Department of Energy
National Nuclear Security Administration
Washington DC 20585

November 28, 2016

OFFICE OF THE ADMINISTRATOR

MEMORANDUM FOR KIMBERLY DAVIS LEBAK
MANAGER
LOS ALAMOS FIELD OFFICE

FROM: MADELYN R. CREEDON
PRINCIPAL DEPUTY ADM[redacted]

SUBJECT: Los Alamos National Security (LANS), LLC, DE-AC52-06NA25396, Fiscal Year 2016 Award Fee Determination

The National Nuclear Security Administration (NNSA) has completed its assessment of Los Alamos National Security (LANS), LLC's effectiveness in meeting the performance expectations established in the Fiscal Year 2016 Performance Evaluation and Measurement Plan for the period of October 1, 2015 through September 30, 2016. Based on assessments provided in the NNSA Performance Evaluation Report, award fee amounts and award terms are as follows:

	At Risk	Available	Final	Percent	Award Term
Goal1: Manage the Nuclear Weapons Mission	30%	$12,387,109	$11,396,140	92%	N/A
Goal 2: Reduce Global Security Threats Mission	10%	$4,129,036	$3,592,262	87%	N/A
Goal 3: DOE Strategic Partnership Project Mission Objectives	5%	$2,064,518	$1,961,292	95%	N/A
Goal 4: Science, Technology & Engineering (ST&E)	10%	$4,129,036	$3,922,585	95%	N/A
Goal 5: Operations & Infrastructure	35%	$14,451,627	$10,694,204	74%	N/A
Goal 6: Leadership	10%	$4,129,036	$3,468,391	84%	N/A
Total		$41,290,364	$35,034,874	85%	N/A

In addition, the fixed fee and total fee summaries are provided below for your information:

Fixed Fee	$17,695,870	$17,695,870
SPP (Fixed Fee)	$6,167,172	$6,167,172
Total Fixed Fee	$23,863,042	$23,863,042
Total Summary	**$65,153,406**	**$58,897,916**

National Nuclear Security Administration

Los Alamos National Laboratory

Fiscal Year 2016 Performance Evaluation Report (PER)

NNSA Los Alamos Field Office

Performance Period:
October 1, 2015 – September 30, 2016

November 15, 2016

Executive Summary

This Performance Evaluation Report (PER) provides the National Nuclear Security Administration (NNSA) assessment of Los Alamos National Security, LLC's performance for the period from October 1, 2015 – September 31, 2016 measured against the Goals defined in the Performance Evaluation and Measurement Plan (PEMP). The National Nuclear Security Administration (NNSA) took into consideration and consolidated all input provided (e.g. CAS, Program Reviews, etc.) from NNSA Program and Functional Offices both at Headquarters and in the field.

Performance against the Goals summarized below, resulted in an overall rating of Very Good for Los Alamos National Security, LLC. Specific observations for each Goal are provided in the following pages.

For Goal 1, managing the Nuclear Weapons Mission, programmatically the Laboratory greatly exceeded expectations overall. Programmatic accomplishments included: design development for the B-61-12 Life Extension Program, component maturation to advance the Conventional High Explosive Refresh portion of the W88 Alt370 program, progress in Plutonium Facility readiness and operations, allowing for successful assembly of a production development pit; reconstituting pit manufacturing and assembly capabilities; joint development (with LLNL) of a path forward for war-reserve pit production; acceleration of vault cleanout activities; confinement vessel disposition; and the enhanced use of PINEX diagnostic methods for evaluating primary performance. Several detonator production improvement increased yield and reduced cycle time, but challenges with post-production product acceptance continue. Several significant accomplishments were made with respect to stockpile stewardship including new plutonium equations-of-state, and new experimental work on Inertial Confinement Fusion at the National Ignition Facility, and increasing Hydrodynamic testing at the DARHT facility. Physical experiments and testing were conducted in high-g environments on high explosive assemblies; and hydrodynamic experiments evaluated acceptable magnitude of materials defects for weapons performance. Further work on high explosives included CO2 predictive capability research, aging as well as convergent geometry research on certain plastic-bonded explosives. The HEKLA experiments broke new ground by integrating Photonic Doppler Velocimetry with visible imaging and atomic spectroscopy to provide more robust dynamic physics knowledge. Advances in supercomputing included the transitioning of the new Trinity Haswell (11 PF/s) to classified computing and the delivery of the D-Wave computing platform. However, the Laboratory experienced issues in performance of some programmatic work, including three of four weapons products with quality issues, issues with component development for detonator pellets and pellet cups, a new production scheduling approach that complicates stakeholder product acceptance work, and changes that will delay delegation of product stamping to the Laboratory. Lastly, a pit surveillance test was unsuccessful due to set up issues, and staffing shortages in key areas delayed fabrication schedules for test articles.

