

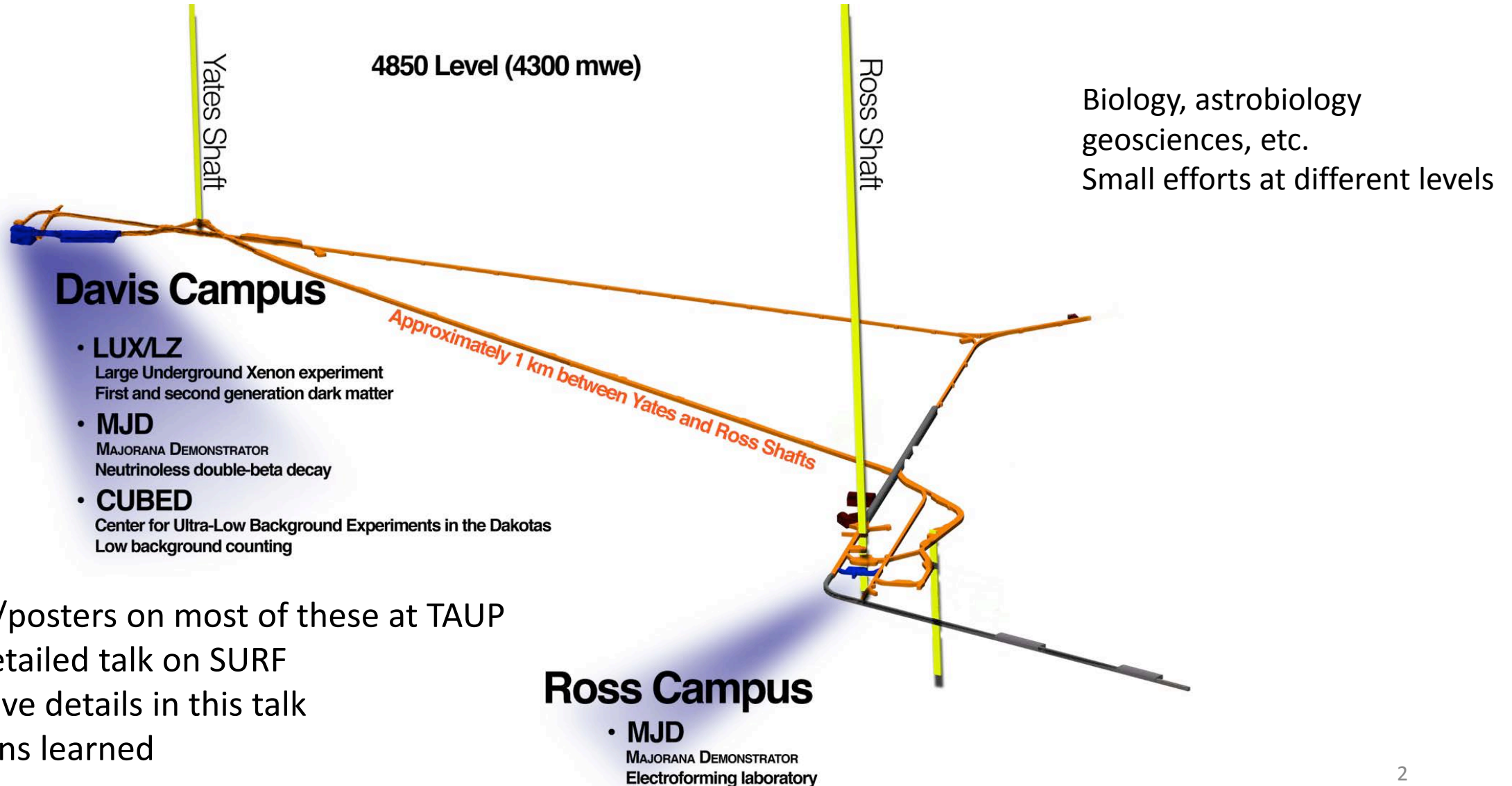
Sanford Underground Research Facility (SURF)

