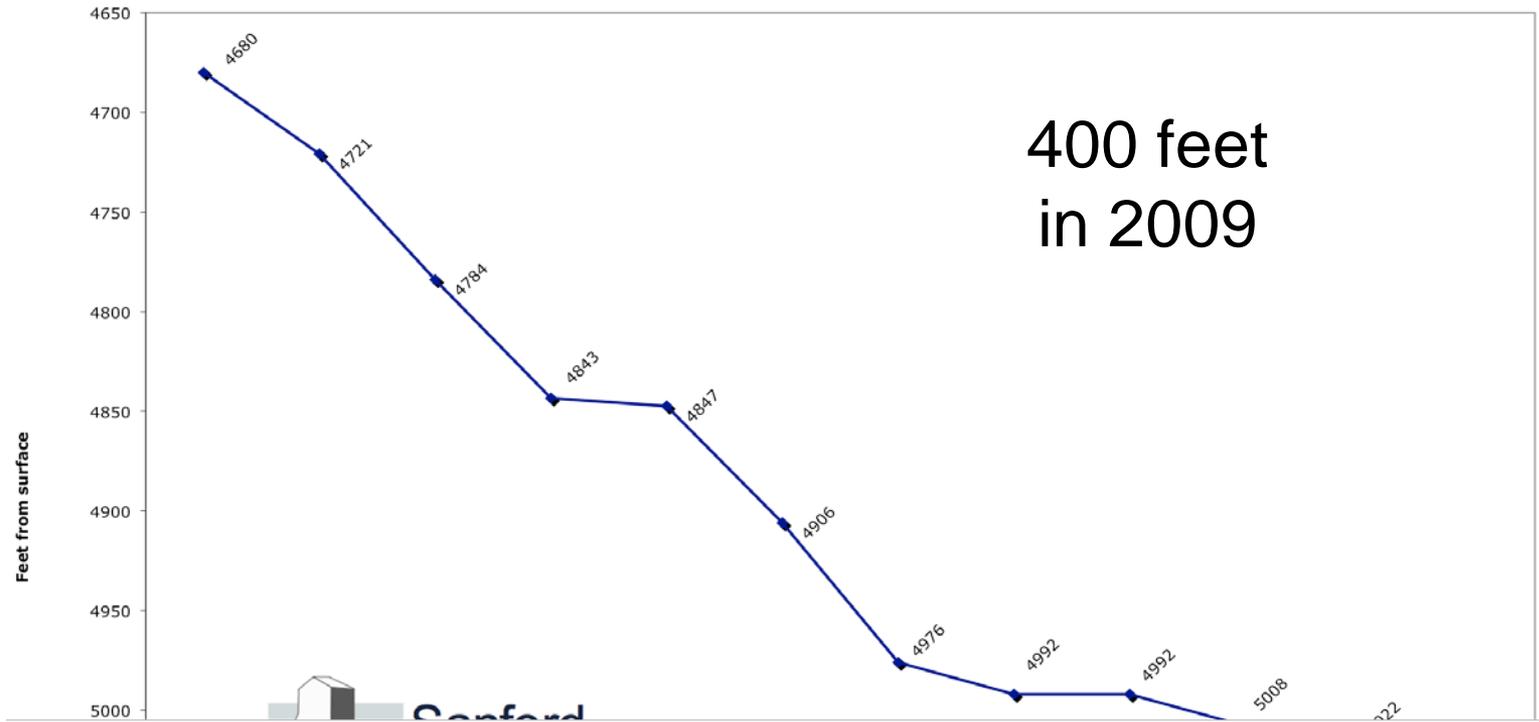
Dewatering



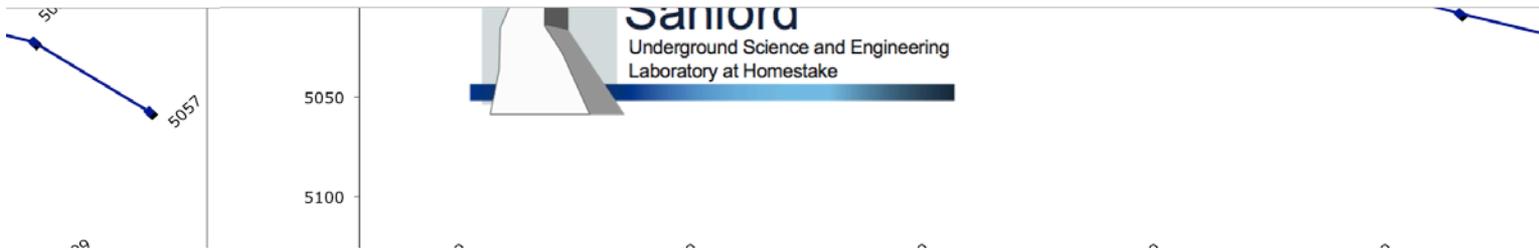
Water level drops from 4,670 to 5,070 feet

LONGSECTION OF THE HOMESTAKE MINE

2009 weekly water level



400 feet
in 2009



Sanford
Underground Science and Engineering
Laboratory at Homestake

Dewatering



Old filters

Faster, more efficient
sand filters installed.



