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Title: Los Alamos National Laboratory Weapons Program Laboratory Director
Update LANS/LLNS Mission Committee

Author(s): Ventura, Jonathan S

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Los Alamos National Laboratory Weapons Program

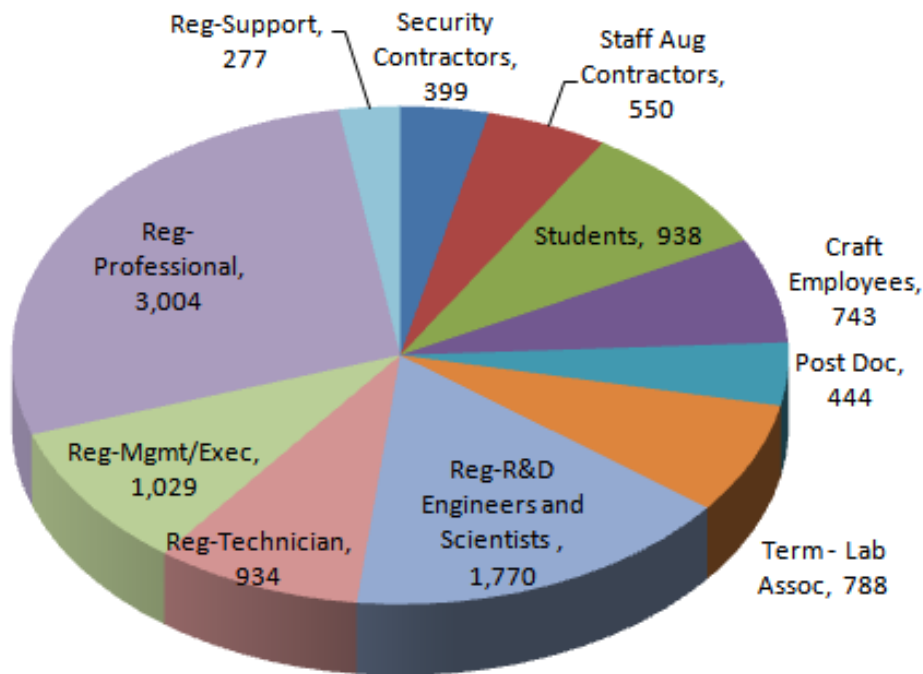
Laboratory Director Update

LANS/LLNS Mission Committee

June 2012

Overall LANL Workforce post VSP

LANL Site Staffing Levels
10,876 Employees as of 4/09/2012



- Regular workforce (7,014):
 - Research & Development
 - Professional
 - Technician
 - Management/Exec
 - Support
- Pipeline workforce:
 - Students
 - Post Docs
- Flexible workforce:
 - Term (up to 10 years)
 - Lab Associates
 - Staff Aug (< 2 years)
 - Craft (union skilled labor)
- Security Contractor

To help manage the impact of declining budget LANL offered a VSP package to employees

- **December 31, 2011 to April 6, 2012 (post VSP), the Laboratory lost 557 FTE (6.3%)**
- **Technical areas with losses greater than 6.3%**
 - Computer Science and Information Technology 7.8%
 - Laser Pulsed Power, Accelerators 8.2%
 - Threat Reduction 8.9%
 - Dynamic Experimentation and Diagnosis 9.6%
 - Nuclear Design and Evaluation 9.7%
 - Project Management 12.4%
 - Human Capital Management 15.1%
- **The Defense Programs lost 6.7% of its R&D workforce**
 - **R&D skill areas with losses greater than 6.3%**
 - Hazard-ranked Facility Operations Security 7.7%
 - Nuclear Design and Evaluation 9.1%
 - Threat Reduction 14.9%

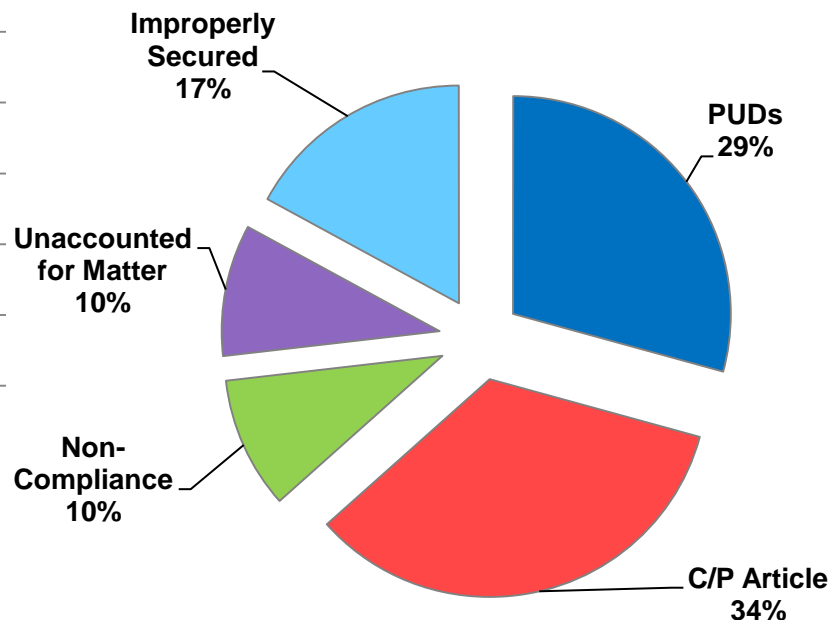
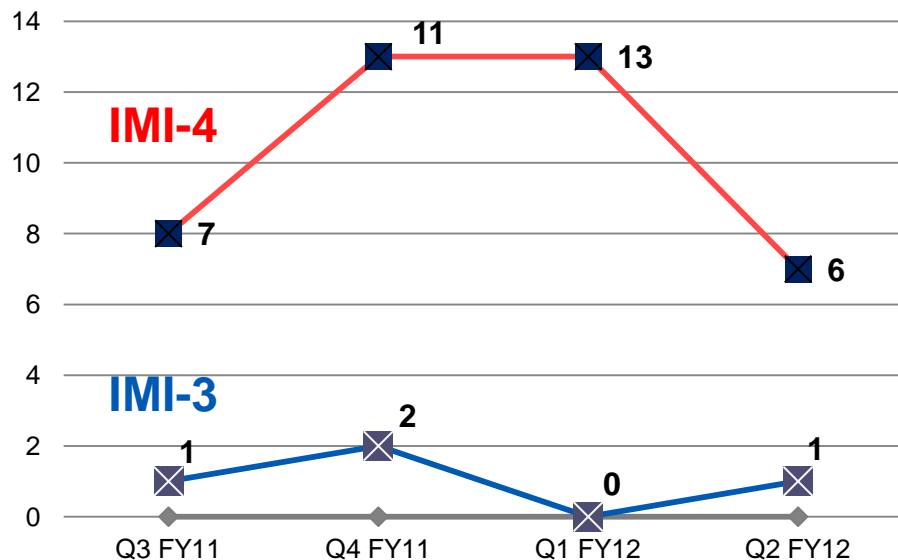
Lab Wide