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September 8, 2013

Current 4850L Science Laboratories

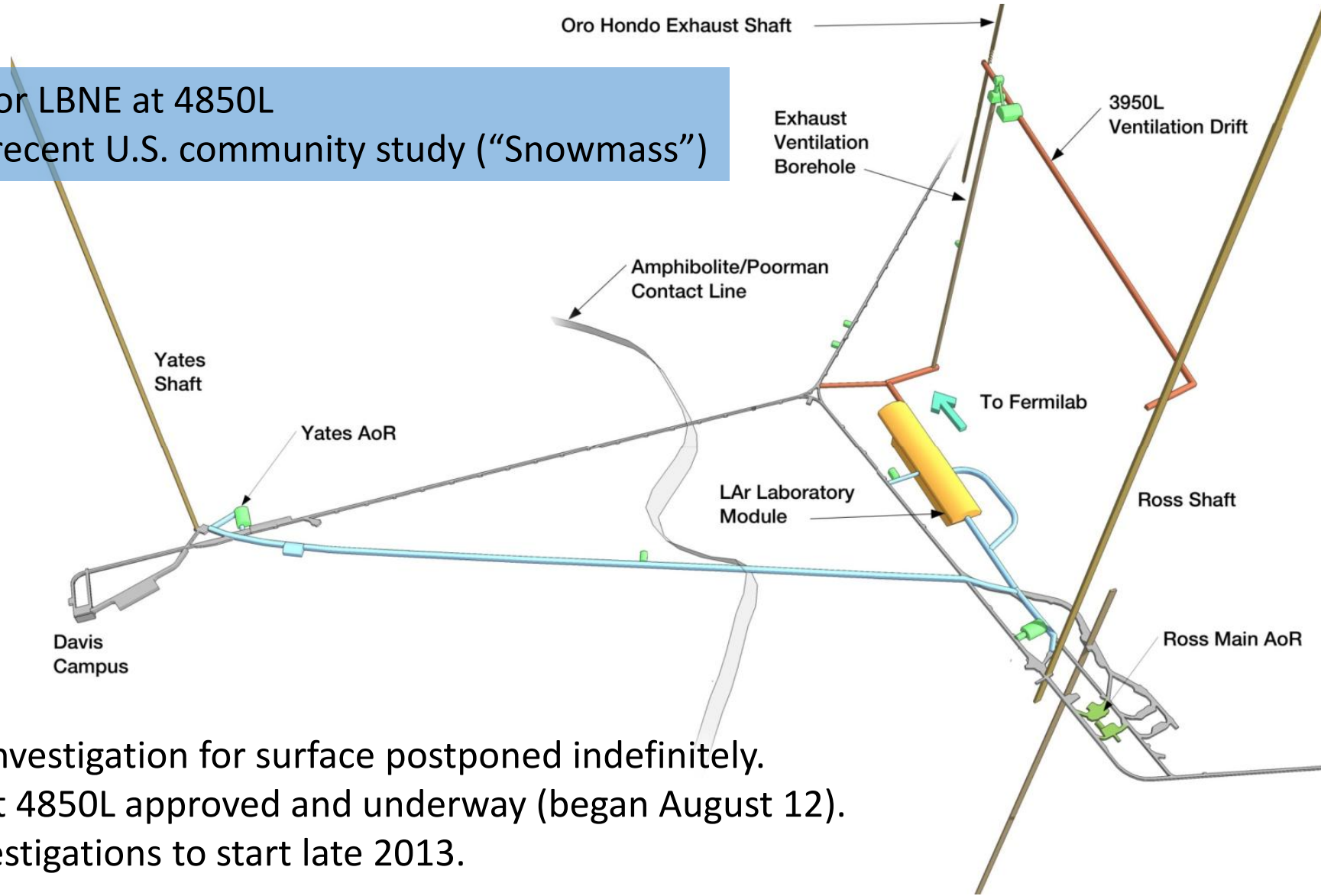


Will be talks/posters on most of these at TAUP
And more detailed talk on SURF
So will not give details in this talk
Mostly lessons learned