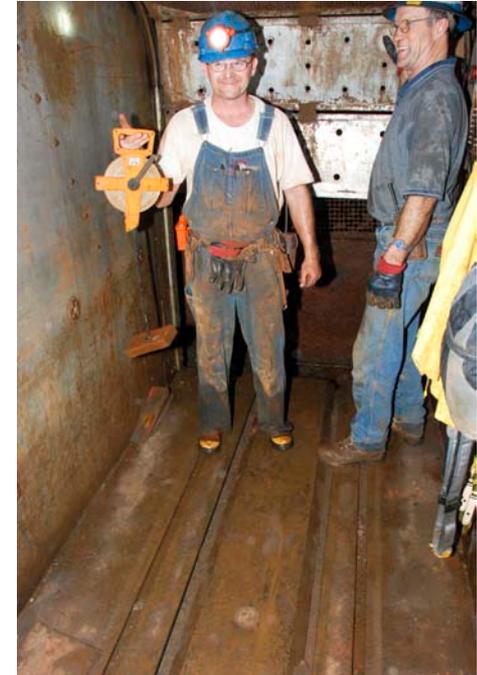
New
filters

Dewatering

LONGSECTION OF THE HOMESTAKE MINE



4550L pump room
for deep pumping



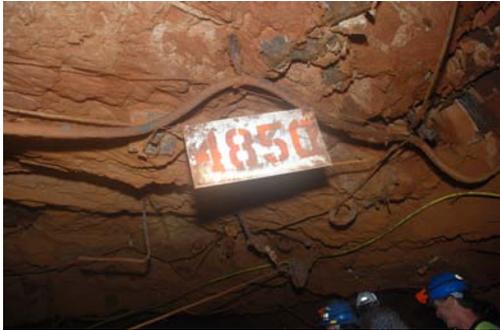
Water level:
5,100 feet



5000L pump room
being refurbished

4850 Level Campus

LONGSECTION OF THE HOMESTAKE MINE



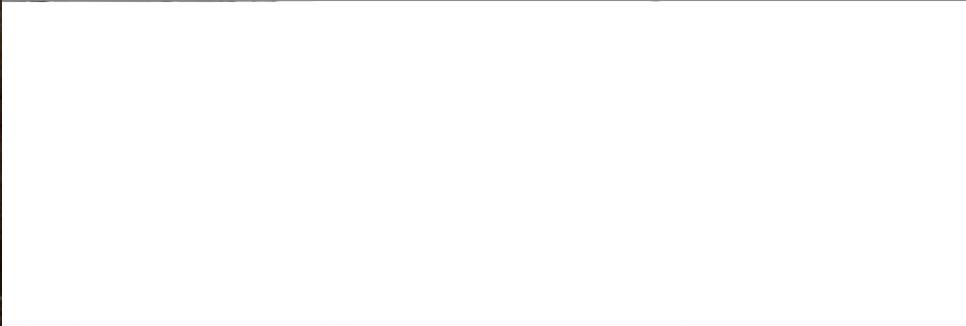
4850L
dewatered