For Goal 2, reducing Global Nuclear Security Threats, the Laboratory exceeded expectations overall in this area. The Laboratory executed authorized global nuclear security mission work in a safe and secure manner to include the Defense Nuclear Nonproliferation, Nuclear Counterterrorism, and Counter Proliferation and Incident Response missions. Progress has been made in all areas, and many individual technical achievements culminated in Laboratory participation and leadership at national and international-level meetings. The Laboratory provided critical support to DOE in the effort to establish the China Center of Excellence. Many of the specific tasks included integration with partners from across

the NNSA enterprise, allowing for optimization of the overall support provided to address strategic national security priorities. The Laboratory exceeded expectations in recovery of Sealed Radioactive Sources with over 2,500 sources recovered totaling 52,071 curies. In terms of Issues, 91% of Technology Integration Program deliverables were completed, and only 70% on time. Timeliness was also an issue with Radiological Assistance Program Deliverables (67% timely); and three of six Lincoln Blue deliverables were completed.

For Goal 3, Strategic Partnership Projects, the Laboratory exceeded expectations in this mission area. The Laboratory continues to provide scientific solutions in performing core mission pillar work with DOE Offices and strategic partners to accomplish the DOE/NNSA strategic vision. Successes demonstrated included gains in the President's Climate Action Plan, support a secure and resilient U.S. energy infrastructure, and deliver the scientific discoveries and major scientific tools that transform the understanding of nature and strengthen the connection between advances in fundamental science and technology innovation. The Laboratory demonstrated leadership by coordinating and leading efforts in several DOE Sustainability Cross-cuts that supports the Secretary's energy sustainability goals. This work provides significant value to the DOE/NNSA mission and addresses the most challenging national and international problems.

For Goal 4, excellence in Science, Technology and Engineering, the Laboratory exceeded expectations overall in this area. Specific advances include two cutting–edge, high-impact experiments of considerable significance to the US/UK nuclear weapons programs were successfully completed at LANSCE, with execution and outcome both greatly exceeding expectations. A particularly wide-ranging advance involved a new method for controlling small-scale ion beams in laser plasma accelerators which has potential medical, scientific, and Homeland Security applications. A successful Laboratory experiment at NIF provided a significant contribution to the Inertial Confinement Fusion (ICF) program, delivering exceptional experimental results supporting the path to ignition for fusion energy, a long-term energy source. Staff achievements were recognized through awards, publications and other recognitions. Most notable are the selection of staff for a Presidential Early Career Award for Scientists and Engineers award and a DOE Early Career Scientist Award. The number of Laboratory articles in high-impact journals has increased to 60 articles per year over the last three years compared to 40 articles per year for the 2007-2013 period. Technology transfer accomplishments includes Fuel Cell and Supercomputing strategies and initiatives that are significantly benefitting the high-impact technologies achieved through partnerships with vendors and small businesses.

For Goal 5, Operations and Infrastructure, the Laboratory met expectations overall in this area, with some areas above expectations and some areas below expectations. Most notably, the Laboratory exceeded expectation for operational resumption activities at the Plutonium Facility and at the Weapons Engineering Tritium Facility. The Laboratory met expectations in several areas, including permitting work with regulators for groundwater discharge at the Radioactive Liquid Waste Facility and a Title V Major Source Air Permit; but a RCRA Notice of Violation was issued and a fine related to the 2015 inspection was assessed during the period. The Laboratory supported the settlement with the New Mexico Environment Department with respect to the 2014 WIPP contamination event, signing the agreement in January, 2016. The Laboratory completed a Radiation Protection Triennial Assessment with no systemic failure identified. The Laboratory Integrated Safety Management Declaration has been approved. In security, the Laboratory effectively executed an operational transition of protective force