Possible LBNE Site on 4850L

Upgrade of Ross shaft key for LBNE
Required for excavation

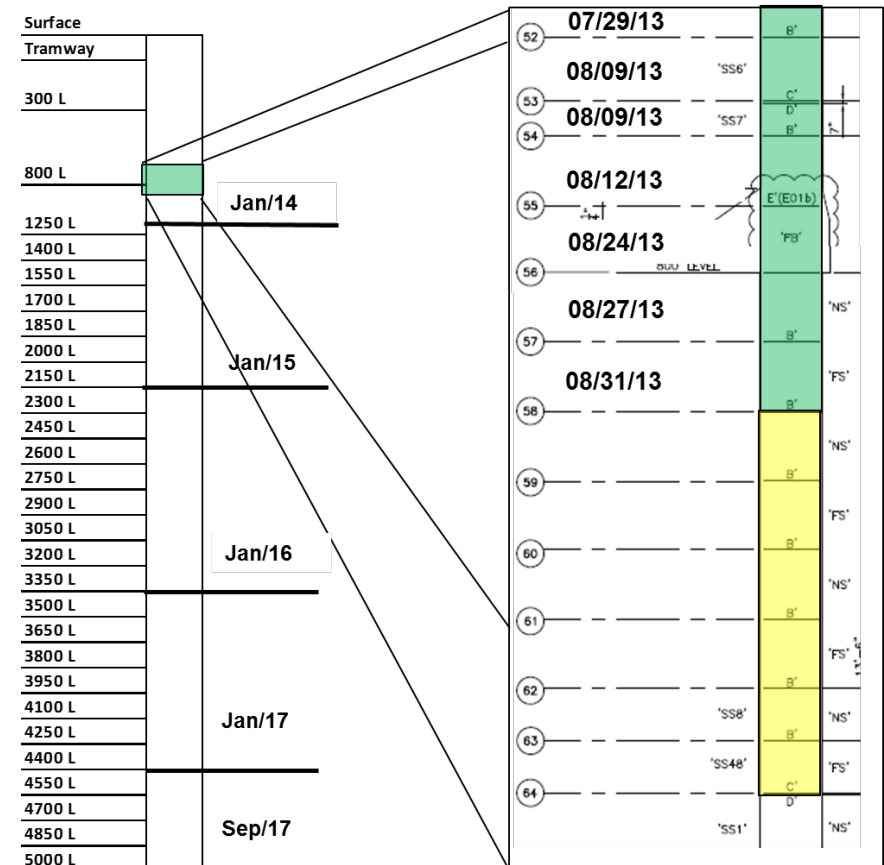
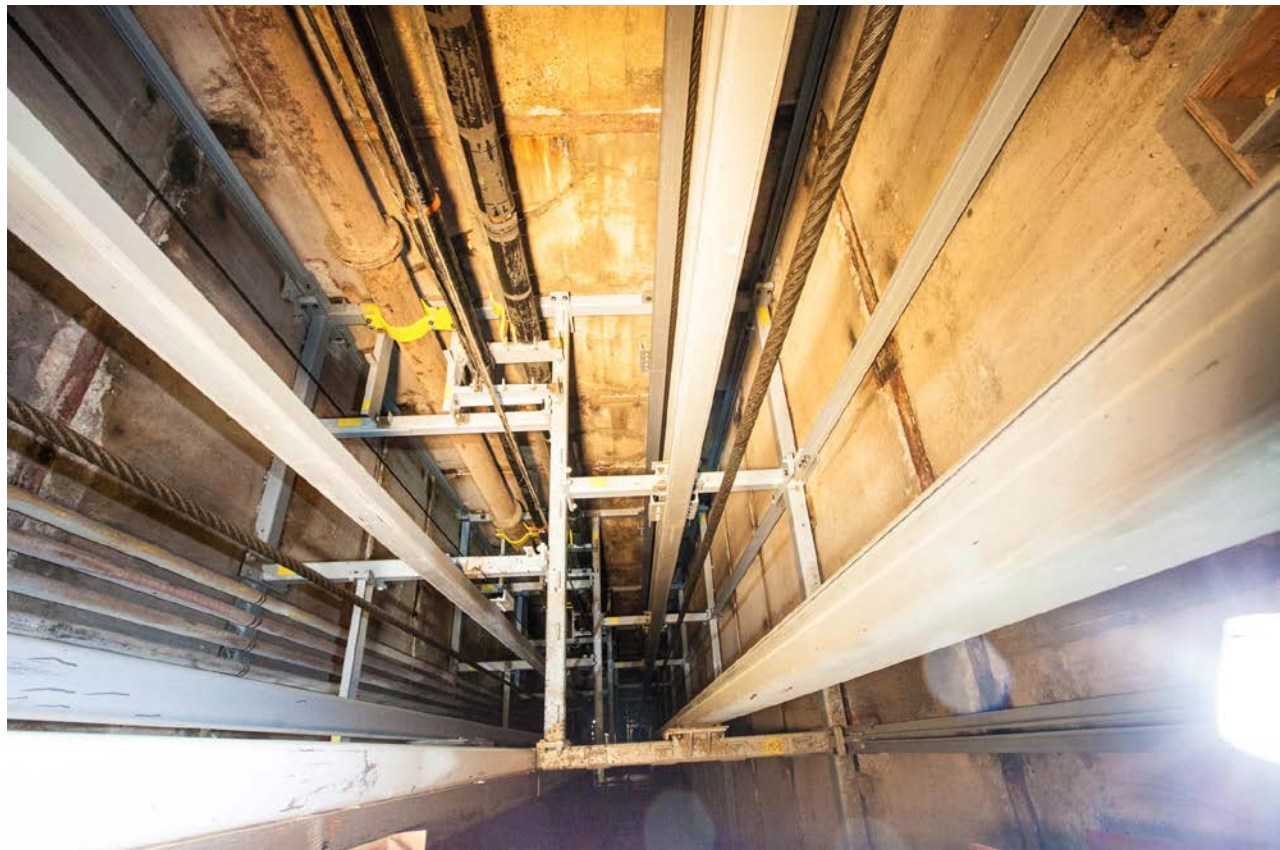
Strong desire for LBNE at 4850L
Reinforced by recent U.S. community study ("Snowmass")



