LA-UR-19-20964
Approved for public release; distribution is unlimited.

Title: FY 19 Performance Evaluation and Measurement Plan (PEMP) Progress Report Trimester 1: November 2018 - January 2019

Author(s): Garcia, Magdalana Gabriella
Ondracek, Kay E.

Intended for: Report

Issued: 2019-02-05

Disclaimer:
Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by Triad National Security, LLC for the National Nuclear Security Administration of U.S. Department of Energy under contract 89233218CNA000001. By approving this article, the publisher recognizes that the U.S. Government retains nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or to allow others to do so, for U.S. Government purposes. Los Alamos National Laboratory requests that the publisher identify this article as work performed under the auspices of the U.S. Department of Energy. Los Alamos National Laboratory strongly supports academic freedom and a researcher's right to publish; as an institution, however, the Laboratory does not endorse the viewpoint of a publication or guarantee its technical correctness.

FY 19 Performance Evaluation and Measurement Plan (PEMP) Progress Report

Trimester 1: November 2018 – January 2019

The briefing is the LANL presentation to DOE that outlines how PEMP contractual requirements are being met for trimester 1: November 2018 – January 2019.

Manager: Seth Littleton, IQPA-DO

Authors: Magdalana G. Garcia and Kay Ondracek, IQPA-PA

Los Alamos NATIONAL LABORATORY EST. 1943

National Nuclear Security Administration

Managed by Triad National Security, LLC for the U.S. Department of Energy's NNSA

FY 19 Performance Evaluation and Measurement Plan (PEMP) Progress Report

Trimester 1: November 2018 – January 2019

Dr. Thom Mason
Laboratory Director

February 6, 2019

Managed by Triad National Security, LLC for the U.S. Department of Energy's NNSA

FY 19 PEMP Goal 1
November 1 – January 31 (T1) Progress

Dr. Robert Webster
Deputy Director, Weapons

February 6, 2019

Managed by Triad National Security, LLC for the U.S. Department of Energy's NNSA

Goal 1 Issues: Ongoing/Transparent Self-Assessment in Pursuit of Continuous Improvement

Issue	Our Actions/Path Forward	Outlook

Tru Waste Storage
Accumulated waste from WIPP shutdown…above 60% utilization of storage capacity
	• Collaboration among LANL, WIPP, CBFO, NNSA HQ to prioritize LANL containers for certification
	• Moved up RANT readiness activities
	  • MSA complete on 1/17/19; Pre-Start findings being addressed
	  • CRA starting February 4; FRA starting Feb 19
		Shipping Campaign to begin in April 2019

Electrorefining Behind Schedule • *Inadequate # of operators* • *60% run rate success* • *Production downtime*	• *Staffing:* Expediting qualification and training; potentially transfer experienced operators back into group; identifying SMEs for mentoring & trouble-shooting • *Yield:* Tried to increase yield by adjusting variables, but now back to running within known parameters for successful output • *Production downtime:* Successful MC&A inventory and CAP reduced # of inventories, allowing 75-day production window	Recovery plan being executed with high confidence of success
Experimental Vessel Shortage *Vendor capability has atrophied*	• NA-115 assigned LANL as Complex lead; R2A2 developing • New dedicated engineering group (J-2) stood up to enable vessel strategy implementation; hiring & training engineers (specialty) • Evaluating our design requirements & developing RFP for HSLA-qualified fabrication vendors	Restored capability & integrated vessel utilization strategy
W88 Alt 940 *LANL accepted production machining and WR component certification scope; reconfiguring space to ensure deliverables*	• DET-DO expanding beyond detonators; will make electrical cables. Reconfiguring TA 22-91-143b into VTR for classified work • Overhaul of TA 3-39-26 (Main Shops); evaluating options for storage of weapons archive material currently in Rm.26; equipment procurement under way • Sigma reconfiguring space to develop/produce surface finishes	On track to meet mission deliverables

Goal 1 Overall: Excellent Performance – Outstanding Science, Engineering and Production Program Execution

Achievement	Description	Impact

Four Hydrotests Executed	• Two completed on same day (DARHT and R306)
	• Unique (complex) shot configuration for 3685 (for Global Security)
	  • Required use of two vessels for safety; now new capability for vessel configurations is available for future shots
	  • New optical-based vessel strain diagnostic field, generating data that we will use to validate simulations on vessel damage
		Advanced hydro capabilities that serve the Complex at a cadence that supports demand

Development Build 11 Complete; Build 12 Under way	• Build 11: New tooling and successful process development resulted in initial laser brazing parameters that have produced a leak-tight development tube braze. • On schedule to proceed with manufacture of a -01 sub assembly and full assembly of Build 12 (the first -01 build) in Q2 FY19	***Manufacturing advances in support of 87-1 FPU and 30 ppy***

Innovative Computational Capabilities	• Developed improved stockpile safety simulation capabilities
	  • New link from safety code to a Lagrangian/ALE code. Advances our ability to provide nuclear safety assessments under a greater # of scenarios
	• ASC Large Scale Calculations Initiative – completed 3D pre-shot calculations for an important DSW experiment
	  • LAP's highest 3D resolution to date -- new capabilities e.g., 3D detonation-shock dynamics and 3D Lagrangian slide-contact surfaces
		New computational capabilities unique in the Complex