subcontractors, and achieved a reconciliation of accountable materials which had been delayed because of an operational pause at the plutonium facility. The Laboratory achieved commendable results during the DOE Office of Enterprise Assessments (EA-22) independent Safeguards and Security Assessment conducted February – March 2016. The assessment revealed a minimum amount of deficiencies, an effective protection posture for the site, and several noteworthy achievements. The Laboratory completed over 30,000 square feet of excess facility decontamination and demolition, approximately 75% of the original goal. Preventative Maintenance completion rates topped 99%, reversing a previous slip in those rates. Laboratory contributions to the complex in an NNSA-wide Congressional Efficiencies Reporting program and in Strategic Sourcing were commendable; as were efforts to embark on a longer-term budgeting and staffing strategy. Significant progress was made on the implementation of cyber security upgrades, including HSPD-12 authentication on unclassified systems. As the result of a settlement, NNSA considers that the Laboratory met expectations on four capital projects, including the two most significant projects The Laboratory did not meet expectations on two of six line-item capital projects. Challenges include the discovery of a drum of mixed low-level waste improperly disposed of on the site and an operational exceedance of PCB limits at the Sanitary Effluent Reclamation Facility. Required improvements to the Criticality Safety program are moving at an unacceptably slow pace. The plutonium facility perimeter security system was not restored to operational capacity for a two-hour period following maintenance; and for the second consecutive year cyber security weaknesses were present in the Laboratory's Public Facing Web Servers. In May, Special Nuclear Materials were discovered in an abandoned drum during a radiological survey of TA-55. The Contractor Assurance System continues to have many serious deficiencies, although progress has been made in metrics, risk evaluation, causal analysis, and in improved assessments and evaluations. While the Laboratory conducted successful and effective exercises for Emergency Management, weaknesses in Laboratory Emergency Management remained as identified in internal and external reviews.

For Goal 6, Institutional Leadership, the Laboratory met expectations overall in this area, with some areas below expectations. During a challenging contract transition period, the Laboratory exhibited several dimensions of constructive leadership, including: a focus on executive and workforce development; increased attention to strategic planning processes; the effective transition of Legacy Environmental Management responsibilities to a separate contract with DOE; support for enterprise wide policy, planning and economic initiatives; and technology commercialization. The Laboratory collaborated with NNSA to complete the TRP II Phase C project within established parameters; but the Laboratory has not effectively used feedback from corporate parents to resolve longstanding project management issues. While several new efforts and initiatives are underway to improve the deficient Contractor Assurance System (CAS), including focused involvement by LANS, LLC parent organizations, challenges persist in both the effectiveness of key CAS elements and in uneven acceptance of CAS across the institution.

Goal 1: Manage the Nuclear Weapons Mission, *30% of fee allocated*

Successfully execute Nuclear Weapons mission work in a safe and secure manner in accordance with DOE/NNSA Priorities, Program Control Document and Deliverables, and Program Implementation Plans, Integrate across the Laboratory, while maintaining a DOE/NNSA enterprise-wide focus, to achieve greater impact on a focused set of strategic national security priorities.

Under this goal, Los Alamos National Security, LLC. (LANS), earned a rating of Excellent, and 92% of the award fee allocated to this goal. The Laboratory exceeded many of the Objectives and Key Outcomes under this Goal in the Performance Evaluation and Measurement Plan, and met the overall cost, schedule, and technical performance requirements of the contract under this Goal in the aggregate.

Objective 1.1

Accomplishments

The Laboratory met FY 2016 expectations by accomplishing scheduled production work according to requirements. The Laboratory achieved PF-4 Readiness and resumed additional pit surveillance activities. One notable achievement was the successful assembly of a production development pit in August (Phoenix Build), which exercised all plutonium operations following completion of readiness and restart activities. The Phoenix Build achievement puts the Laboratory on track to produce two development units in FY 2017.

The Laboratory implemented several detonator production and process improvements that increased yield and reduced the cycle time for the FY 2016 Lot of 1E33 detonators. Specifically, yield improved from 44% to 78% and manufacturing time reduced from 27 months down to 12 months from the previous lot. The Laboratory has applied these lessons learned to other product lines as well. Specifically, the Laboratory improved the cable reject rate for 1E38 detonators from 45% in the previous lot to 15%. The Laboratory improved the detonator cable assembly reject rates for 1E38 detonators from 37% in the previous lot to 23%. The Laboratory has made great improvements to their processes, reducing occurrence and cost of non-conformance and producing more consistent detonator lots.

The Laboratory delivered the LANL Manufacturing Modernization Project (MMP) baseline plan that NNSA accepted as part of CD2 documentation. The Laboratory demonstrated MMP equipment communication concepts in PF-5.