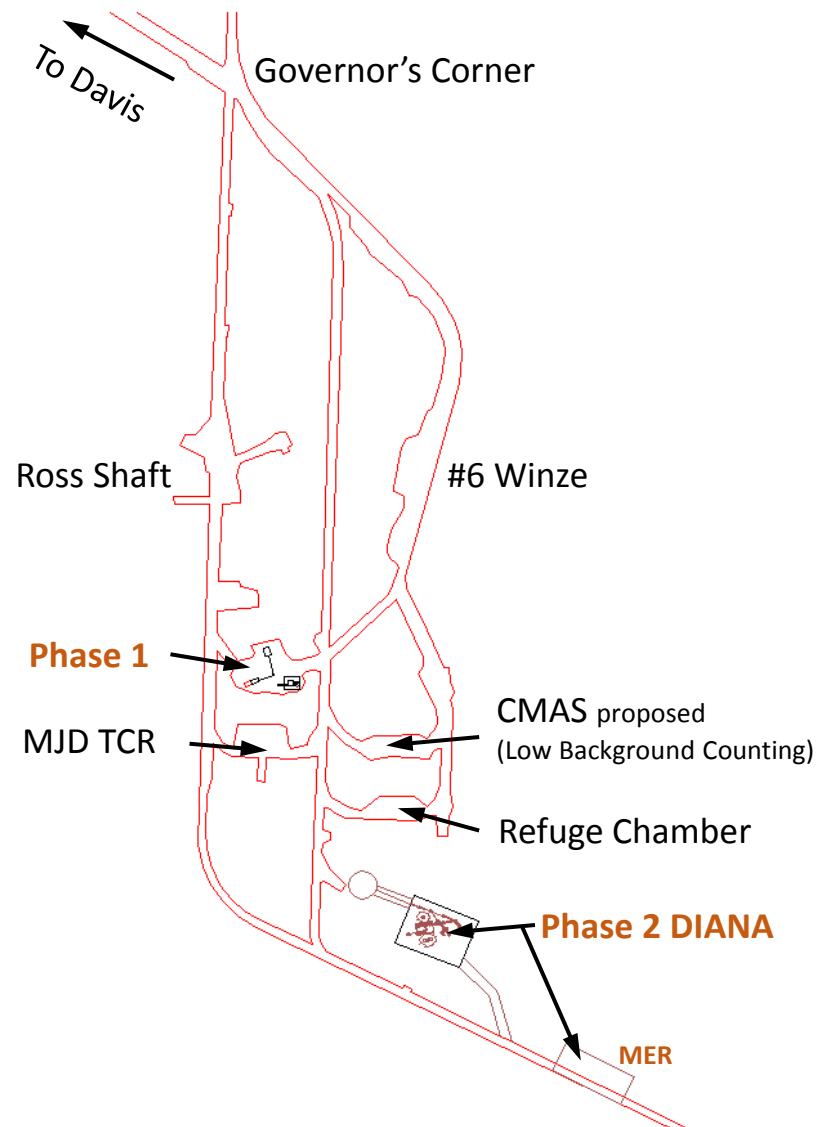
Geotechnical investigation for surface postponed indefinitely.
Investigation at 4850L approved and underway (began August 12).
Drilling for investigations to start late 2013.

Ross Shaft Upgrade

- Underway by SURF staff. About 1,000 feet completed. ~ 100 ft/month
- When done ~ 6 million pounds of steel
- A bit ahead of schedule, target completion now is June 2017. Match LBNE need.