LANL is continuing to assess financial and technical impacts of VSP

OMB's Category B Apportionment restrictions on the pension costs have proved a challenge this FY

- **Introduction of new requirements on fencing pension contributions in FY12 called “Category B Apportionment”**
 - Would introduce restrictions on how funds can be spent when M&O pension contributions vary from previous estimates
- **Has the potential to affect LANL's expected FY12 funding from NNSA at the ~\$50M level**
 - LANL has raised serious concerns to NNSA leadership on the impacts to the Laboratory of such a large reduction at a late stage in the FY
- **Compounded by difficult year, budget-wise**
 - LANL new BA across all programs down \$300M compared to FY11
 - Just executed a voluntary separation – 557 individuals left
 - Announced reductions in contract workforce and NM business contracts
- **No written direction on resolution; verbal indications only that the issue will be largely mitigated;**
 - Awaiting written direction and receipt of remaining funding in order to be assured this problem is manageable in remaining months of FY12.

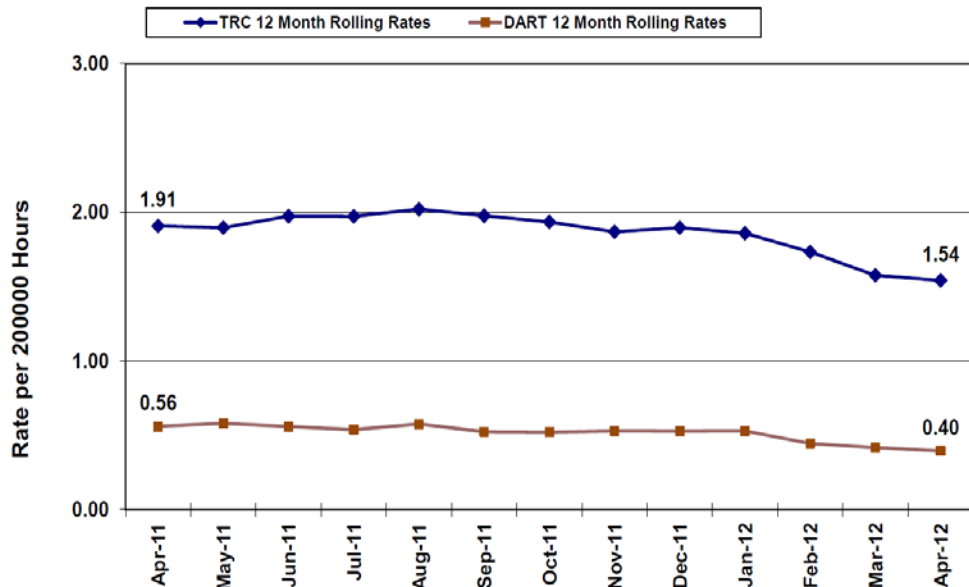
ZERO IMI-1/IMI-2 security incidents over the last year



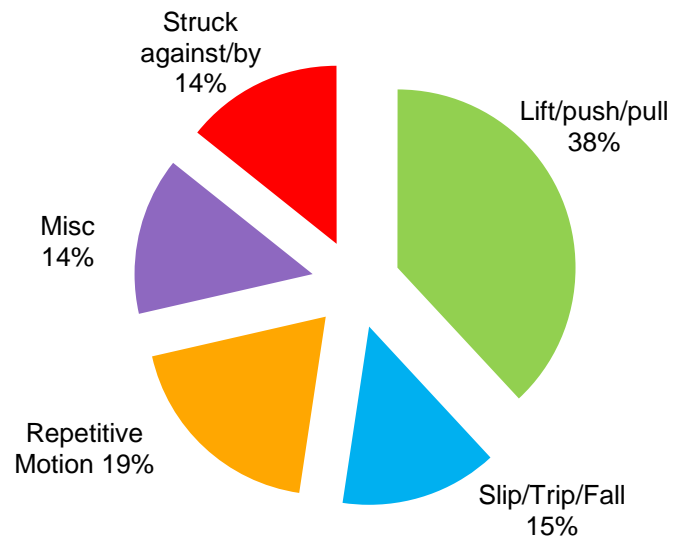
Over half of our incidents are controlled/prohibited articles (phones) or potential unauthorized disclosures (emails)

Weapons Program TRC/DART rates are dropping but we still have significant improvements to make

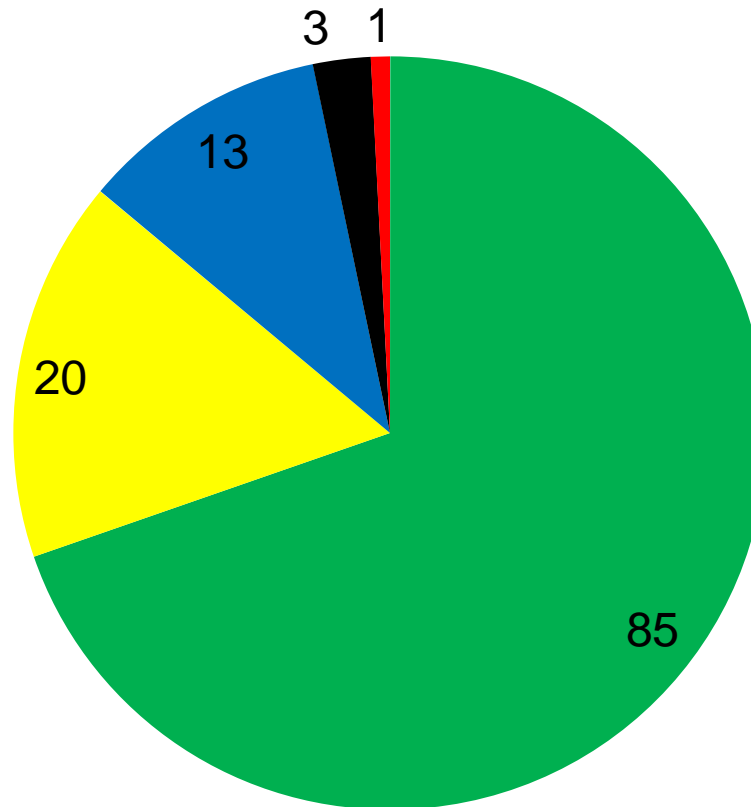
LANL TRC/DART Rates



PADWP Rates: TRC 1.75 DART 0.58



Level 2 Milestone performance 2nd Qtr FY 2012 LANL weapons program



We believe that @93% of the yellow milestones will be successfully completed by the end of the FY