The Laboratory accomplished FY 2016 Product Realization Integrated Digital Enterprise (PRIDE) requirements by upgrading PDMLink-production definition hardware and completing EAWorkx-engineering authorization development prototype for future reductions in development time, training, validation and reduced management overhead.

In FY 2016, The Laboratory has exceeded the planned deliverables for activities associated with the Material Recycle and Recovery (MRR). The Laboratory exceeded expectations for activities associated with the recycle, recovery or disposition for accelerated vault cleanout, confinement vessel disposition, Chemistry and Metallurgy Research Facility (CMR) deinventory, WETF tritium recycling, and compliance with the DOE Order 410.2. The effort to accelerate the PF-4 vault cleanout was above expectations. 374

containers (150% of the objective) were dispositioned from the vault and first floor to include MAR reduction for containers in safes and floor locations. MAR on the main floor of PF-4 outside of gloveboxes was reduced by 21.5% or 141 kg from the start of FY 2016. The CVD project also exceeded the plan with introduction of the 5th vessel into CMR. The WETF shipments were successfully completed supporting the WETF de-inventory plan. Ten new Premium vault locations from current 12x12 vault locations or floor locations were created to support the Pu Sustainment mission.

The Laboratory met expectations for activities associated with the SAVY container surveillance, certification, testing and procurement. The Laboratory completed the experimental aspects of Life Extension Program to request life extension of the SAVY – accelerated aging, oxygen consumption, synergistic effects, including filter membrane and O-rings. The Laboratory submitted the SAR amendment to include extended lifetime, additional content and the two quart SAVY. In addition, the Laboratory identified several stored containers during the surveillance activities that have led to enhanced surveillance on certain package configurations in order to ensure safe storage and new test methods for analysis of corrosion and filter membrane degradation. The Laboratory completed drop testing of Hagan containers to support PF-4 safety basis analysis and prioritization of repackaging. In-glovebox storage container development was initiated for improved criticality safety and MAR reduction, as well as testing of the pipe over pack containers. The Laboratory also procured required SAVY containers for the complex.

The Laboratory supported the FY 2016 Joint Integrated Lifecycle Surety (JILS) Assessment of emerging capabilities to determine impacts on methodology. The Laboratory completed the FY 2016 DOE/NNSA Agency Nuclear Enterprise Assurance related program activities in accordance with NAP-24A Attachment 4, DOE Order 452.1E and DOE Order 452.4C.

The Laboratory successfully completed a multi-week Weapon Quality Assurance Survey (QAS 1) of Los Alamos National Laboratory's (LANL's) Design Agency and Production Agency during the third period, led by the NNSA Weapon Quality Division (NA121.3) and supported by a multi-site team of NNSA federal and M&O partner subject matter experts representing the Nuclear Security Enterprise Design and Production Agencies. The QAS 1 was performed in accordance with NNSA Weapon Quality Policy NAP-24A. The Laboratory was the first NNSA Laboratory as well as the first NNSA Design Agency to be evaluated using this new approach. The Laboratory was recognized with eight noteworthy practices.

Issues

Near year end the Laboratory transitioned from a monthly product submittal showing a full year of forecast production, to a schedule that only forecasts two weeks into the future. This resulted in less production variance within the narrow two week window, but eliminated NNSA's ability to plan acceptance work from three to fifty-two weeks into the future. The longer term "level loaded" schedule was intended to provide transparent visibility into an even production effort and to avoid a mass product delivery at year end, and this change did not support this objective in FY 2016 where most products were delivered at year end.

The AYD810530 container kit product did not meet design and product quality requirements. These shortcomings involved every phase of the production including design, production and certification; and collectively raise concerns about the quality system under which those elements operate. Of the three

remaining product submittals, two of them had identified defects. With three of four products delivered for inspection showing issues, NNSA confidence in the production quality system is less than what is desired.

With respect to the goal of delegating product acceptance authority to the Laboratory, challenges remain in demonstrating an effectively integrated quality assurance program as highlighted by several examples. Near year end, the Laboratory informed NNSA of their intent to transition weapon quality roles and responsibilities to a new organization again at the start of FY2017. However, a transition plan has not been provided and the target implementation date of June 2017 will delay NNSA intended quality activity Delegation. The Laboratory Manufacturing Modernization Project to implement a modern Production Agency system did not initially integrate all requisite Laboratory and NNSA functional elements to include quality requirements, and interfaces for success. While there was improvement near year end, both progress to date and project assumptions that do not factor end state manufacturing are problematic.