Additional Activities at 4850L



Low Background Counting

- Shielded systems for many years at Oroville CA run by LBNL will move to SURF this year.
- Hope to add additional capability
- In addition to CUBED counters
- Become center of excellence in this area

DIANA

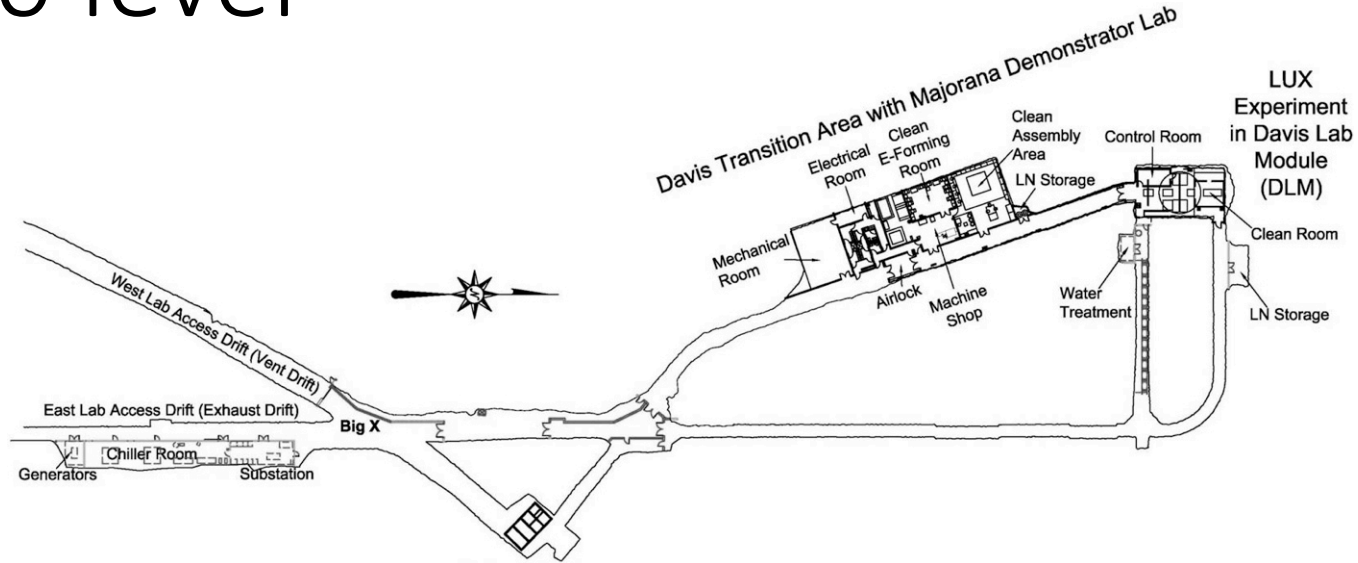
Phase 1

- Small accelerator currently at UND relocated into existing space, solid or gas target
- Potential to add low energy accelerator in same space as intermediate phase
- Minimal infrastructure requirements

Phase 2

- Full DIANA scope with low and high energy accelerator, solid and gas targets
- All new excavation and utility supply