May 13, 2009



4850L inspected

4850 Level Campus

LONGSECTION OF THE HOMESTAKE MINE



Dedication
June 22, 2009



4850 Level Campus

LONGSECTION OF THE HOMESTAKE MINE

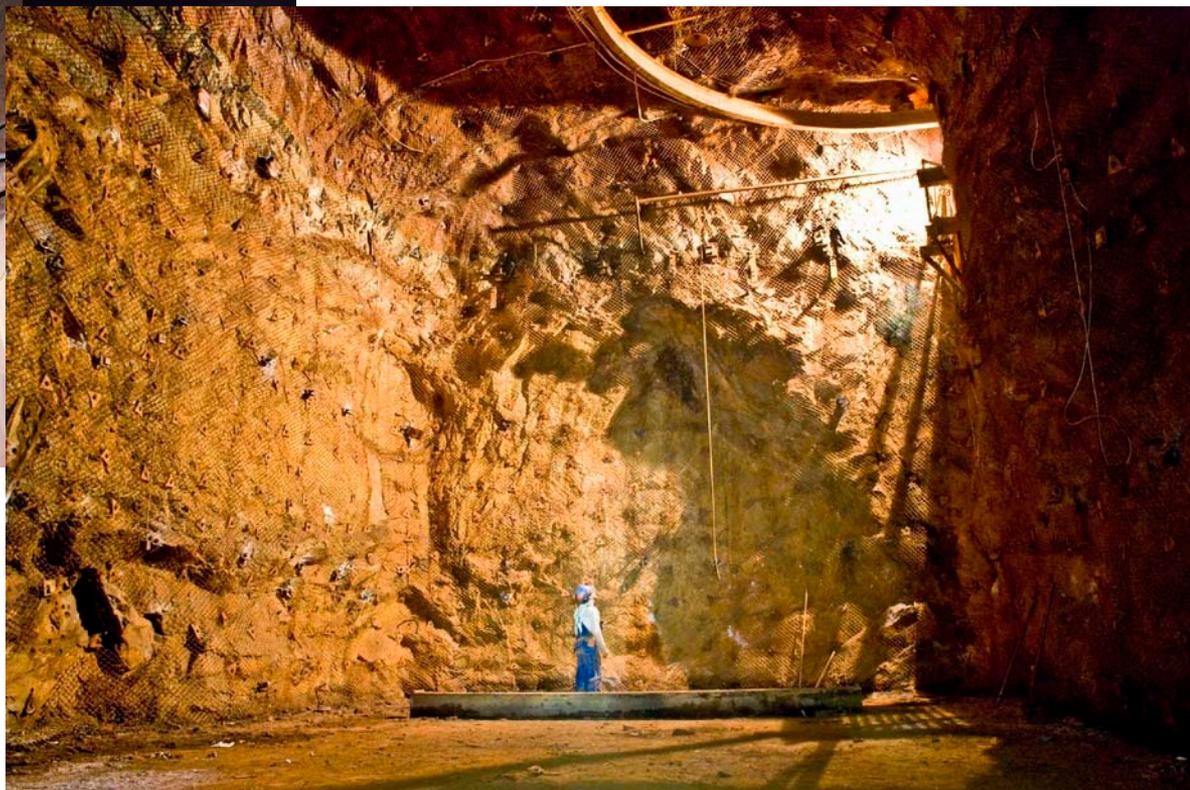
Yates Shaft
opened to
4850L



4850 Level Campus



Davis Cavern emptied

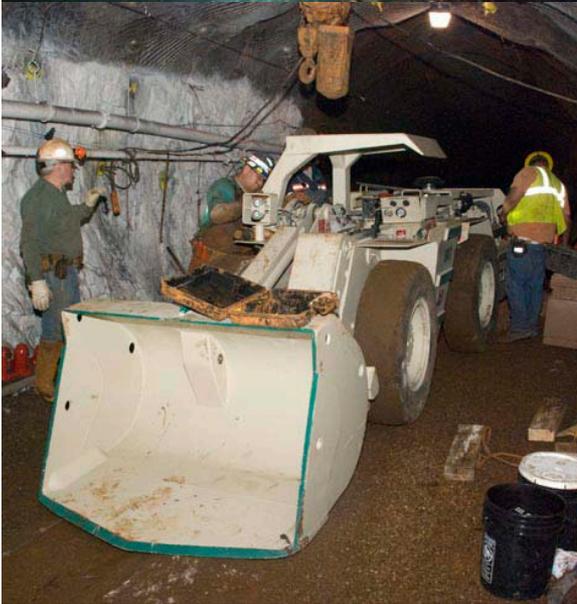


4850 Level Campus

LONGSECTION OF THE HOMESTAKE MINE