In two instances the Laboratory shipped weapon related product that did not meet labeling and marking quality requirements associated with shipping documentation. An NNSA quality hold on a Long Term Storage (LTS) War Reserve (WR) product part remained unaddressed for the entire period.

The Laboratory did not produce the last Structural Mock-Up (SMU) pit for the B61. Delivery of the pit was delayed over six months, requiring CNS to utilize an alternate to meet the scheduled build of the Joint Test Assembly.

Objective 1.2

Accomplishments

The Laboratory met most of the expectations in support of Defense Programs mission objectives by maintaining knowledge of the state of the stockpile by executing the ongoing surveillance and Integrated Weapons Evaluation Team requirements for all stockpile systems to support the Annual Assessment process at both nuclear Design Laboratories. The Laboratory delivered the Weapons Reliability Report (WRR) in November 2015 and the update in May 2016. The Laboratory supported the development activities for the B61 Joint Test Assembly (JTA) Modernization (JTAM) project and the W78 JTA7. The Laboratory supported testing and completed radiography activities for B61 JTAM 602, 606, 607, 610, 611, and 917. The Laboratory served as a Gate Reviewer for the W78 JTA7 component gate review.

The Laboratory has closed out Cycle 20 and 21 Annual Assessment activities consistent with the Annual Stockpile Assessment Execution Plan. The Laboratory developed and issued the Cycle 21 Annual Assessment Reports (AAR) for the B61, W76, W78, and W88 weapon systems and released the final Laboratory Director letter to NNSA. The Laboratory oversaw the execution of the Independent Weapon Assessment Program (INWAP) activities and issued reports on the W80, B83, and W87 for the Livermore Director. The Laboratory completed the B61, W76, W78, and W88 Surveillance Year-in-Review for AAR equities as well as the Engineering Program review.

The Laboratory developed drafts of improved versions of the Major Assembly Release (MAR) documents for the W78, W76, W88 and B61. The Laboratory has led the effort to improve MAR's to keep them current with assessments and warhead configuration changes.

The Laboratory staff improved the analysis of pinhole neutron experiment (PINEX) images that strengthens the confidence in using these results to constrain simulations. Analysis of both reaction-in-flight and time-integrated images from the PINEX diagnostic has been used to infer a key parameter for primary performance. The detailed data analysis combine theoretical models for high-energy-density and nuclear physics coupled with the two images from a single underground nuclear test. Recently, the analysis has been extended to include a previously ignored physics effect, and the resulting impact on the inferences has been characterized for two different nuclear tests. This helps solidify the accuracy of the inferences and strengthen the confidence in using the results for constraining nuclear simulations.

Issues

The Laboratory restarted pit surveillance activities in PF-4 and executed the first W88 pit surveillance issues that resulted in a 'no test' and loss of the test asset as a result of test set up issues. As a result, the test procedures are under evaluation and additional training implemented to prevent further 'no tests'. The Laboratory did not complete the B83 Cycle 113 Pit d-test carried forward from FY 2015 due to several issues that delayed the Critical Safety Analysis.

Objective 1.3

Accomplishments

The Laboratory supported the HATT W78 Weapon Repair Project and delivered the W78 New Tooling weapon response that enabled the September Internal Verification Review to commence at Pantex.

The Laboratory met FY 2016Gas Transfer Systems (GTS) activities at the Savannah River Site, responded to eight W78 URs. Additionally, the Laboratory continues to support the W88 Stockpile System GTS and Enhanced Surveillance technology development activities according to approved project plans.

The Laboratory performed above expectations by working through multiple activities, completing multiple walk-downs, and mapping activities for the W88 Collaborative Authorization Safety-basis for Total Life-cycle Environment (CASTLE) transition of the W88 Documented Safety Analysis prior to the start of the W88 ALT 370 Seamless-Safety for the 21st Century (SS-21) Project. The Laboratory assumed the schedule integration responsibility typically managed by Pantex to ensure continued progress on the W88 ALT 370 SS-21 Project and CASTLE transition. The Laboratory met the W88 ALT 940 development, integration, and production activities within budget.

The Laboratory completed the updates to the Weapons Dismantlement, and Disposition (WDD) Plan on time. The Laboratory supported the B61 Legacy Upgrade Project by completing NESS planning activities and inputting the B61 legacy information into CASTLE.

The Laboratory developed GTS non-nuclear components by focusing on ABAQUS and LSDYNA model development to solve specific GTS geometry problems and to delay pyrotechnic composition for future GTS actuator.