Davis Campus at the 4850 level



Davis Campus ~ 30,000 ft²
Expt Space ~ 10,000 ft²

Eur.Phys.J.Plus (2012) 127:114



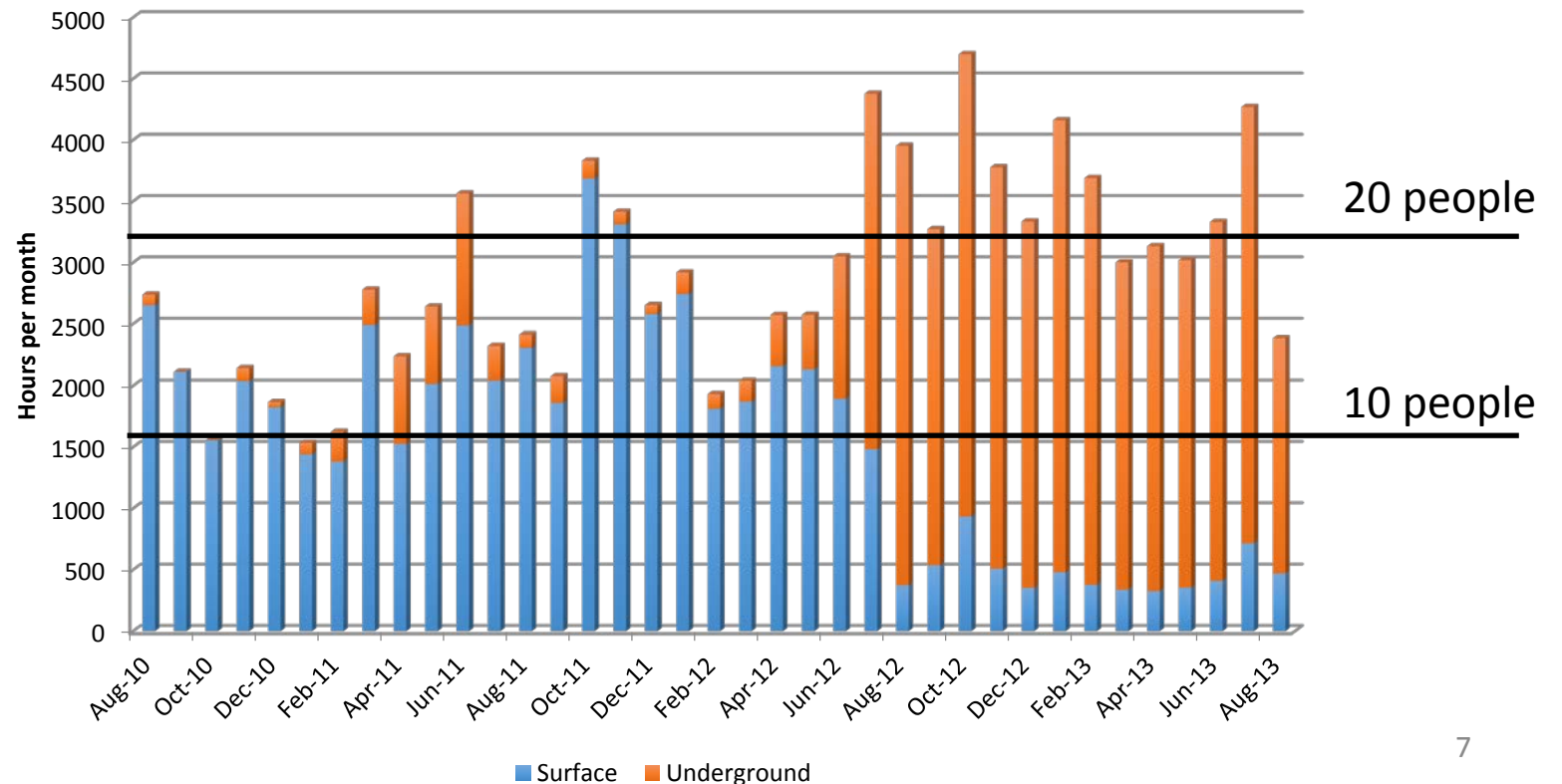
Davis Campus Operations

- Davis Campus dedication end of May 2012. 15 months experience.
 - Experiment installation began immediately after dedication.
 - LUX data taking began in March 2013. First result by end this year.
 - MJD assembling. Start operations later this year.

Researchers only

Does not include SURF staff
or contractors.

Does not include meetings
on site.



Lessons Learned(1)