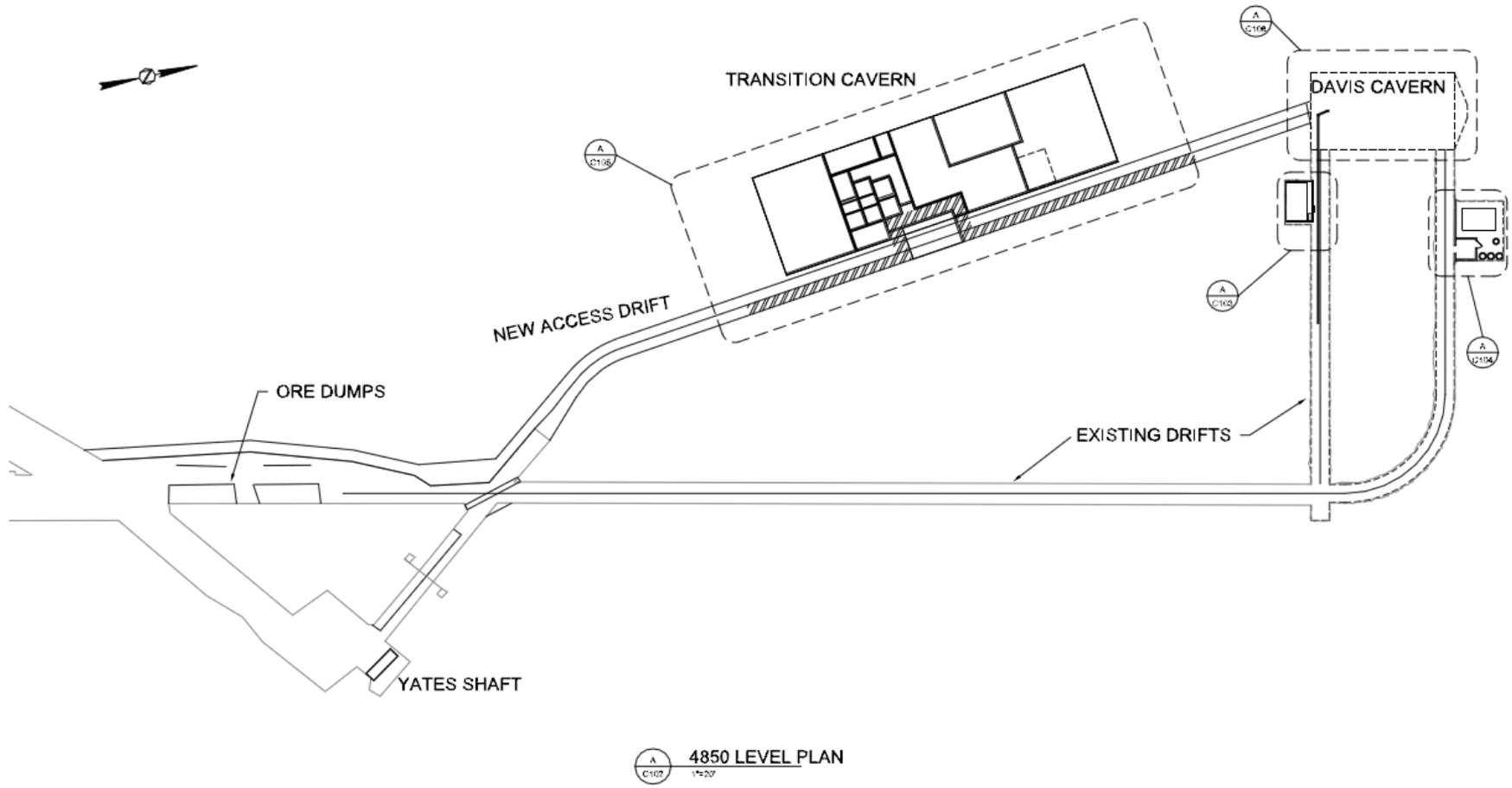


Drilling, blasting,
rock bolting,
mucking



Davis Campus Layout

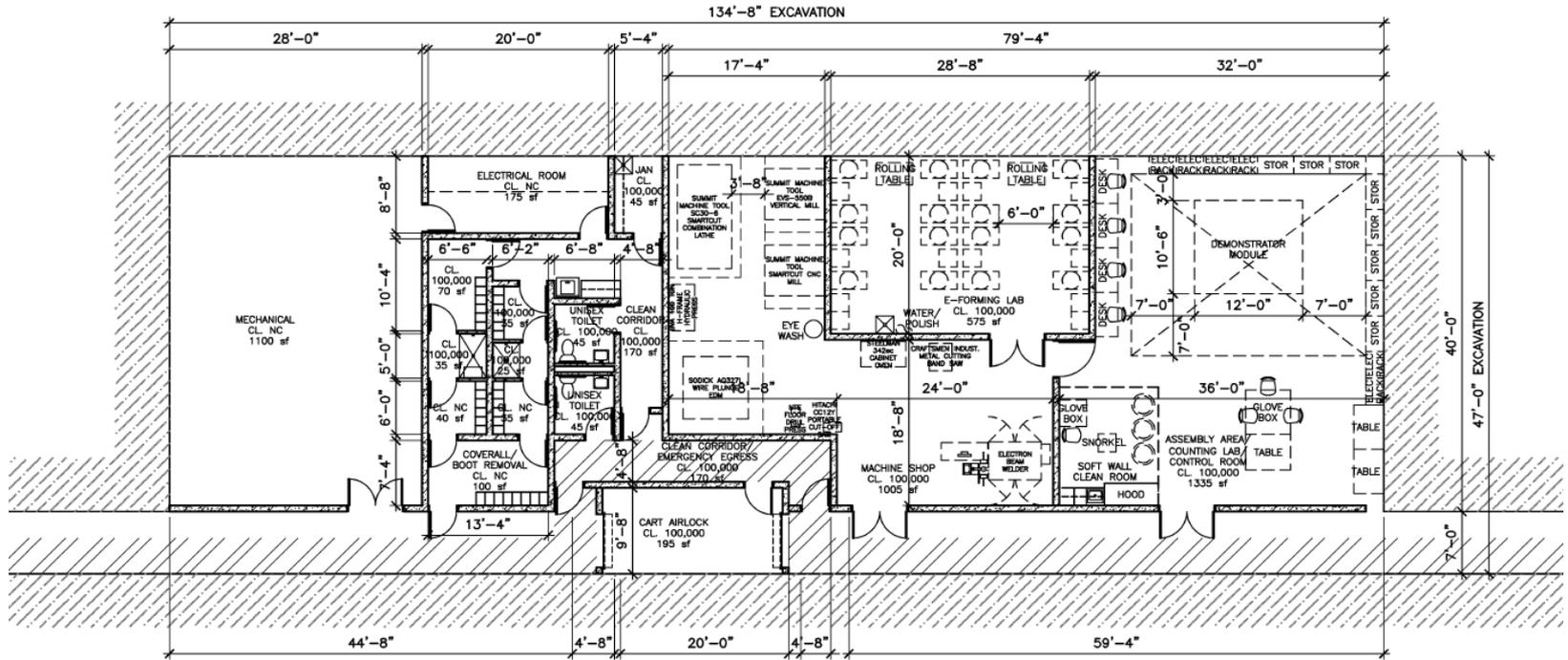
LONGSECTION OF THE HOMESTAKE MINE



A 4850 LEVEL PLAN
C102 1"=20'

Expanded View of Lab Space

LONGSECTION OF THE HOMESTAKE MINE



SHARED TRANSITION SPACE – OPTION 13Arev

4/10/09

3/32" = 1'-0"