Issues

None

Objective 1.4

Accomplishments

The Laboratory exceeded expectation during the year by creating and utilizing new technologies and scientific understanding to support stewardship activities. Among these accomplishments were peer-reviewed weapon physics baseline models for the Annual Assessment process. These models are based on development of new plutonium equations-of-state (EOS) (based on years of experimental effort to acquire new small-scale plutonium dynamic behavior data), small-scale weapon physics experiments at the National Ignition Facility (NIF) on certain turbulence effects, and integral experiments based executed at U1A. The Laboratory now has a common foundational model for our primaries and full-system assessments. A result is two new performance assessments for mods of the B61, which are being incorporated into the drafting of a new Major Assembly Release for the B61 System.

The Laboratory fully supported the Inertial Confinement Fusion (ICF) program by developing innovative platforms for understanding ICF processes by completing experiments at the NIF and developing models to simulate the behavior of wetted foam targets, hydrodynamic stability of beryllium capsules, and double shell geometry implosions. One of these activities is an ICF stretch goal. Additionally, the Laboratory hosted a workshop on NIF Science in June that reviewed the three ignition approaches and addressed common technical challenges among the three approaches.

The Laboratory fully supported the implementation of the new Infrastructure reporting tool. They successfully integrated current year and ongoing previous year projects, funding, and milestones prior to assigned suspense's, and the updated report matched that from the legacy system, which is required for a successful transition.

The Laboratory led the development of the Enhanced Capabilities for Subcritical Experiments program, providing senior staff to serve as the Technical Program Director for the project. The tri-lab and Nevada team successfully completed a "Blue-Ribbon" Panel review of the project with very positive results.

The Laboratory conducted the initial high explosive assembly centrifuge test in support of the W88 Weapon System. The recently installed centrifuge, at TA-36, is capable of simulating high-g reentry loads on full-scale weapon assemblies with live high explosives and is a critical new tool vital to weapon qualification. Prior to realizing this capability, high explosive environmental data acquisition was only possible in joint test assemblies that were flown by the DoD, thus limiting actual data to a small number of channels on a small number of tests costing in the millions of dollars each. With this new capability, local test data is available to complement and correlate JTA data and thus generate a broader picture of this weapon environment in a cost efficient manner. The 4.25-meter centrifuge has a maximum velocity of 220 rpm that can impart up to 216 g's on a test article. With a significant number of data channels now available, it will be possible to examine relative component movement vs. g-load vs. total time at a specific g-load, all not previously attainable.

The Laboratory performed three "off-normal" hydrodynamic experiments, two of which are the first of their kind in the history of stockpile stewardship. Two of the experiments were performed at pRad and one at DARHT; all three are leading to the emergence of new understanding how weapon birth defects

and 3D weapon engineering features impact weapon performance, and what magnitude of defects are acceptable or trigger performance impacts.

The Laboratory continued to provide input to the National Survivability strategy concluding with the production of a draft strategy. The Laboratory addressed NNSA's FY 2016 Get the Job Done List item regarding modeling of weapon flight dynamics and has continued editing and reviewing the Warhead Hostile Environment Survivability Plan (WHESP). The Laboratory also fully implemented chemical analysis methods and completed a number of analyses used to improve chemical kinetics models used for simulations.

The Laboratory performed above expectations for several projects within the Enhanced Surety Program. They performed material compatibility and parametric studies on Multi-Point Safety (MPS) options, shared legacy system material characterization with Enhanced Collaboration-12, and completed compatibility testing with Special Nuclear Material. For Advanced Use Control Technology Qualification Testing, they completed the Baseline test plan and executed local tests on schedule. For the Air Force Integrated Surety Architecture (ISA), they completed the Initial project plan and coordination of conceptual designs and interfaces with Sandia.

A new CO_2 equation of state has been developed for high-explosive products, which will significantly improve the Laboratory's predicative capability for high explosives and is being made available to the Verification & Validation and broader user community for testing.

The Laboratory developed two new boost metrics that are providing the most detailed characterizations of boost performance ever achieved. These have been written up in three internal Weapons Research Letters (WRLs) and have been presented in detail at the March Predictive Science Panel meeting. Additionally, the Laboratory is supporting Lawrence Livermore in developing the long-term strategic plan for Boost, including discussions with the Tri-Laboratory and NNSA on the completion criteria for the FY18 Level 1 Milestone and the composition of the Review Panel.