Red Milestone: On 3/8/12 the FOD for the WETF conservatively identified a TSR noncompliance based on unanticipated oxygen in-leakage during a glovebox post maintenance leak test.

UNCLASSIFIED

Congress is marking up the FY 13 request

	PB Request	HASC	SASC	CONF	HAC	SAC	CONF
DSW	2,088.2	2,307.2			2,069.1	2,078.2	
Campaigns	1,690.7	1,712.7			1,735.6	1710.7	
RTBF	2,239.8	2,339.8			2,239.8	2,239.8	
Secure Transport	219.3	219.3			219.3	219.3	
Nuc.Counter Terrorism	247.5	247.5			225.4	247.5	
Site Stewardship	90.0	72.6			79.5	88.2	
Def.Nuc Sec	643.2	643.2			663.2	643.2	
NNSA CIO	155.0	155.0			160.0	155.0.	
Pension	185.0	185.0			185.0	185.0	
Nat.Sec. Application	18.2	18.2			0	10.0	
Rescission					- 65.0		
TOTAL	7,577.3	7,900.9			7,512.3	7,577.3	

Key legislative provisions in House and Senate Energy and Water Bills

- **Senate**

- Cuts \$30M to B61-12 and increases W76-1 funding by \$30M
- \$20M increase for ASC and earmarks \$69M for exascale
- JASON to assess surveillance program
- NNSA to submit comprehensive Pu Strategy
- Encourages NNSA to procure/install additional AC equipment in RLUOB
- NNSA and labs to eliminate unnecessary and bureaucratic functions that affect the quality of science and engineering

- **House**

- Fully funds B61-12 and increases W76-1 production by \$45M
- Concerned about escalating costs of Contractor pensions
- No funds to plan for or to reduce stockpile levels below New START
- NNSA to report on full options for B61-12 LEP and Pu Sustainment

House Authorization Bill reflects *deep* dissatisfaction with NNSA

- \$66M increase for B61-12 and \$81M increase for W76-1
- \$100M increase for CMRR/NF
- \$30M cut for ASC
- Creates interagency council (SecDef; SecEn; SecHS; DIRNie; NA-1) to ensure adequate support for the strategic capabilities @ national labs
- Reduces NNSA federal employment to 800 by 10/14, greater than 50% reduction
- Creates NNSA Council (Lab Dir and Plant Mgrs) to advise on scientific/technical issues related to policy matters and operational concerns
- Foreign weapons design and build prototypes of nuclear weapons to further intelligence assessments of foreign nuclear weapons activities. - prohibit experiments that would produce a nuclear yield
- NAS conduct a study of peer review and design competition related to nuclear weapons

House of Representatives adopted the bill by a vote of 299-120 on May 18

Senate Authorization bill contains elements of NNSA reform as found in the House bill

- Committee is committed to honoring the nuclear modernization commitments made under New START Treaty, and provides funding and authorities to restore key facilities and programs. Provides the DoD a limited transfer authority to the DOE for fulfilling this important commitment.
- Requires Congressional Budget Office (CBO) to estimate over a 10 year window the costs at the DOE and the DoD on maintaining and modernizing nuclear warheads and their delivery systems.
- NWC to certify the NNSA budget to meet stockpile and stewardship requirements and report to Congress whenever an authorization or appropriation bill falls below the President's budget request level on any significant impacts.
- NWC to determine the feasibility of further consolidations to the NNSA complex and, if feasible, requires in its report a proposed process. The provision requires the report to be submitted before construction begins on the UPF and CMRR-NF (CD-3)
- NWC to report to Congress on the definition of a common W88 / W78 warhead that will be used for phase 6.1 and 6.2A studies

Committee has NOT released committee report with funding details

OSD's concerns with NNSA/DP programming and budgeting has led to the creation of a Cost Analysis and Program Evaluation Team (CAPE) of NNSA budget

- **Issue: Are too many resources being allocated to science/engineering at the expense of meeting DoD warhead/bomb delivery schedules?**
 - Shift in W76-1 production, schedule slip and cost growth of B61-12; 5 year delay in CMRR/NF and impact on pit manufacturing
 - NNSA credibility with DoD and Congress diminished
 - NNSA commitments exceed flat budget environments for the foreseeable future
- **CAPE issues team has been extremely active since establishment January 2012**
 - 2 visits to LANL complete with 2 additional visits planned for June
 - Numerous interactions with NNSA and lab staffs in Washington, DC
 - Numerous interactions with senior NNSA management
 - Senior level (Dep. Sec., NWC and Lab Dir.) interactions May 15 and May 21
- **CAPE expected to be deeply involved with NNSA FY 14-18 budgeting**
 - NNSA has been approved to proceed with its FY14-18 Programming Planning and Budget Evaluation (PPBE) independent of the DOE CFO processes
- **CAPE NNSA Issues team is expected to conclude activities in Sept. 2012, with a final report due Sept 14, 2012**

CAPE analysis of NNSA budgets will be critical to any future funds transfers

60-day report provides options and recommendations to reach a limited future Pu AC/MC capacity

- A capability-based approach was the focus of the effort
- Five key points:
 - The CMRR NF project will be suspended in a disciplined way that leaves funding available for remedial actions
 - The strategy maximizes the use of the CMRR-RLUOB for Analytical Chemistry at the revised limit of 26 grams
 - Continue to pursue use of RLUOB at greater than 26 grams but this is fruitless without NNSA risk acknowledgement and acceptance
 - Moving forward with a flexible capability-based solution that can be expanded to a reasonable capacity through several different means
 - Recovering vault space in PF-4 and managing TRU waste effectively will be important