Delivering on all LANL LEP & Alt Milestones	• B61-12: CSA, Pit, GTS, 1E40 FPUs complete (6-9 months early) • W88 Alt 370: Meeting/exceeding milestones for HE, Insert & 1E38 • W88 Alt 940: Manufacturing of LANL mechanical module at KC will meet original FPU date (originally highest risk). LANL also taking on manufacturing responsibility of several SNL-designed components.	***Leading the Complex in on-time execution of 6.x***

Goal 1 Overall: Excellent Performance with Very Good Progress on Key Outcomes

Key Outcomes		Status
1.1	Develop an integrated schedule for TA-55 that supports all weapons deliverables, including a focused plan for increased pit production, and meet FY19 plan deliverables.	**On Track**
1.2	Meet funded FY19 pit surveillance milestones to eliminate backlog by FY23 consistent with integrated schedule for TA-55.	**On Track, some minor risk but LANL is executing recovery plan**
1.3	Complete fabrication of the Red Sage test article (green) and execute the Iris Confirmatory Experiment (yellow).	**On Track with fabrication; Iris at risk for FY19 due to loss of access to Nevada resources**
1.4	Issue RFP and complete selection review for Crossroads Advanced Technology System (ATS-3).	**On Track**

After Ediza, LANL will oversee upgrades to U1a, with a focus on timely completion. Also striving to compress pre-shot activity schedule by 4 weeks

LANL is actively identifying and mitigating issues while executing technically difficult, complex, and innovative programmatic work at an extraordinary pace in support of the NNSA Mission.

Goal 1: DP Milestones (Q1 Status)

ID	Milestone Title	Programs/ Subprograms	HQ Q1	HQ AYE	HQ on LANL Q1	LANL Q1	LANL AYE
6153	Execute the Manufacturing Modernization Project for Pits…	DSW / Prod Supp Stockpile	R	R	R	Y	B
6509	Effect of Age on Thermodynamic Properties: Part I	SC / Primary Assess Techn	Y	B	Y	Y	B
6518	Execute the Ediza Subcritical Experiment at U1a	SC / SCEs	Y	B	Y	G	B
6519	Achieve Readiness for Red Sage/Nightshade Shot Operations	SC / SCEs	Y	B	Y	Y	B
6564	Complete, Submit, and Update a Project Management Plan (PMP)	DSW / Surety	G	B	G	Y	B
6682	Direct Cast Material EOS and Support Technology Dev. Efforts	AMD / Component Mfg. Devl	G	B	G	Y	B
6692	Execute LANL TRU Waste Management	DSW / MR&R	G	B	G	Y	B
6699	Establish LANL Storage Board	DSW / Storage	G	B	G	Y	B
6706	Testing and analysis for weapons in future delivery platforms	ENGR / Delivery Environments	Y	B	Y	G	B
6778	Program Management	DSW / W78 Replacement	G	B	G	Y	B
6798	B61-12 LEP 6.4 Component Development and Production Activities	DSW / B61 LEP	G	B	Y	G	B
6822	Complete ER Metal Production Runs and Castings	DSW / Pu Sustainment	G	B	G	Y	B
6860	High Strain Rate Testing of EBAM'ed High Z material	AMD / Component Mfg. Devl	G	B	G	Y	B
6864	Program Reporting	DSW / W78 Replacement	G	B	G	Y	B

- To date, LANL has been assigned 162 milestones in the MRT
- Overall, we are *highly aligned with our FPMs* on milestone progress (agreed on 91% this quarter). LANL tends toward more conservative scoring.
- LANL PMs and NNSA FPMs are partnering to identify and address issues, solve problems, and achieve critical milestones.

FY 19 PEMP Goals 2, 3 and 4
November 1 – January 31 (T1) Progress

Goal 2 : Global Nuclear Security
Goal 3: DOE and Strategic Partnership Projects
Goal 4: Science, Technology, and Engineering (ST&E)

Dr. John Sarrao
Deputy Director, STE

February 6, 2019

Los Alamos NATIONAL LABORATORY EST. 1943

NNSA National Nuclear Security Administration

Managed by Triad National Security, LLC for the U.S. Department of Energy's NNSA

Crosscutting Challenges/Opportunities for Improvement – Goals 2, 3, 4

- Impacts associated with Government Shutdown beginning to emerge
- Implementation of additional training requirements for foreign travel
- General staffing challenges associated with significant work volume
- Core processes essential to Federal authorization of Strategic Partnership and DOE Projects
  - Leveraging the resources/experience brought together in new DDSTE Org. in partnership with NA-LA
  - Improve compliance, opportunity for greater standardization, thru-put, and ultimately improve utilization of both Federal and Triad staff
  - Joint Workshop in December 2018, follow-on planned for February
- Delivery schedule delay for LANL portion of SuperCam to Jet Propulsion Lab
  - Jointly developed by LANL and Research Institute in Astrophysics & Planetology (Toulouse, France)
  - French portion of the instrument heavily damaged in December; LANL staff working mitigation

Key Outcomes		Status
2.1	Meet delivery timelines to deploy satellite sensors in support of USNDS; conduct a Critical Design Review for the next Generation Global Burst Detector (GBD); support 2 launches of already-delivered GBD payloads up to early on-orbit testing. Improve U.S. underground nuclear test detection thresholds; successfully execute 3 high explosive tests in support of the Source Physics Experiment program	On Track
2.2	Continue operations to convert 100 kilograms surplus plutonium to oxide in preparation for final disposition consistent with integrated schedule for TA-55.	On Track