The Laboratory developed a new equation of state for the products of PBX 9404 high explosive to study the effects of aging on performance. The Laboratory developed Magpie, a new equation of state generation tool, now used to characterize complex materials, like HE and other mixtures, based on thermodynamically complete physical descriptions of material state (e.g., pressure, temperature, internal energy, etc.).

The Laboratory executed the Insensitive High Explosive (IHE) Convergence Experiment at pRad, which successfully measured the effects of convergent geometry on the detonation properties of PBX-9502. Additionally, the experiment coupled proton radiography with microwave interferometry (MWI) providing important validation data for the MWI diagnostic. The experiment provides valuable data for validating our weapons physics codes and IHE modeling, improving the level of confidence in our assessment of systems of interest.

The Laboratory prepared and analyzed HE-Crystals of the solid pentaerythritol tetranitrate (PETN) derivative, PETN-CNH_3Cl, using X-ray diffraction measurements, as part of an ongoing effort to study various synthesized PETN-CNH_3X derivatives. As part of this experiment, the Laboratory varied minor systematic changes to study the resulting changes to obtain a better understanding of the fundamental

properties that affect explosive sensitivity. This understanding will enable the design and synthesis of less sensitive, but still high performing PETN derivatives.

The Laboratory met expectations in exploring, and assessing potential new technologies for application to the stockpile. Certification readiness exercises were successfully conducted and the Laboratory continues to make great progress in this area.

The Laboratory conducted radiochemical, and boost experiments to study the fundamental physics underlying ion coupling and mix in nuclear implosion phenomena.

Issues

The Laboratory incurred cost overruns in fabricating and installing the GCD-3 Detector at the NIF. The milestone was completed and the first data were taken in accordance with the schedule, but doing so required an additional $450K from HQ. This increased cost however, was considered relatively minor in relation to the overall ICF budget at LLNL.

Objective 1.5

Accomplishments

The Laboratory significantly exceeded expectations by demonstrating and assessing a common modeling capability for use in certification of LEPs. Specifically, the Laboratory expanded the Verification and Validation and applied two elements of a recently completed FY 2015 Level 1 Milestone on pit reuse. The Laboratory uniformly applied the Common Model for Primary Assessment (COMPASS) modeling approach to a large suite of underground test data, including a set that was particularly relevant to pit reuse. Additionally, at DARHT, the Laboratory conducted Axis II inspection cleaning and refurbishment activities to ensure system availability for Hydrodynamic test schedules. Specifically, in January, the Laboratory maintained Axis II Cell 13 and 20, the Kicker assembly, and the multi pulse x-ray conversion target housing, and installed a new target wheel. Subsequent to this maintenance period, the Laboratory executed two hydrodynamic experiments during the month of February, which demonstrates successful progress towards a Defense Programs future goal of executing ten hydrodynamic experiments in a 12-month period.

The Laboratory made significant upgrades to the computational capabilities for nuclear criticality safety assessments have contributed to the substantial resumption of operations at PF-4, the nation's sole plutonium fabrication facility. Upgrades to the computational capabilities for Nuclear Criticality Safety (NCS) assessments include Monte Carlo Neutron Particle (MCNP®) code enhancements, use of new, high-quality nuclear data, as well as a new validation tool, Whisper, which, when coupled to the MCNP® code calculates the Upper-Supercritical-Limits together with quantitative measures of uncertainty. The Laboratory developed and implemented a new efficiency procedure to increase the Pu sample handling efficiency for surface science measurements. The Laboratory performed the transfer of samples from and to the ToF-SIMS (Time-of-Flight Secondary Ion Mass Spectrometer) system at the Target Fabrication Facility (TFF) utilizing the AFM (Atomic Force Microscope) glovebox for the first time. This new procedure eliminates the need to hand-carry the entire ToF-SIMS sample holder to and from PF-4 and the corresponding processes involved with introduction, transfer, packaging, and release operations. In the future, only plutonium sample preparation and relatively simple packaging, introduction, and release

operations will be required at TA-55. The result is a great savings in labor and a much more rapid sample turn-around to the TFF Pu surface science instruments.

In collaboration with the Atomic Weapons Establishment (AWE), the Laboratory executed the first shot in the HEKLA series of experiments at the LANSCE pRad facility on February 25, 2016. The purpose of the HEKLA experiments is to investigate a key weapons physics phenomenon, by a first-of-its kind integration of complex diagnostics including Photonic Doppler Velocimetry, visible imaging and atomic spectroscopy in addition to proton radiographic imaging. Researchers from AWE attended the experiment and led the fielding of the spectroscopic diagnostics. The US/UK HEKLA research team obtained a rich dataset for the physics issues in question and demonstrated the feasibility of the joint operation of diagnostics that will be used in follow-on HEKLA (and other) experiments.