**It will take significant effort to reach a
20-30 pit per year support capacity**

60 day study concluded that LANL, by itself, cannot support a 20-30 pit per year production rate

- Evaluated potential LANL AC/MC capability and capacities, considered pit production capacities and possible schedules
- Pit production schedules tied to LEP decisions, technology selections and funding for the Plutonium Sustainment program
- Need to examine PF-4 and off-site strategies to achieve required capacity
 - Off-site support should be able to supplement LANL capacity
 - No long term evidence that this model will work successfully for ~1500 samples per year, since every site handling plutonium has it's own lab
 - Follow on work to work with multiple labs to determine supplier with acceptable quality at best value to customer
- The most likely outcome will be to work with offsite labs to create a plan that can meet the Pu mission needs to provide NNSA and other sponsors with sustainable capabilities

Revised Pu Strategy results in a 10 year plan to complete, costs about \$800M to provide approximately 30 ppy

- Schedule for completing actions in the 60-day report will take @ 8 years to substantially complete
- Significant progress can be made if FY 13 funding is available
- Major risks exist that are difficult to mitigate
- Planning to successfully execute this revise strategy will take between 18-24 months to accomplish

Risk	Probability	Consequence	Comments
Requirements Change	High	High	Risk generally transfers to NNSA
Cost/Funding Risk	High	High	Risk generally transfers to NNSA
AC Process Development	Mid	Mid	Mitigated by some activities being in gloveboxes and other sites' experiences
Staffing	High	Mid	Mitigated by other Laboratory and sites' personnel
PF-4 Mitigation	Mid	Low	Mitigated by the time frame involved – longer term risk
Inability to operate RLUOB at HazCat 3	High	Mid	Mitigated by being mostly related to capacity rather than capability
Above-Ground Transportation Implementation	Mid	Mid	Mitigated by current transportation systems
Programmatic Interruptions	Mid	Low	Mitigated by scheduling and operational segregation
Offsite Shipping	High	Mid	Mitigated by existing protocols for inter-site shipments

LANL continues to work on B61-12 but delays in release of remaining funds increases risk to FPU

- **LANL 3B draft Weapon Design Cost Report input to NNSA—June 2012**
- **LANL has received half of the \$35M at the beginning of FY 2012**
- **Release of final FY 2012 study funds is being worked**
 - Resolution of Category B Apportionment issue critical
- **JASONS Brief April 2012**
 - Expressed general agreement with CSA remanufacture plan
 - Emphasized importance of gathering fissile material aging data
 - Requested additional information on costs, TRL/MRL, requirement drivers that led to component down selects
- **B61-12 Congressional Report**
 - Cost and schedule
 - Cost/benefit analysis for safety, security and maintainability enhancements
 - Risk mitigation plans for technologies that DO NOT meet required readiness levels

LANL work on the 120 study is complete, work has been challenging and stimulating for staff

- **A major experiment supporting 120 day study will be executed at DARHT the week of June 11th – Hooks/Pedicini**
- **Builds on series of experiments conducted over the last several years**
 - Sandwich tests
 - Half Skull successfully executed April 26
- **An aggressive out brief schedule is being executed**
 - Steve Goodrum NNSA will be briefed at SNL and shown the physical models and meet with senior LANL technical staff June 4th
 - SAGSAT June 5-8 Goodrum to brief only scope of study will be discussed
 - NNSA brief June 13th
 - DoD brief June 14th

LANL classified supercomputing resources are being utilized by the weapons program

Machine Name	Resource Class	Number of Processors	Availability of Processors	Utilization of Processors
Hurricane	Capacity	5760	98%	84%
Typhoon	Capacity	13312	98%	87%
Road Runner	Advanced Architecture	12240	95%	70%
Cielo	Capability	142304	95%	86%



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Trinity Mission Need

- **The DOE NNSA ASC Program requires an Advanced Technology computing system to be deployed in FY15 to support the national Stockpile Stewardship Program**
- **“Trinity” has been selected as the name for this platform**
- **The ASC Roadmap defines a path to predictive capability to 2020 to support the goals of the ASC Strategy. Its four focus areas are:**
 - Address national security simulation needs
 - Establish a validated predictive capability for key physical phenomena
 - Quantify and aggregate the uncertainties in simulation tools
 - Provide mission-responsive computational environments
- **Trinity directly supports bullets 2 and 4**
- **Trinity will be a tri-Lab (LANL, SNL, LLNL) resource for the most challenging physics simulations in the FY16 to FY20 timeframe**

Trinity will be sized to dramatically increase the fidelity of simulations in DSW, weapon science, and engineering

- **Simulations on the largest ASC computers (Purple, Roadrunner, and Cielo) are pointing to the improvements needed for predictive simulations**
- **This continues the trend over the last two decades that improved prediction fidelity is dominated by:**
 - Improved physics models and sub-grid model complexity
 - Increased dimensionality and resolution
- **These will be high fidelity benchmark simulations, not production**
 - The high fidelity benchmarks will be validated versus experimental data
 - Production simulations will be at lower resolution in 2D, using locally valid sub-grid models that are tuned to the high fidelity benchmarks
- **Improvements in physics fidelity and validation science also drive increased need for uncertainty quantification**
 - Model and physics fidelity must be improved while maintaining reasonable time-to-solution to allow for multiple simulation runs to quantify uncertainties on high fidelity benchmarks

Increased fidelity in simulations is improving our understanding of weapons performance.