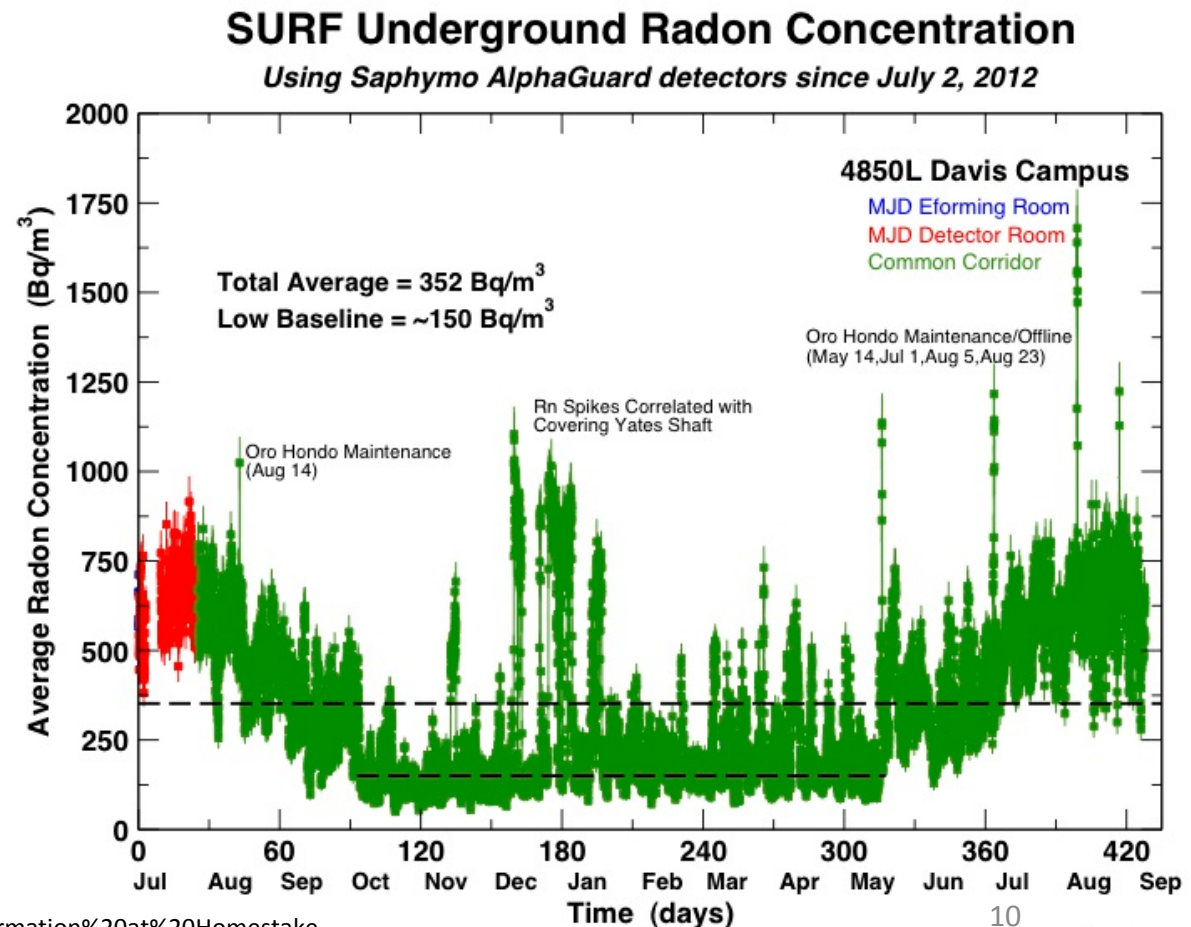
- Many of these are apparent/obvious....
- Involvement of experiments in facility design
 - LUX and MJD were very involved in the detailed design and construction of the Davis Campus. This was critical.
 - Reviewed design drawings
 - Participated in weekly meetings with SURF staff during construction, including change orders
 - This is continuing in detail with LZ and later LBNE and to some extent DIANA
 - Requires small team of dedicated engineering staff at SURF
- EH&S support, engineering reviews provided by SURF staff
 - Essential for safe operation. Both EH&S professionals and engineering.
 - In addition to EH&S structure within each experiment.
 - Has taken some time to learn how to work together with experiments.
- SURF science support(i.e. physicists) – very small team OK(but just)

Lessons Learned(2)

- Surface assembly and staging space
 - Nearby surface laboratory used extensively by LUX, including clean rooms and partial experiment operation. Less so by MJD, but still some.
 - Even more planned for next generation dark matter experiment (LZ)
 - LBNE needs just starting to be understood.
- Nearby (on-site) office and meeting space
 - Substantial usage. Also for remote monitoring. Although can be done from anywhere, need to be close by to respond quickly.
- Contamination
 - Standing committee that reviews use of radioactive items to prevent cross contamination