Goal 2 - Mission Execution: Global Nuclear Security

- Nuclear Incident Response: LANL successfully supported a major national level exercise (Jackal Stone) (2.1, 2.2, 2.5, KO 2.1)
  - LANL in charge of technical exercise control
  - Led the Technical Field Team and the Technical Home Team
  - Developed the technical inject package for the Jackal Stone exercise
  - As a follow on to the Jackal Stone exercise the LANL technical team will also be supporting the DFEAT drill in Nevada the last week of January

- Nuclear Nonproliferation: LANL's Hard Radiation Sensor (HRS) Team successfully completed Critical Design Review (CDR) in mid-December 2018, the culmination of several years of effort (2.2, KO 2.1)
  - HRS is critical to ensuring the next generation of Global Burst Detectors (GBDs) that will be hosted on the Global Positioning System (GPS) IIIF satellites, and will perform measurements of the space weather environment while monitoring the upper atmosphere transition region and near earth space for nuclear detonations
  - Team will now transition to the Qualification phase where they will adjust their design as needed and build a flight representative instrument for further testing

Goal 2 - Mission Execution: Global Nuclear Security

Nuclear Counter Terrorism & Counter Proliferation Initiatives

- Nuclear Counter Terrorism: LANL continued the development of materials models along with a methodology for verification, validation, and/or confidence assignment in regards to identifying materials of concern for nuclear counter terrorism (2.2)
  - LANL hosted a multi-lab and Federal sponsor review of a LLNL materials experiment proposal
  - Provided support and calculations on the P3 Nuclear Explosive Material Security program
  - Presented recent results on a novel inexpensive render safe technique developed by LANL to the interagency
- Nuclear Forensics: LANL was the lead technical planner for the FY19 Interagency Nuclear Forensics (NF) Exercise (PathFinder) (2.1, 2.2, 2.5)
  - LANL participated in a UK led Nuclear Forensics Materials week long exercise (Graphite Grail) in early December, at AWE
  - These exercises continue to strengthen the J29 Nuclear Forensics Users Group (NFUG) interactions
  - Aligned with the overall J29 goal to begin to push the program efforts towards “left of the boom”

Goal 2 - Mission Execution: Global Nuclear Security

- Nuclear Nonproliferation: The DAG-2 experiment was successfully executed at the NNSS on Dec 19th (2.2, 2.5, KO 2.1) This 50 metric ton TNT equivalent experiment is the largest of the four chemical explosions in the second phase of the multi-Laboratory Source Physics Experiment (SPE) called Dry Alluvium Geology (DAG).
  - The SPE is designed to advance U.S. ability to detect underground nuclear explosions.
  - LANL's DDW organization leads the HE Operations for the SPE Phase II series
  - Scientists/engineers from DDSTE play a major role in the data collection and analysis of signatures from these explosions

- DAG-1: 1 metric ton (2,200 lbs.) at 385 m (1260 ft.) depth
- DAG-2: 50 metric tons (110,000 lbs.) at about 300 m (984 ft.)
- DAG-3: 1 metric ton (2,200 lbs.) at about 150 m (492 ft.) depth

Goal 3 - DOE and Strategic Partnership Projects Mission Objectives

- Demonstrated Innovation and Innovative Strategic Solutions aligned with National Priorities (3.1)
  - Elizabeth Hunke, T-3: Arctic ice model upgrade to benefit polar research, industry and military, a predictive capability partnership with the U.S. Navy, the National Oceanic and Atmospheric Association, and the National Ice Center
  - Kevin John, C-DO, leads the Tri-Lab (Brookhaven, Los Alamos, Oak Ridge) effort to provide accelerator-produced actinium-225 for the radiotherapy project
  - Glen Wurden, P-24: Fusion research experiment confirms several theoretically predicted properties at the Max Planck Institute in Germany that provides a credible alternative path to nuclear fusion
  - Bill Louis, P-25: The Plot Thickens for a Fourth Neutrino
  - Brenda Dingus, P-23: The first-ever detection of highly energetic radiation from a microquasar
  - Andy Gaunt, C-IAAC: Synthetic Chemistry of Neptunium opens access to learning difficult-to-control nuclear waste
  - Four DOE Bioenergy Technology Office CRADAs awarded/executed
    - Andrew Sutton (C-IIC) - ChemCatBio Consortium (Chemical Catalysis for Bioenergy); GEVO, Sironix (executed)
    - Taraka Dale (B-11) - Agile BioFoundry consortium; University of Georgia (executed)
    - Troy Semelsberger (MPA-11) - Feedstock-Conversion Interface Consortium; Jenike&Johanson (funds-in, in process)
    - Jim Coons - Bio-Separations Consortium, HelioBioSys (funds-in, in process)

Polar conditions modeled more accurately for naval and commercial safety improvements

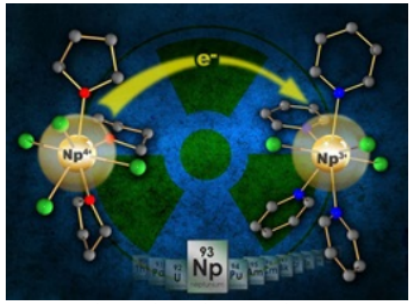


Image courtesy of the authors and the Royal Society of Chemistry (see publication)

A new, easily prepared starting material (left) containing neptunium (Np^{3+}) can be readily prepared by an electron (e-) transfer to a parent neptunium (Np^{4+}) compound (right). This process avoids the need to use hard-to-obtain neptunium metal and allows access to Np^{3+} chemistry from readily available sources.