Trinity high-level project description

- **An ASC Program advanced technology system to be deployed by the New Mexico Alliance at Extreme Scale (ACES) in FY15 as a tri-Lab resource**
- **Meet the mission needs with the ASC codes for all three Laboratories (LANL, SNL, LLNL)**
- **Technology on-ramp to future platforms that use next-generation technology**
 - Strategic technology investments
 - Begin transitioning ASC codes
- **Assumptions/constraints**
 - Budget ~\$152M – \$167 M - \$15 for Maintenance
 - \$18M in FY13, \$73M in FY14, \$61M in FY15
 - Performance >> Cielo, > Sequoia
 - Power: 12 MW
 - Water-cooled

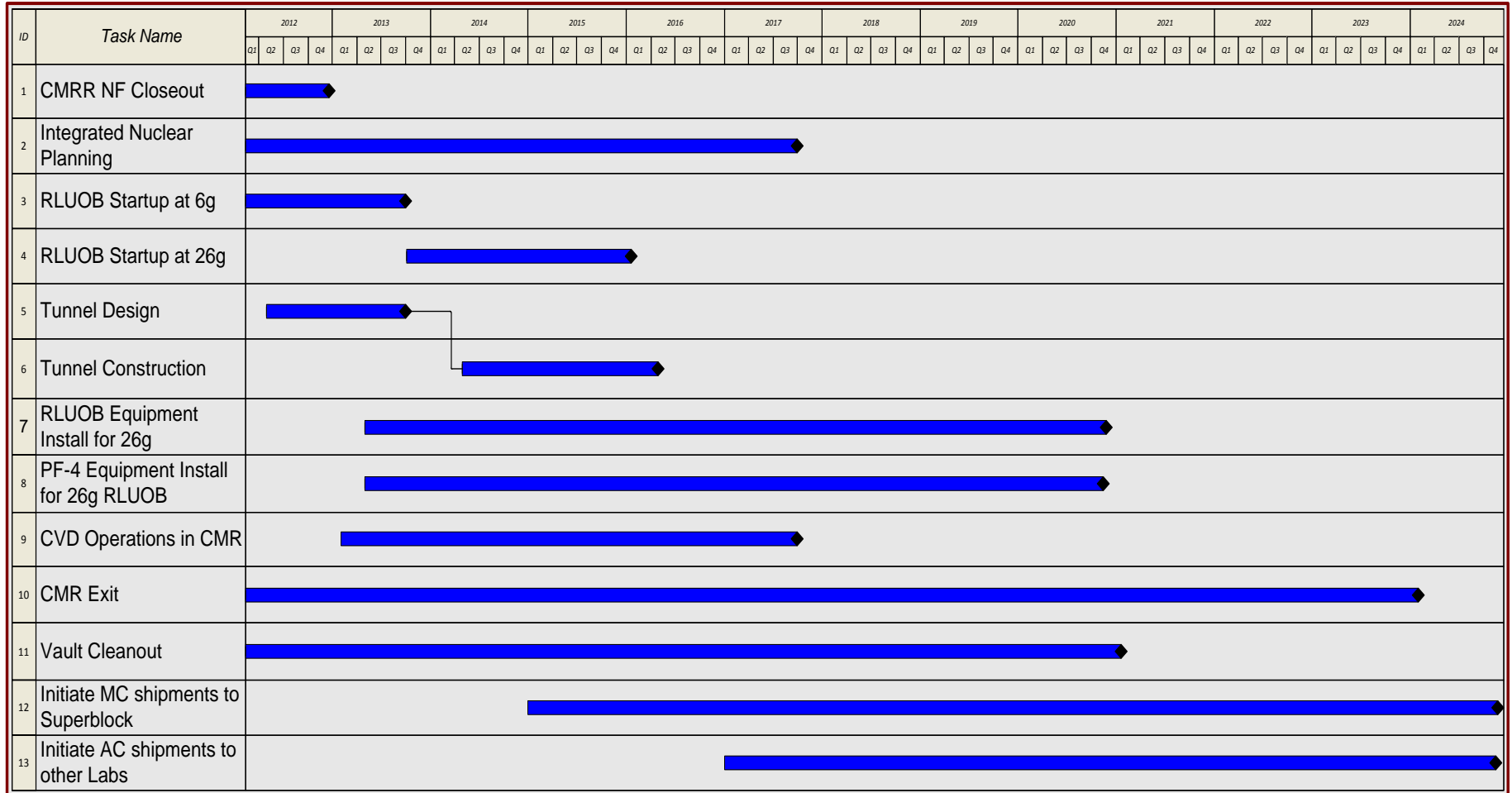
Science tools delivering on stockpile commitments

- **Utilization of DARHT Dual Axis capability**
 - B61-12 hydro in support of LEP
 - Full scale hydro in support of advanced implosion concept
- **Science, ICF and other program commitments**
 - Successfully executed 3/7/12 the MPDV integration Test for the Gemini project. A fisheye probe monitored surface velocity at 96 separate points, the most ever for a single dynamic event
 - LANL, LLNL, SNL working in close partnership with NNSA/HQ on applying ASC resources to work on SCI level challenges
 - Successfully executed scaled experiment in support of advanced implosion concept 4/26/12
 - Executing a series (@12) of Fogbank EOS experiments using a gas gun at TA-40 in support of level 2 milestone
- **Technical leadership for LEPs**
 - Supporting plants on W76-1 builds
 - Working with Pantex to solve pit CT challenge
 - Submitted NDLGS for R&D100 Award