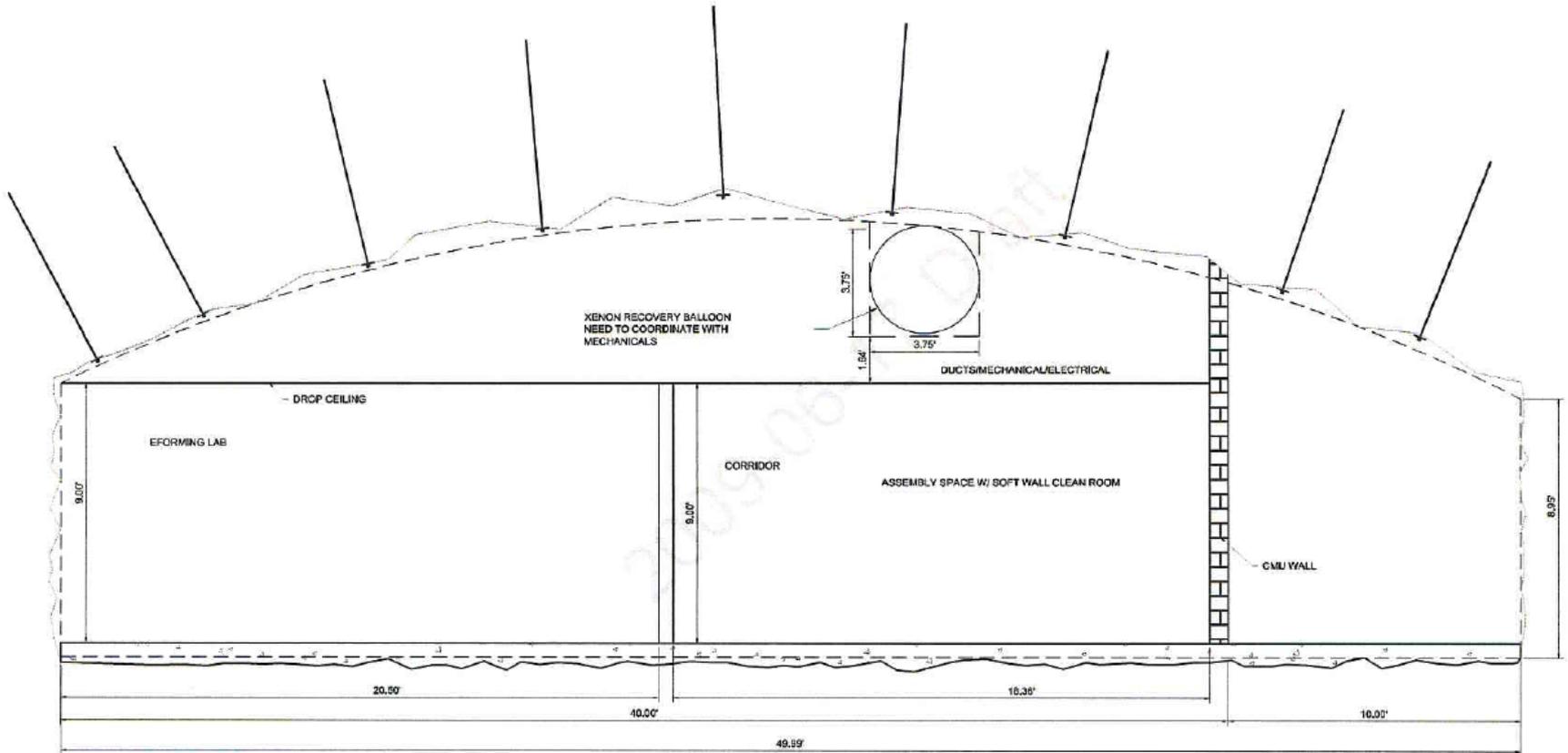
MEP / TRANSITION / MAJORAN

1320 gsf / 1035 gsf / 3030 gsf

5385 gsf TOTAL

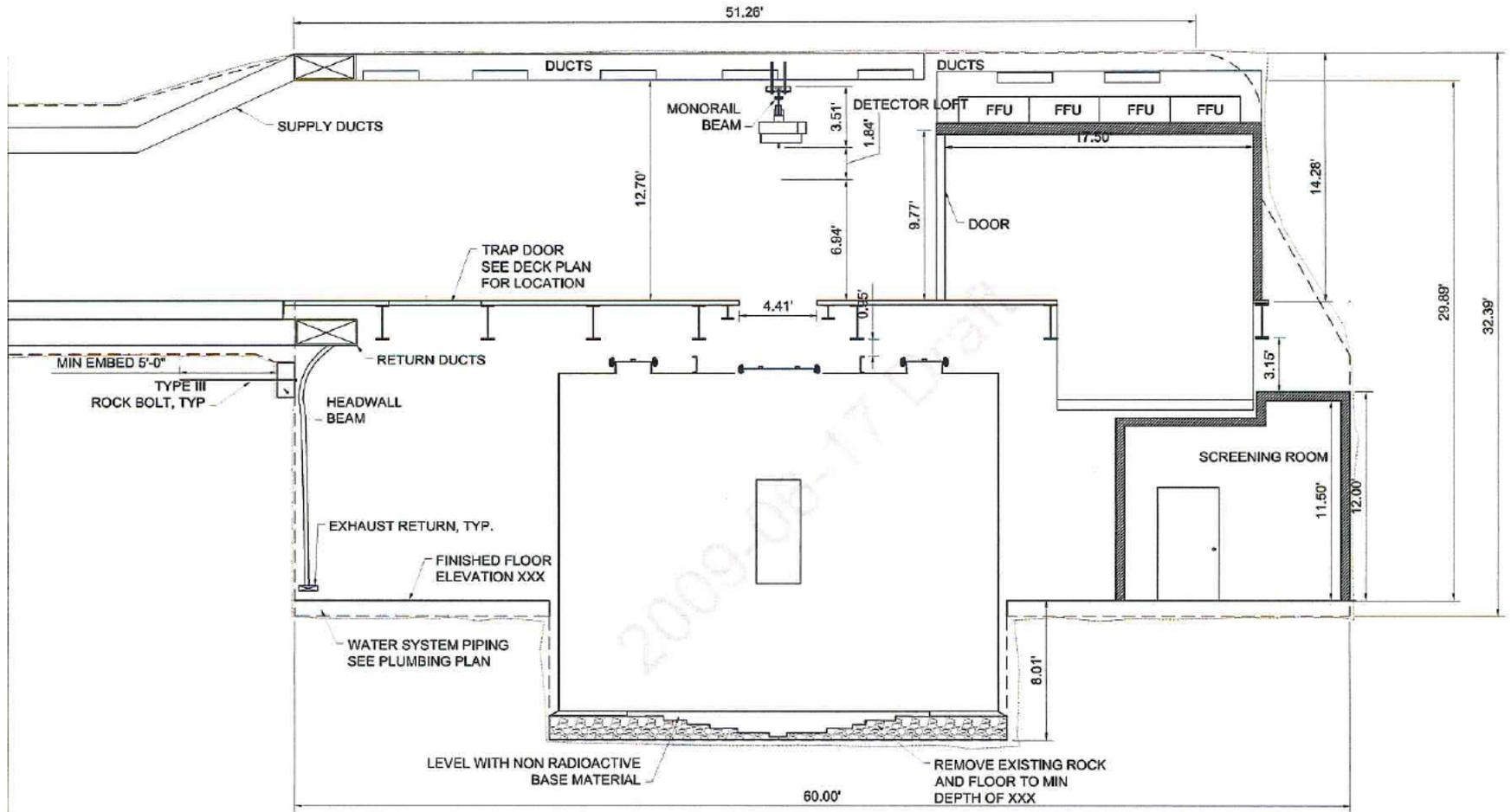
Cross Section of Lab Space

LONGSECTION OF THE HOMESTAKE MINE



Cross Section of Davis Cavern

LONGSECTION OF THE HOMESTAKE MINE



Beginning of Right Elbow

LONGSECTION OF THE HOMESTAKE MINE



New Access “Right Elbow”