Courtesy BES Highlights 11.07.18

Goal 3 - DOE and Strategic Partnership Projects Mission Objectives

- Strategic contribution to National Security & Defense/Intelligence and Emerging Threats (3.1,3.2)
  - Successfully delivered numerous intelligence assessments regarding high-interest foreign nuclear weapons programs as part of Foreign Nuclear Weapons Intelligence Initiative (FNWII)
    - Program is chaired by DOE and SPP partners and provides significant benefit to all parties
      - Activities engage nuclear weapon design physicists and engineers
      - Leverages LANL's capabilities in high performance computing and other complimentary areas
      - Effectively utilizes the Lab's repository of knowledge of current and legacy nuclear weapon concepts to serve the national interest
  - Delivered first engineering development units and conducted critical design review for USARMY Small Sat program
    - Efforts were lauded by USARMY and approvals were given to LANL to proceed with multi-million dollar space program.
    - LANL continues to be identified by outside agencies as technical lead in small satellite technology development and deployment
  - Successfully transitioned small satellite manufacturing technology to Kansas City National Security Campus
    - Supports NNSA/DOE mandate to execute successful technology transition
    - Allows LANL to focus on future science and technology developments for small satellite while maintaining robust manufacturing capability to support all National Security agencies

Goal 3 - DOE and Strategic Partnership Projects Mission Objectives

- Strategic Partnership Project executed with Sumitomo Corp enriches support of Office of Global Materials Security's (GMS) International Mission (3.2)
  - Sumitomo, as the sponsor of this agreement, serves as a subcontractor to the Tokyo Institute of Technology for removal of sources through the Offsite Source Recovery Program
  - Agreement utilizes expertise from LANL's Off-site Source Recovery Program (International Threat Reduction Group, NEN-3) for recovering and disposing of radioactive sealed sources
- Strategic Partnership Project executed with Space Exploration Technologies Corp.(SpaceX) utilizes unique LANL capabilities to address critical need for noninvasive analysis of defects (3.2)
  - Utilizes LANL MeV Microtron x-ray source which has unique energy and spot size characteristics, and E-6 expertise in using the source to provide rapid 3D imaging of dense parts to provide noninvasive analysis of SpaceX components
  - This work is critical to assist the company in developing reusable low earth orbit launch systems and analysis of component specifications

Goal 3 - DOE and Strategic Partnership Projects Mission Objectives

- NSD Special Projects portfolio leverages a significant portion of laboratory assets to support SPP partners such as USSSOCOM, DTRA, DARPA, and Navy C-EOD 3.1, 3.2)
  - LANL provides critical trainings for ordinance disposal, homemade explosives, and various weapon training classes
  - Demonstrates the ability to successfully leverage existing laboratory (and thus NNSA/DOE) assets to support our national security partners capability needs through the Strategic Partnership Projects. **Supports Objectives 3.1, 3.2 – On Track**
- LANL continued its active membership in a 7-lab consortium designed to understand, track, and assess the Bio Threat landscape (3.1)
  - LANL's expertise showcased in this area by being name lead author to the DOE S&T National Bio Preparedness Plan
- Partnership with the Research Institute in Astrophysics and Planetology (IRAP) in Toulouse, France and the National Centre for Space Studies (CNES), the French space agency to develop NASA SuperCam
  - SuperCAM is a remote-sensing instrument for the Mars 2020 mission that uses remote optical measurements and laser spectroscopy to investigate the surface geology history and processes on Mars.

Goal 4 – Mission Execution: Science, Technology, and Engineering (ST&E)

- Awards and recognition received by LANL staff members continue to illustrate sustained excellence and the breadth of national and international leadership
  - Two LANL scientists received one of the most prestigious American Geophysical Union (AGU) honors – the AGU fellowship for their leadership and excellence in Earth and space sciences
    - Geoff Reeves and Peter Gary (retired) has been involved in numerous NASA and national security missions, most recently the Van Allen Probes mission to study the Earth's radiation belts.
    - Peter Gary, who retired from Los Alamos in 2012, is a global expert on turbulence and instabilities of space plasmas.
  - Three Los Alamos scientists named Fellows by AAAS
    - Manvendra Dubey (Earth System Observations, EES-14) was elected fellow as part of the AAAS Section on Atmospheric and Hydrospheric Science, for distinguished synergistic laboratory and field studies across scales elucidating fundamental mechanisms driving aerosol and greenhouse-gas warming and facilitating their realistic representation in models
    - David Janecky (Assembly Operations, PT-3) was elected fellow as part of the AAAS Section on Geology and Geography, for pioneering contributions to the field of fluid-rock interactions at high temperatures in deep ocean rift valleys and vents and for distinguished service to scientific organizations
    - Greg Swift (Condensed Matter and Magnet Science, MPA-CMMS) was elected fellow as part of the AAAS Section on Physics for pioneering developments in the science and technology of thermoacoustics, for his influential textbook "Thermoacoustics," and for efforts on behalf of science education in New Mexico.

Goal 4 – Mission Execution: Science, Technology, and Engineering (ST&E)

- 2nd Cohort of the UC-LANL Postdoc Entrepreneur Fellowship initiated
  - Program designed to facilitate exploration & evaluation of a LANL technology for commercialization.
  - Postdocs challenged to create a viable business model based on information derived from personal engagement rather than secondhand market research:
    - ROSS BEATTIE is focusing on High Value Rare Earth Metals Recovery and Refinement.
    - YUXIANG CHEN is evaluating Affordable & Rapid Testing for Food Safety in any Environment. Los Alamos' R&D 100 nanocluster beacon technology is behind a new type of portable smart sensors used to detect DNA targets, including pathogens.
    - LAURA LILLEY is investigating Ridding Pipelines of Biofouling with Nuclear Antibiotics.
    - KANNAN RAMAIYAN is evaluating Sensor Platforms for Reliable Gas Monitoring in Demanding Environments.