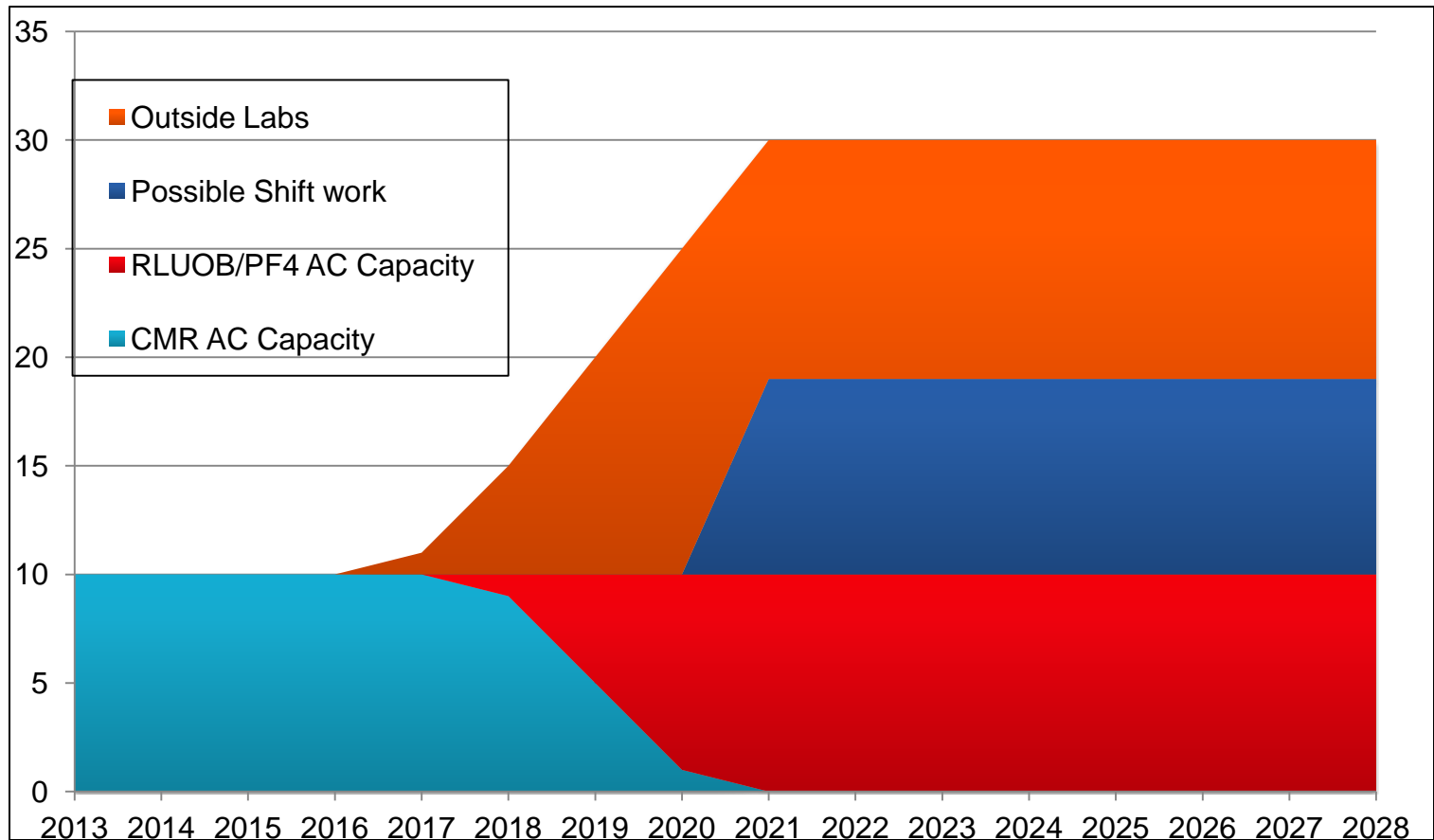


BACKGROUND

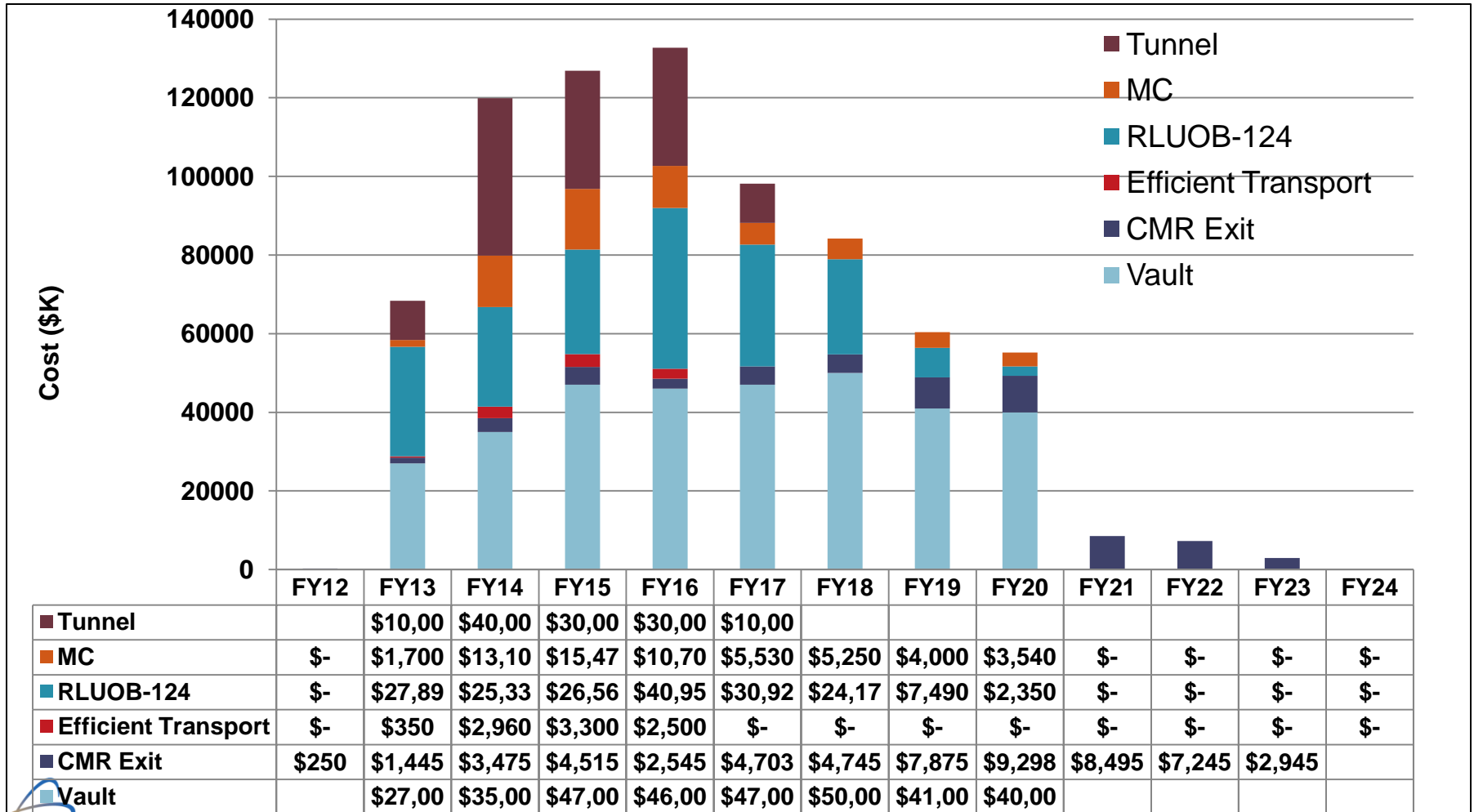
Proposed schedule to execute revised Pu strategy