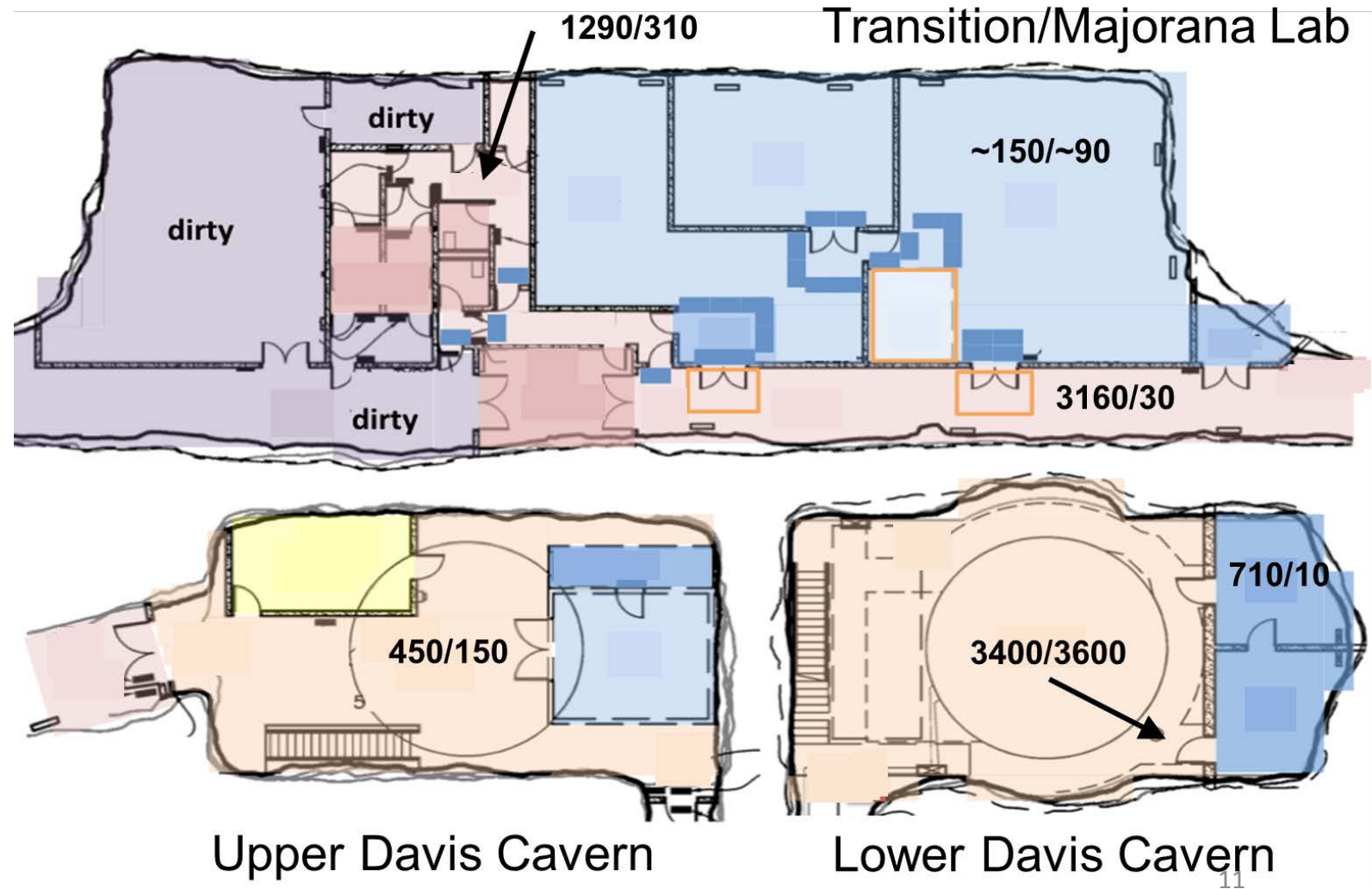
Lessons Learned(3) - Radon

- Monitor radon
 - Interesting but not critical so far
 - Local control used successfully
 - Global affected by ventilation, season?
 - Future (LZ), continue local control



Lessons Learned(4) - Cleanliness

- Critical
- Dedicated protocols for access
- Full-time cleaning personnel
- Particulate monitoring
- Occupied/unoccupied shown at right
- Median, $0.5 \mu\text{m}/\text{cf}$



Lessons Learned – What Didn't Work Well

- Issues, minor so far. Fortunate.
- Redundant network connection to underground.
 - High speed network connections for monitoring are critical
 - Not just locally but internationally. Have monitoring for LUX outside U.S.
 - Redundancy locally not implemented initially (cost). But now about to implement.
- Power outages
 - Site wide. Experiments have to have backup power for critical systems. And test them. Was judged too expensive to provide full site backup.
 - Local, breaker issues. Peak current issues. Have resolved slowly.
- Humidity control
 - Upgrading now based on experience, also looking forward to LZ

High Level Items

- LUX, LZ, MJD and LBNE are international collaborations
- So far, no significant issues with non – U.S. members, or access problems
 - Insurance to work on site can be a challenge for non – U.S.
 - Lab management needs to recognize international access as issue to be addressed early
 - SURF provides some minimal user support
- SURF is an anchor for major educational and public outreach effort
 - Thousands of students come through (but not underground)
 - Public events. Tourist area.
 - Recently, agreed to fund associated local “science center”

Beyond SURF

- Design studies for big future experiments were done as part of the DUSEL effort and are documented in <http://arxiv.org/abs/1108.0959>
- The details of these studies may be of modest use to CJPL expansion
- Of possibly more relevance is the process that was used
 - Considerable interaction with potential experiments
 - Workshops, studies, etc
 - Easy to organize, but requires in – house group for continuity and to capture the information
 - Best if on – site but not required