- Awards and recognition received by LANL staff members continue to illustrate sustained excellence and the breadth of national and international leadership (4.2, 4.3)
  - Lab Computational Biologist, Bette Korber, named R&D Magazine Scientist of the Year (https://www.rdmag.com/article/2018/10/r-d-magazine-announces-2018-scientist-year)
  - Unprecedented award of **eight** R&D 100 Award winners reflect the strength and innovative contribution to national security mission and advancement of frontiers of ST&E (4.1, 4.2, 4.3)

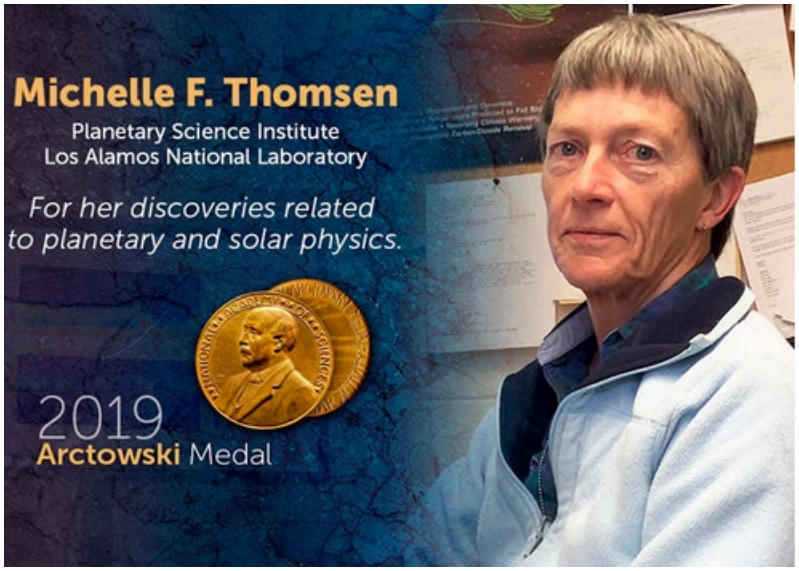
Goal 4 – Mission Execution: Science, Technology, and Engineering (ST&E)

- Awards and recognition received by LANL staff (continued)

  Physicist Michelle Thomsen (ISR-1: Space Science and Applications) has been awarded the National Academy of Science's 2019 Arctowski Medal, which includes a $100,000 cash prize. The Arctowski Medal is presented every two years and recognizes outstanding contributions to the study of solar physics and solar terrestrial relationships.

  In her 40 years at the Laboratory, Thomsen has studied Earth's relationship to the sun and other planets, using data collected from past National Aeronautics and Space Administration (NASA) missions, including the Pioneer 10 and 11 planetary missions to Jupiter, the International Sun-Earth Explorer missions and the Cassini mission to Saturn.

  Thomsen's studies have primarily been focused on the magnetospheres of Jupiter and Saturn, as well as the physics of collisionless shocks. She continues to work at the Lab, studying the effects of solar wind on the magnetospheres of Jupiter and Saturn.



Goal 4 – Mission Execution: Science, Technology, and Engineering (ST&E)

Additional Notable Research:

- More stable light comes from intentionally 'squashed' quantum dots (4.3)
  - Intentionally “squashing” colloidal quantum dots during chemical synthesis creates dots capable of stable, “blink-free” light emission that is fully comparable with the light produced by dots made with more complex processes
  - New research at LANL suggests that the strained colloidal quantum dots represent a viable alternative to presently employed nanoscale light sources, and they deserve exploration as single-particle, nanoscale light sources for optical “quantum” circuits, ultrasensitive sensors and medical diagnostics
  - Single-dot spectroscopic studies were funded by the U.S. Department of Energy’s Office of Science. The work on quantum dot synthesis was supported by the Laboratory Directed Research and Development program at Los Alamos National Laboratory.
- ‘Realistic’ new model points the way to more efficient and profitable fracking (4.2)
  - New computational model could potentially boost efficiencies and profits in natural gas production by better predicting previously hidden fracture mechanics. It also accurately accounts for the known amounts of gas released during the process.
  - This research was funded by the Laboratory Directed Research and Development program at Los Alamos National Laboratory, and the collaborating team at Los Alamos was funded by the U. S. Department of Energy’s Office of Science

Goal 4 – Mission Execution: Science, Technology, and Engineering (ST&E)

- LDRD Program initiatives continue to drive significant mission-aligned achievement (4.1 & 4.4))
  - Strategic Investment Plan published - sets out science, technology, and engineering investment priorities for Directed Research (4.1)
  - Early Career Research (ECR) provides support to exceptional EC staff members (4.4)
    - 62 endorsed proposals peer reviewed
    - 18 funded (~$7.5M, $208K each for 2 calendar years)
    - http://int.lanl.gov/science/programs/ldrd/ecr/ecr-calls/fy19-call-for-proposals/new-starts.shtml

Goal 4 – Mission Execution: Science, Technology, and Engineering (ST&E)

- LANL Innovation Assets Strategic Council re-chartered to drive innovation strategy