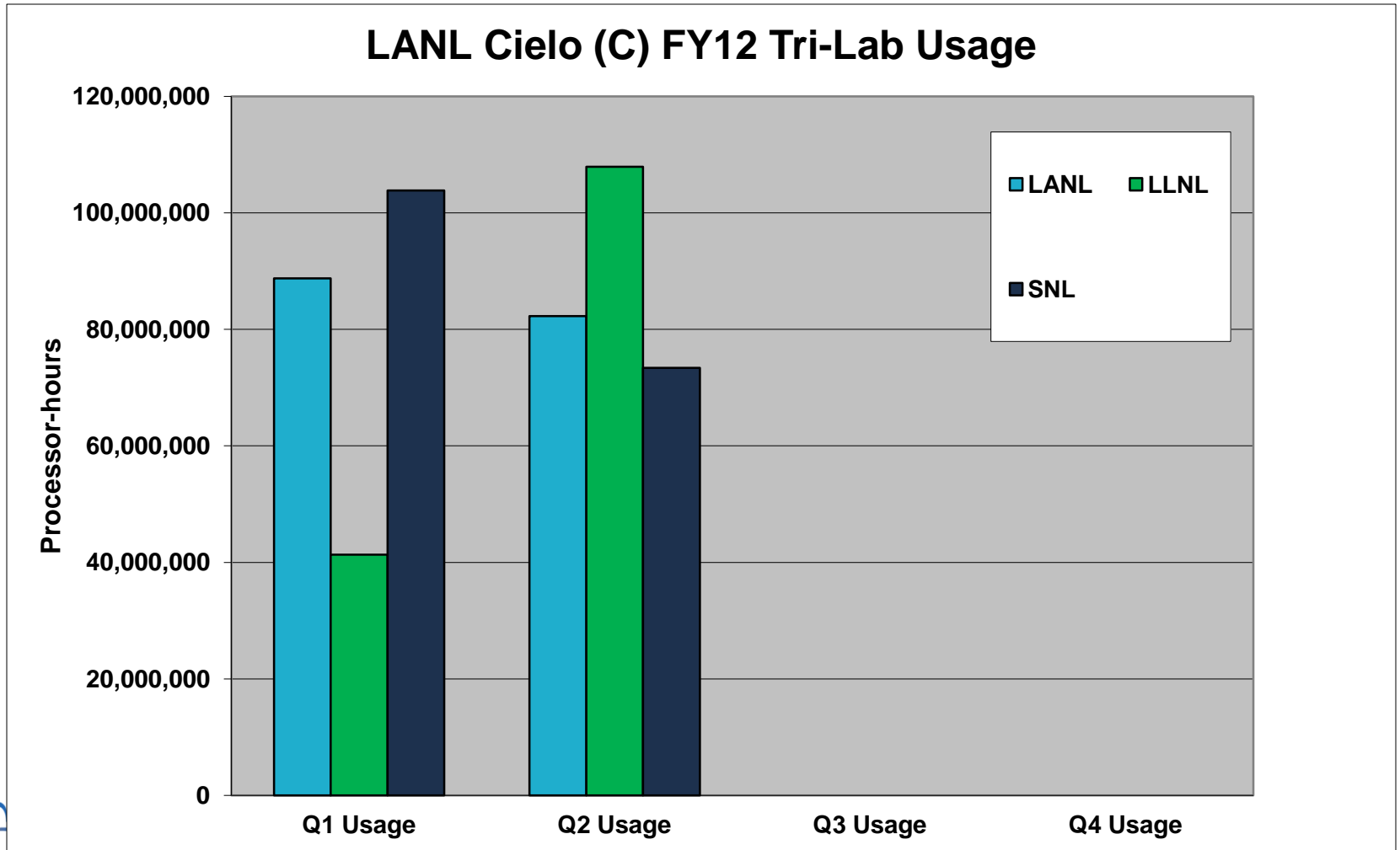
Possible approach to meeting a 30-ppy production schedule



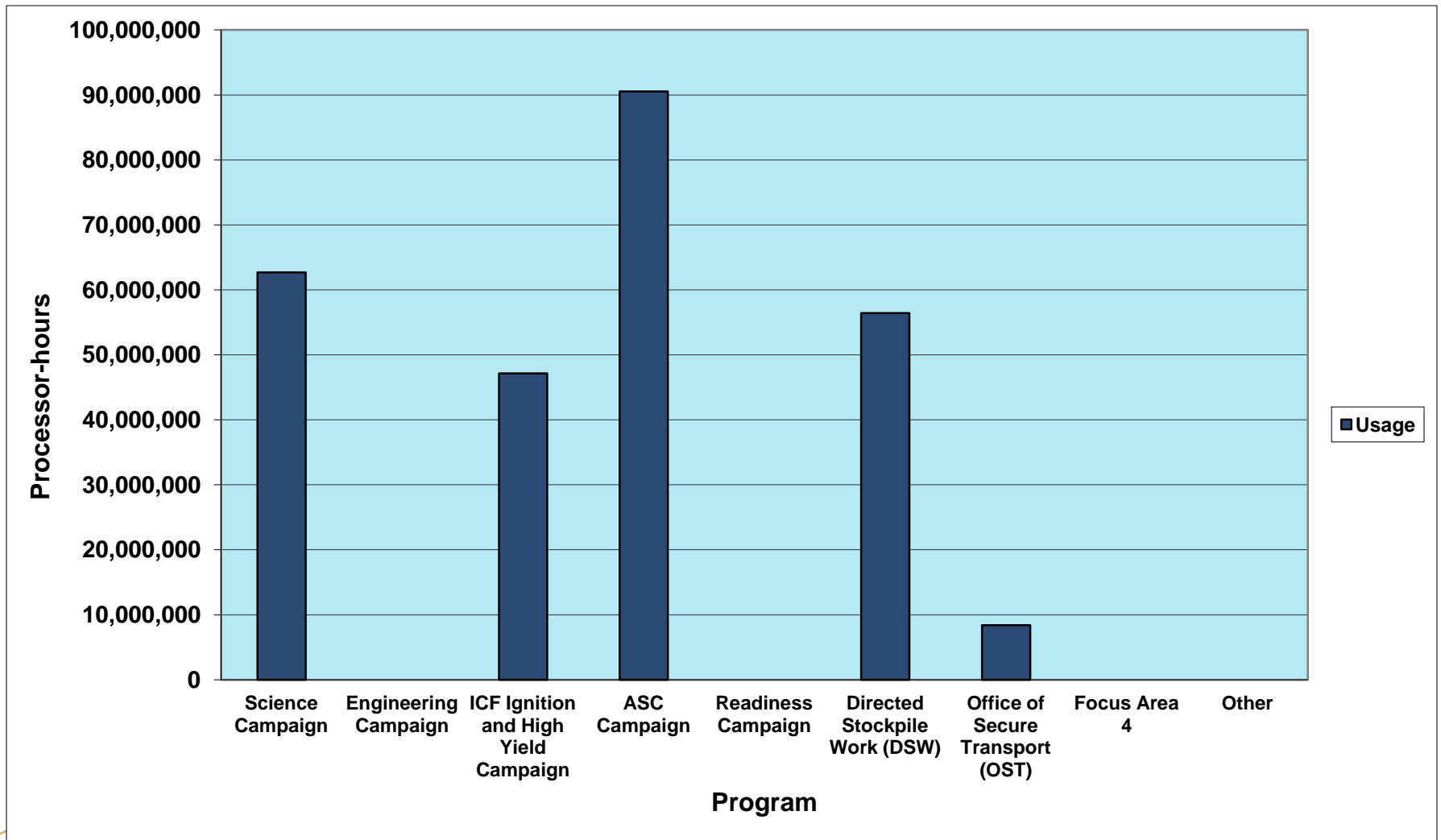
Budget Requirements to Execute 60 day Strategy