LONGSECTION OF THE HOMESTAKE MINE



4850 Level Campus

LONGSECTION OF THE HOMESTAKE MINE



Core sampling

LONGSECTION OF THE HOMESTAKE MINE



Rock sampling for mega-detectors
and lab modules on 4850L

Ventilation upgrades

LONGSECTION OF THE HOMESTAKE MINE



Old Oro Hondo

Underground
air flow
improved



New Oro Hondo



Electrical and data infrastructure



SDSTA network and fiber installed, Internet2 connected



New surface substations established

Underground system upgraded



Hoist infrastructure refurbished



Ross bushings changed



Ross MG set cleaned

Early underground science started

LONGSECTION OF THE HOMESTAKE MIN



Low-
background
counts

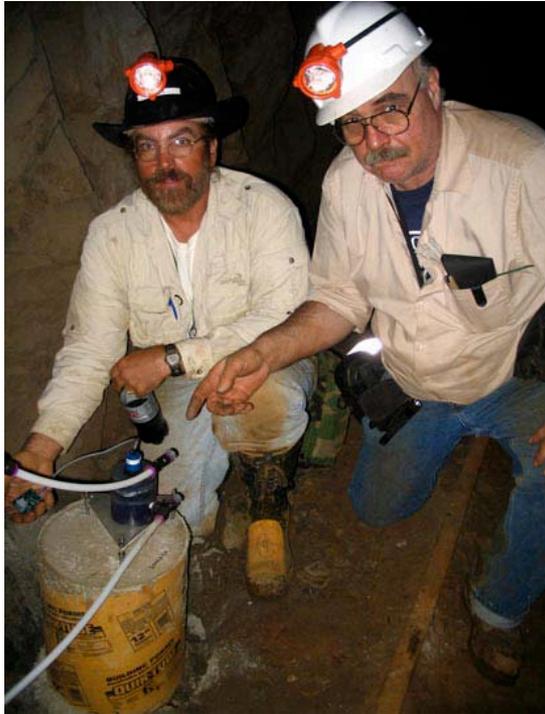


Gravity waves



Early underground science started

LONGSECTION OF THE HOMESTAKE MINE



Tiltmeters



Geological mapping



Biological sampling

LUX Surface Laboratory completed



Three-story detector pit

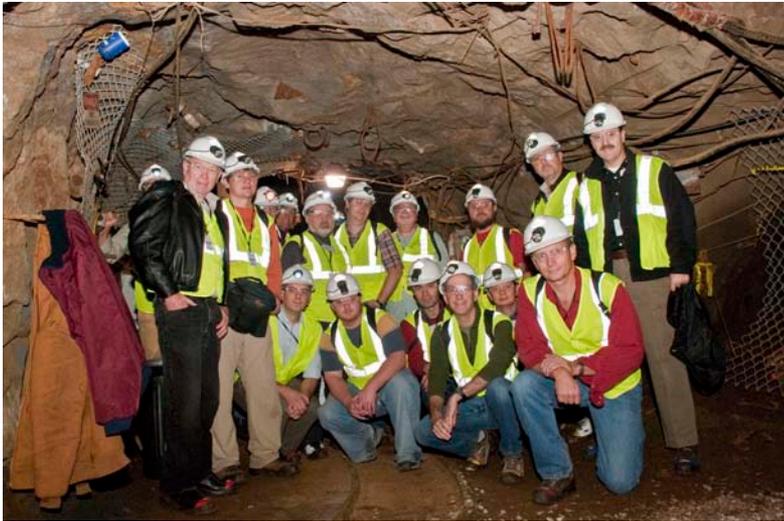


Clean room



S4, LBNE collaboration workshops

LONGSECTION OF THE HOMESTAKE MINE



Education and Outreach



Neutrino Day

Davis-Bahcall scholarship program



Education and Outreach



Deep Science for
Everyone lectures

GearUp support



Why the shortfall in FY 2010/11?

LONGSECTION OF THE HOMESTAKE MINE

- **The Conceptual Design Report dated January 9, 2007 called for construction of an approved MREFC to begin in October 2010. (The SDSTA had sufficient funds)**
- **There is no legal precedent for the NSF funding operations until there is an approved MREFC.**
- **The National Science Board will not be considering approval of an MREFC until May of 2011.**
 - Delays in awarding Preliminary design.
 - DOE involvement complicated the process.

SDSTA FUNDING SOURCES & USES

Shown to appropriations last year

Sources and uses of Funds

	Previous yrs	July 1 - June 30 FY 08/09	July 1 - June 30 FY 09/10	July 1 - June 30 FY 10/11	July 1 - June 30 FY11/12	Total Funds
Source of Funds						
Sanford Gift #1	\$15,000,000	\$20,000,000				\$35,000,000
Sanford Gift #2					\$20,000,000	\$20,000,000
Sanford Gift #3				\$15,000,000		\$15,000,000
HUD Grant	\$10,000,000					\$10,000,000
SD Legislature	\$33,387,630					\$33,387,630
Interest Income	\$4,415,346	\$2,500,000	\$1,000,000			\$7,915,346
Total	\$62,802,976	\$22,500,000	\$1,000,000	\$15,000,000	\$20,000,000	\$121,302,976
Use of Funds						
Restricted Funds*	\$13,500,000					\$13,500,000
Spending on Capital projects	\$10,660,050	\$12,711,660	\$16,628,290	\$20,000,000	\$20,000,000	\$80,000,000
Spending on Operations	\$5,045,000	\$9,910,198	\$10,207,504	\$10,513,729	\$10,829,141	\$46,505,572
Total Spent or restricted	\$29,205,050	\$22,621,858	\$26,835,794	\$30,513,729	\$30,829,141	\$140,005,572
Balance remaining	\$33,597,926	\$33,476,068	\$7,640,274	(\$7,873,455)	(\$18,702,596)	(\$18,702,596)

*restricted for indemnification, closure, & Insurance

Monthly Costs to operate

Total estimated cost to continue operating: \$ 896,000 per month.