- Westinghouse Electric Company (WEC) and Los Alamos partnership to advance nuclear innovations towards commercialization under a Technology Commercialization Fund award (4.5)
  - WEC and LANL researchers in Mechanical and Thermal Engineering (E-1) executed a CRADA that will provide LANL technical assistance relevant to the design trade space, evaluation, and analysis of the core and energy conversion regions of a very small modular nuclear reactor
  - LANL executed an exclusive license agreement with WEC – giving exclusive rights for commercialization of a terrestrial nuclear micro-reactor using a novel passive cooling concept based on heat-pipe technology.
  - Advanced Research Projects Agency-Energy (ARPA-E) selected WEC and LANL to receive $5,300,000 in DOE funding to advance nuclear innovations towards commercialization under the MEITNER program.
    - Project focuses on the development of an autonomous nuclear micro-reactor using distributed generation power capacity
    - LANL will provide technical assistance relevant to the monolith design, electrical demonstration, and modeling and simulation of the core and energy conversion regions of a very small modular nuclear reactor.

Goal 4 – Mission Execution: Science, Technology, and Engineering (ST&E)

- LANL and Mellanox partner to develop ultra-large scale Mission-centric computing infrastructure (4.5)
  - Mellanox Technologies, Ltd. is a supplier of high-performance, end-to-end smart interconnect solutions for data center servers and storage systems
  - The partnership will focus on leveraging Mellanox In-Network Computing acceleration engines to enable data discovery at scale for the lab´s current and next generation applications
  - The collaborative development will be done under the Efficient Mission Centric Computing Consortium (EMC3), centered at LANL´s Ultra-Scale Systems Research Center (USRC).
  - The EMC3 consortium´s mission is to investigate efficient ultra-scale computing and networking architectures, applications and environments, in order to provide the most efficient infrastructure needed for the US Industry and national security.
- LANL start-up UbiQD Inc. launched commercial sales of its red-light emitting window film, marking a major milestone for the 4-year-old company, and possibly a ground-breaking advance for greenhouse production (4.5)

FY 19 PEMP Goal 5
November 1 – January 31 (T1) Progress

Getting off to a brisk and enthusiastic start

Dr. Kelly Beierschmitt
Deputy Director, Operations

February 6, 2019

Managed by Triad National Security, LLC for the U.S. Department of Energy's NNSA

Goal 5: Making very good progress on each of the 7 objectives, and 8 KOs to achieve this goal

Key Outcomes		Status
5.1	Improve waste management throughput • *Plan drafted (@50%) and includes key elements, outlook, path forward for waste management program, facilities, waste types.*	On track
5.2	Execute milestones that meet planned commitments for Nuclear and High Hazard Operations in areas including Conduct of Operations, Criticality Safety, Safety Basis, and Work Planning and Control • *Issue: Critical staffing, Open infractions, NCS backlog*	On track, few issues
5.3	Achieve recertification of the Earned Value Management System (EVMS) for capital projects over $100M	On track
5.4	Execute projects within the Line Item construction portfolio in accordance with approved cost, scope or schedule baselines or execution plans to obtain the requisite Critical Decision • *TA-3 Electrical substation project behind schedule*	All major projects on track except one with significant concern; 70% of small projects behind schedule
5.5	Meet milestones for the improvement of emergency planning, preparedness and response core capabilities and demonstrate improved overall readiness and performance through drills, exercises, and assessments	On track
5.6	Meet green status for NNSA approved Institutional and Weapons Quality Assurance metrics by the end of FY 2019 • *Developing an agreed-on stamping schedule*	On track, one significant issues
5.7	Develop and implement actions to drive cultural change, with outcomes and impacts measureable through metrics in the LANL executive dashboard	On track
5.8	Improve mission integration of operations with safeguards and security for the Nuclear Material Control and Accountability (NMC&A) program	On track

Developed mitigations for identified issues

KO 5.2 issues are being worked to meet FY 19 PEMP goal

Issues	Mitigation
Staffing critical positions for CSA, CFO, and RCTs	Work is underway with a local community college to develop an RCT pipeline.
Open infractions	Open infractions have been reduced from twenty in October 2017 to six in December 2018. Currently, after the completion of a Fact Finding for a new infraction, NCS promptly supports recovery planning for open infractions, and prioritizes new or revised CSEDs as the need is defined.
Complete NCS backlog	A new revision of the NCS program improvement plan (PIP) will be issued in T2 that will define the strategy to reduce the backlog

KO 5.4, 5.6 issues are being worked

Issues	Mitigation
KO 5.4: TA-3 Electrical Substation Replacement Project Behind Schedule	• LANL scope on schedule. • Discussions are ongoing regarding addition to LANL scope and a re-baseline would be requested as a result.
KO 5.6: Execution Schedule Reliability and Execute three major infrastructure projects	• Developing an agreed-on stamping schedule • Develop an integrated program schedule

Other issues are being worked and will not impact delivery of Goal 5

Issues	Mitigation
Environmental Assessment findings and opportunities for improvements	Two finding and one improvement opportunity
Capital projects	• CMRR: Availability of qualified welders, construction delays • PEI1: Analytical chemistry resources, qualified crafts, room for construction • ECCE: Accident during lift with significant injury • TRP III: Certified NFPA 72 providers for design, equipment and installation oversight • TA03 substation: Project behind schedule, CD-4 forecast date is Dec 2019 • Infrastructure (Small) Projects: ~70% projects experiencing scheduling delays
F&O Winter Storm Recovery	• Developed a winter weather action and recovery plan using the F&O Community of Practice
Clearance backlog	• Use “Interim Security Clearance and Temporary Clearance Update processes” • Arranged dedicated NBIB/OPM investigators deployed to LANL in March/April 2019 to help with priority clearance investigations