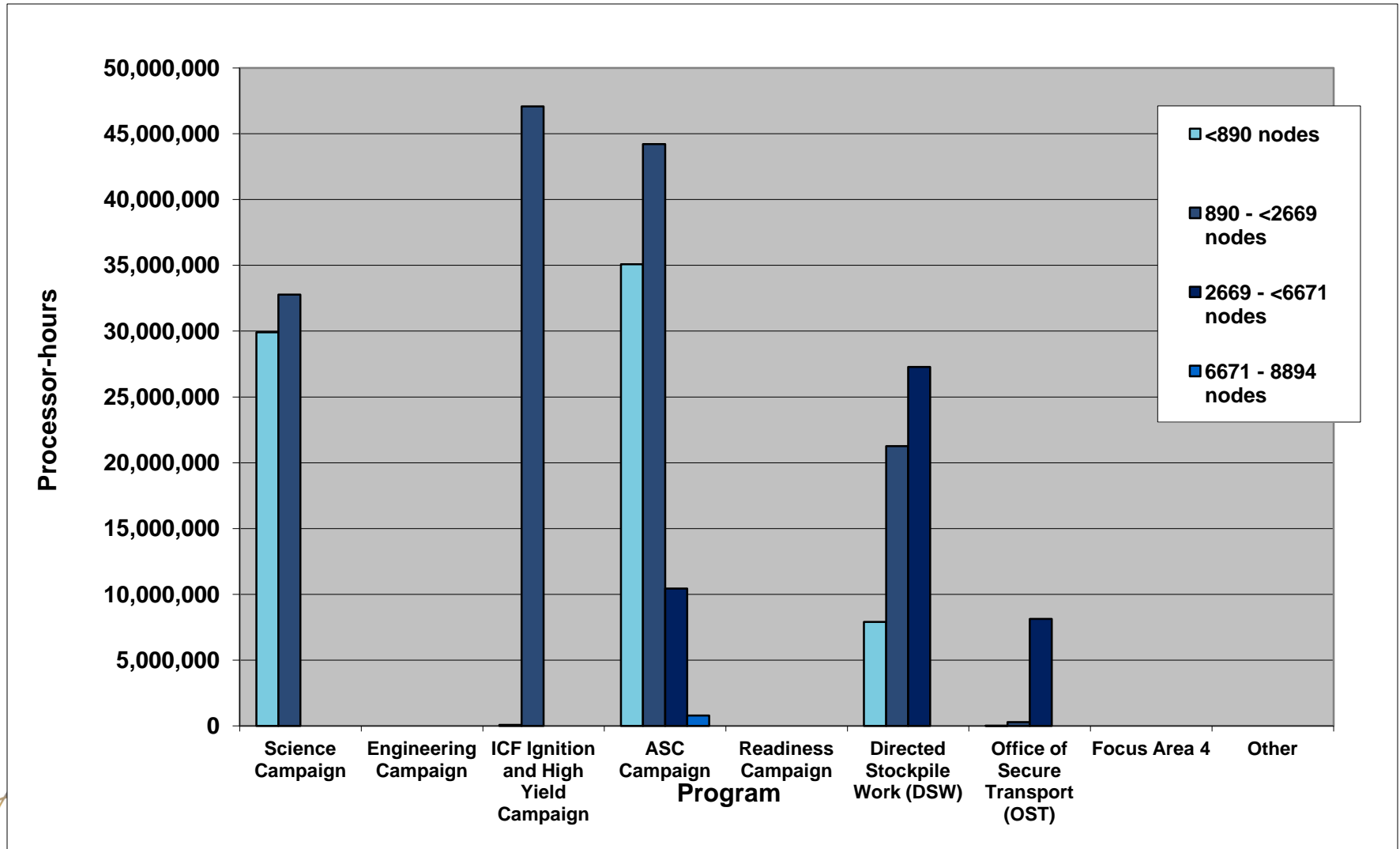
Cielo being utilized by all three laboratories



LANL FY 12 Q2 Capability Usage by Program



LANL Cielo usage by program and job size



LANL in partnership with other labs and plants working W76 Issue G

- **NNSA led Project Team developing a plan for the coordinated release of W76 Issue G weapon response**
- **Objective: understand and characterize Pantex hazards and issue weapon response to those hazards, while having minimal impact on W76 operations**
- **LANL is working to complete it's weapon response development**
 - Working with Pantex and LLNL on ESD responses
 - Completed Drop Weight Impact testing of detonators
 - Examining the effects of adhesives/tape on PBX 9501
 - Initiated chemical compatibility tests of HE/adhesives/tape
 - Skid testing in planning phase
 - Falling Man Study
 - Preliminary results for Pantex scenario parameters August
 - Parameters will be used for LANL testing beginning in September
- **Issue final joint LANL/SNL weapon response Dec 2012**