Monthly costs:

Administration

Executive management (<i>including insurance, supplies, etc</i>):	\$ 65,000.
Human Resource Dept:	\$ 7,000.
Finance (<i>including payroll, payables, purchasing</i>):	\$ 22,000.
Information Technology:	\$ 19,000.
Education, Outreach and Communications:	\$ 26,000.
Subtotal Administration:	\$139,000.

Operational budgets

EH&S (<i>including, PPE, supplies, etc.</i>):	\$ 87,000.
Engineering:	\$ 25,000.
Operations & Maintenance:	\$615,000.
Science support:	\$ 30,000.
Subtotal Operations:	\$757,000.

Total Costs per month: \$896,000.

Human Resources - FTE

LONGSECTION OF THE HOMESTAKE MINE

Administration

Executive management:	1
Human Resources Dept:	1
Finance (<i>Reception, Acctg, payroll, payables, purchasing</i>):	4
Information Technology:	2
Education, Outreach and Communications:	<u>1</u>

Subtotal Administration: 9

Operational budgets

Environmental, Health & Safety:	6
Engineering:	4
Operations & Maintenance:	53
Science support:	<u>3</u>

Subtotal Operations: 66

Total: 75

Answers to common questions.

Question: Can these operational costs be further reduced?

Answer: Further reductions in these costs will result in significant risks.

The SDSTA would face significant safety and liability issues were further reductions made to reduce employees or curtail maintenance and inspection activities. As an example, the elimination of one shaft and all related personnel and costs would eliminate secondary egress, which is required under OSHA. Pumping can't be curtailed or reduced without loss of previous investment.

What is the likelihood of NSF approval?

- Strong support from Science Community.
- Strong support from OSTP (White House).
- Strong support from DOE (to work with the NSF)
- Strong support from Congress.
 - South Dakota
 - Illinois
 - California

Investment to date by the NSF/DOE

LONGSECTION OF THE HOMESTAKE MINE

NSF:

DUSEL Conceptual Design	\$ 1,000,000
DUSEL Preliminary Design:	\$ 47,000,000
DUSEL Experiment Design:	\$ 25,000,000
DUSEL Environmental Impact:	\$ 5,000,000
LUX and Other experiments:	<u>\$ 2,500,000</u>
Total to date:	\$ 80,500,000

DOE:

Fermi Lab DUSEL accelerator:	\$ 10,000,000
Majorana at Sanford Lab:	\$ 6,000,000
Plans for upscaled Majorana:	<u>\$ 20,000,000</u>
	\$ 36,000,000

What happens if it is not approved by NSF?

LONGSECTION OF THE HOMESTAKE MINE

The State of South Dakota can not afford to operate the Sanford Underground Science and Engineering Laboratory as a state facility.

The facility would have to be shut down or the DOE may want to use it for a more narrowed purpose.

The SDSTA board will need to consider a closure plan in June 2010 if gap funding cannot be found.

What happens if it is approved by the NSF?

LONGSECTION OF THE HOMESTAKE MINE

The Facility construction is expected to cost a minimum of:

\$500,000,000

- The economic impact to South Dakota both for construction and ongoing operations would be huge. (Fermi Lab has a \$400 million annual operating budget)
- The impact on our education (both K12 and Universities) will be transformative.

Question: Is this a loan to the NSF or the SDSTA?

Answer: No this is not a loan, but a further investment by the State of South Dakota.

- **Question:** How much of the State of South Dakota and Sanford money has been spent in South Dakota?
- **Answer:** Of the \$66 million that will have been spent by the SDSTA through next November, it is estimated that approximately 75% or \$49.5 million will have been paid to South Dakota contractors, suppliers and workers. Those workers either work for the Authority or the contractors that were awarded bids.

- **Question:** If the legislature funds this gap and the NSB approves the project and starts funding it, what would the role of the State of South Dakota and South Dakota Science and Technology Authority be?
- **Answer:** This will be worked out in detail over the next year. The current view is that the NSF would provide operating funds through a cooperative agreement with either the University of California Berkeley and/or SDSM&T, who in turn would either contract with the SDSTA to operate the Sanford Laboratory or contract with a new operating company. In the event a new company was contracted to operate the lab, then the SDSTA would lease the facility to the University given the cooperative agreement. In either event, the SDSTA would ensure that the lease/operating contract would cover all expenses including insurance and administrative costs so the SDSTA would not require future funding from the legislature for this project.