Goal 5: Initiatives undertaken in T1 making a difference and is expected to bring significant improvements in delivering mission

Objectives: 5.1	
Environment	• Successful EMS external audit; significant support and coordination for NEPA and waste compliance operations in support of 30 PPY; RSO program continues to keep WIPP doors open
Safety	• Multi-year strategy for RCT put in place • Significant progress on RCT program's ability to meet mission staffing needs – improved training and qualification, recruit new staff, retain existing staff • LSS-Kaizan to improve subcontractor safety • Completed annual ISMS effectiveness evaluation – LANL's ISMS enable the Laboratory to safely accomplish its mission • Support N3B, NNSS • Adopt-a-Parking Lot Safety Initiative started: Review pre-assigned parking lots to improve safety, reduce hazards, and create a culture of self-assessment and accountability • IWSST -> IWESST: Focus on site-wide environment, safety, and security improvements and promote expectation and a culture of excellence • VPP completed actions - cultivate a Performance excellence Culture that emphasize safety
Health	• Steady improvement through Dec 2018; health issues expected to increase in FY 19 T2- due to slips/trips/falls due to uncharacteristic inclement weather
Quality	• Laboratory's Policy Office recognized with a Quality New Mexico Performance Excellence Award; RIT and PF-4 initiative to improve supply chain through NCRs review; R2A2s of three separate quality organizations reviewed assumed under one institutional quality Division (IQPA-DO) to strengthen Lab-wide use of quality

Goal 5: Initiatives undertaken in T1 making a difference and is expected to bring significant improvements in delivering mission

Objective: 5.2

CMRR	• Project achieved 1.7M job hours without lost time incident; • Incident evaluation of REI2 under review to correct and neutralize First Aid events that occurred over the last 6 months • REI2 Completed installation of 106 of 141 HVAC spools • The cumulative performance for PEI1 is SPI of 0.96, CPI of 1.18, and with a PM EAC below CBB
ECCCE	• Lift incident resulting in significant injury • the construction subcontractor (Cross Connection Inc.) has been successful in accelerating construction activities • The cumulative performance for ECCCE is SPI of 1.0, CPI of 1.05, and with a PM EAC below CBB
TRP III	• CD-1 revision to reflect strategy to support deconflicting project impacts to pit production programs and other PF-4 operations
TA03	• the current SPI is 0.97, CPI is 1.44, and the effort is 86% complete • the project overall is behind schedule with a CD-4 forecast date of December 2019
Small Projects (126)	• Approximately 70% of small projects are experiencing schedule delays

Goal 5: Initiatives undertaken in T1 making a difference and is expected to bring significant improvements in delivering mission

Objectives: 5.3	
Safeguards and security	• 6 Security events in T1 (2 per month) • Many lab-wide improvement initiatives identified and started • Alarm response assessments performance completed – 7 tests, 0 failures; • Assessment of LANL protection strategy – 2 findings and 1 opportunity for improvement identified • Successful K-9 Annual Certification, force-on-force exercise • Clearance investigation continue to experience backlog – using Interim Security Clearance and Temporary Clearance update processes
Emergency management	• Successful NA-40 visit - complements in Wildland Fire Program, TA-49 Emergency Response Training Center, Emergency Management Program • Implementing 24/7 operations to support inclement weather issues using the IRC equivalent trained individual • Submission of ERAP • Emergency Management Partnership Meetings to build/strengthen partnerships with NA-LA, N3B, EM-LA, DNFSB, SAFE-PA, LAFD, etc.

Goal 5: Initiatives undertaken in T1 making a difference and is expected to bring significant improvements in delivering mission

Objective 5.4	
Three plans commissioned	• Guide the renewal of infrastructure, appropriate management of waste and revitalization of the lab o Maintenance baseline o An enduring waste management operations plan o Laboratory infrastructure masterplan
Infrastructure prioritization	• Engage LOC, COOs to establish cross functional infrastructure spending prioritization
Establish FOD forum	• Ensure consistent FOD performance across the Laboratory
Move non-core services	• From Acquisition Services Division to ALDFO
Correction of main stairwell in Otowi	• This includes non-slip surface – increase safety

Goal 5: Initiatives undertaken in T1 making a difference and is expected to bring significant improvements in delivering mission

Objective 5.5	
Transition financial activities	• Transfer all assets and liabilities to the Triad financial set of books; completed Triad payroll and STARS financial reporting to NNSA
Workforce	• Employee actions approval matrix redesigned to expedite approval process for hiring and promoting staff and strengthening manager accountability; implemented parental leave policy; diversity report submitted • Three diversity awards: (1) Gold Level Employer, Hire Vets Medallion Program; (2) Top 20 Government employer, Career and the DisABLED Magazine; (3) Top 20 Government Employer, Minority Engineer Magazine • Initiatives to build strong workforce ➢ Build SBs. small business achievements through December is 67%, against a goal of 59.7%. ➢ Institutional procurement commitments Year-to-Date (YTD) are $265M compared with $227M in 2017 ➢ Acquisition Services Division achieved $9.7M dollars in YTD strategic costs savings, 4.73% of the total invoiced spend for the same period against a goal of 4%
Subcontracting	• RFP for Crossroad supercomputer acquisition issued to NNSA for consent • Subcontract to Cavium/Marvel for R&D to support successful mission including pit production • Process for contracting six named subcontractors developed – developing SOW and improves administrative process • Review all open procurements – communicate status, issues, reduce bottlenecks, and cycle time
IT	• EasyIT services at TA-55 – convenient location for customers to obtain devices, services, and knowledge
Plans for deployed service model staff	• Developing– improve acquisition planning, provide accountability and ownership of respective customers, provides visibility to shepherd procurement process

Goal 5: Initiatives undertaken in T1 making a difference and is expected to bring significant improvements in delivering mission

Objective 5.6	
Negotiated settlements	• Two outstanding construction claims relating to the RLWTF-LLW project. Finalized claims against design contractors concerning TWF project – recovery to Government, net gain to project
Resolved Notice of Violation by NMED	• 15 counts of violations to NMHWA. Civil penalty of $116K reduced to civil penalty of $55K
Post-transition activities	• Establish contract vehicles for two Triad Integrated Subcontractors and three small business subcontractors • Worked on Personnel Appendix to establish system of delegates of authority for Triad • Establish the Benefits investment Committee for Traid pensions • Strategies for protection against potential legal challenges to Triad's mandatory arbitration clause developed and incorporated into employee offer letters • Prepare for civil jury trial on employment matter held in December – succeeded in avoiding punitive damages and obtaining dismissals for the personal defendants • Preparing a strategy for FOIA activities at LANL – incorporating best practices

Goal 5: Initiatives undertaken in T1 making a difference and is expected to bring significant improvements in delivering mission

Objective 5.7	
Advance Tools/Systems	• New enterprise reporting tool to replace Oracle BI • Mobile LANL help request web portal to request IT help • Migration of LANL IT systems to higher security control baseline as required by NIST • EVMS capability for W80-4 program demonstrated – support weapons mission • Bluetooth in TA-55 – streamline the production of the Plutonium Pit Production project • Hardware upgrade for Local virtualization infrastructure – major upgrade, faster network service to customers • VPN refresh at remote sites (DC, Nevada, Pantex, others) – faster and more reliable network connections • Firewall upgrades for yellow, NNNSA secret network, and Green, to avoid cyber-attacks • Upgraded Terminus of Security Center – better security of unclassified and classified network • VOIP 94% complete – Comply to NNSA directive for telecom security and safety • Institutional perimeter firewall planning completed –LANL's first defenses in information protection
Process efficiency	• Automated LANL Recruiter Web App – help direct good candidates to LANL jobs electronically • Developed plan and began executing move archives (RMS to WRS) of classified report, UK documents, and top secret document collections. WRS can implement lan for a National Science Research Center • Expanded Document control services to Prime Contracts Management, Defense Security Programs, Nuclear Maintenance Group and continuing to increase to Weapons Engineering organization • Replaced Radiological Work Permits systems (TA-55, LANSCE) – significantly reduce operational and cyber security risk • FedRAMP moderate accreditation on Google's G Suite for external collaboration – improve cyber security • Automate certification for Mac, Linux, Wi-Fi users – quicker, transparent configuration to access LANL wireless network for LANL customers and guests • VDI expansion and standardization – faster and same user experience for six large classified networks • $16K/month cost avoidance through over 500 "6 month no usage" process
Plan/Policy	• **Published LANL's first privacy policy** (health, privacy) – conforms to national, state, NNSA requirements

FY 19 PEMP Goal 6
November 1 – January 31 (T1) Progress

Dr. Thom Mason
Laboratory Director

February 6, 2019

Managed by Triad National Security, LLC for the U.S. Department of Energy's NNSA

Goal 6: Making excellent progress on each of the 4 objectives to achieve this goal

Objectives	
6.1	• Finalized **FY 19 Lab Agenda** • Lab's FY 19 PEMP objectives and KOs are tied to the Lab Agenda initiatives • FY 19 leadership performance plan tied to FY19 lab agenda critical outcomes and strategic initiatives
6.2	• **Working closely with field office** - increased level of communication and interaction, shared goal of integrating oversight, increasing transparency • **Management systems (MS) framework developed** – contractor requirements mapped to MSs, CDRLs mapped to MSs, and each MS has a leadership sponsor, MS lead, one or more functional leads, and SMEs • **An integrated CAS being designed** • **Setting up Governance and Committees**
6.3	• **Taking leadership role into the community**: working with Pueblo's and counties to develop joint development vision for the Laboratory, surrounding counties, and the state • **Working closely with TAMU, UC, Battle** to support strategic initiative (LOSA, LOLA, Communities of practice) • **Reach-back support**: For improved snow removal response from **other Battelle labs**; from **HII** on NMC&A and nuclear operations; from **Fluor** on construction management and subcontractor safety; from **Longenecker** for a variety ESHQSS activities; and **joint UC/Battelle** support for LOSA/SAFE. • **Communicate transparently with the government and build trust with NNSA**, **our employees and the community** – website for employees to ask questions of laboratory leadership, Laboratory director's blog, Laboratory director's regular meeting with NNSA, Deputy Laboratory Director for operations meetings with county
6.4	• **Building partnership with NA-LA, N3B, DOE EM-LA, DNFSB** • LANL has developed an **integrated Leadership Development curriculum** - impact organizational culture • **Started LOSA training** for FLMs and supervisors • **Enhancing performance through real-time operational learning** opportunities • **Improving employee engagement** • Lab leadership represented at COO and NLDC meetings