During the FY 2016 run cycle at the Los Alamos Neutron Science Center (LANSCE), the Laboratory made significant progress towards development of neutron imaging (NI) applications. Through improvements in detector technology and the use of a new LANSCE beam line specifically built for imaging, best ever neutron images have been obtained on multiple types of weapon CSAs. The potential impact on future manufacture and production of CSAs for the complex will be significantly influenced on the ability to assess and reaccept assemblies nondestructively. In addition to radiographic imaging, best quality computed tomographic images were also obtained, allowing viewing of internal cross-sections of test objects. This effort has revealed valuable information on required neutron energies and configurations required to design and build future neutron-imaging devices. In addition to NI, improvements are being made via parallel x-ray imaging efforts to improve existing capabilities and methods commonly used today.

The Laboratory collaborated with Sandia National Laboratory in executing the first containment experiment using depleted uranium in a thin walled cylindrical geometry device at Sandia National Laboratory's Z-machine. This facilitated the exploration of actinides behavior to significantly higher pressures and densities, providing information that will be incorporated into other Stockpile Stewardship analysis supporting the Annual Assessment of the Stockpile.

Laboratory researchers also measured the stress-strain behavior of Parylene-C films over a wider range of radiation doses that increased their understanding of how radiation-induced defects are manifested and affect material performance. The findings support the Nuclear Deterrence mission area and Materials for the Future science pillar through a Laboratory-conducted Orpheus experiment in the U1A underground complex at Nevada National Security Site. This work supports the technical basis for confidence in the nation's nuclear deterrent.

The Laboratory successfully completed the Lyra Series 3667 and Orpheus data package.

The Laboratory met expectations in executing experiments with an emphasis on ejecta-related phenomena, strength, and cooperative work with AWE. Possible experiments include: double shock ejecta platform experiments, ejecta with chemistry, horizontal shock tube experiments, HiPhy, PHELIX platform experiments, HEKLA/BAMUS, and HiPhy-AMI.

The Laboratory exceeded expectations by continuing to make progress in developing a new diagnostic capability. The Laboratory demonstrated through simulations and analysis of results from static

experiments a mature concept for a first dynamic NDSE experiment. This new development will support physics certification method.

The Laboratory met expectations in continuing to develop a common model approach. The Laboratory assessed our capability in mix and burn modeling through a Common Model Suite; focus on limitations of capabilities and how experimental programs are being used to address such limitations. For the first time, the Common Model was used for assessment of the Laboratory stockpiled systems to support the Annual Assessment process.

The Laboratory met expectations in studying advanced manufactured material. Conducted a comparison of AM and conventionally processed stainless steel to provide an assessment of the potential for AM processing in future LEP options.

The Laboratory met expectations in developing and assessing new HE molecules for stockpile application. New high explosive molecular crystals will be synthesized, scaled up, and evaluated for performance. The most promising explosive molecules for future stockpile applications will be identified. Past results on new high explosive molecular crystals will be summarized and analyzed.

Issues

The Laboratory has worked to advance the capability and capacity to fabricate test articles for experiments, however staffing shortages have led to delayed fabrication schedules during this fiscal year, which led to delays of three planned experiments into early in the next fiscal year.

Planned Z-Machine experiments involving plutonium were delayed first due to lack of machining resources due to the PF-4 resumption, and then unavailability of the 9975 Shipping Container. The test articles were shipped and the experiment executed at Sandia prior to the end of the fiscal year. The Laboratory had no control over the shipping container recertification schedule.

Due to funding constraints, the Laboratory ceased operations at the Trident Facility in order to better support other DP facilities. However, this decision was not discussed with Defense Programs Leadership prior to execution.

Objective 1.6

Accomplishments

The Laboratory continues to meet expectations for supporting production realization procedures supporting stockpile Life Extension Programs (LEPs).

In support of the W88 Alt 370, the Laboratory exceeded expectations in catching up the Conventional High Explosive Refresh (CHE-R) portion with the rest of ALT 370 scope under enormous time constraints and budget challenges. The Laboratory performed accelerated development and testing on the CHE-R portion to enable those activities to catch up and align with the ongoing portion of the Alt 370. This accelerated pace of activities was vital to the W88 Alt 370 successfully passing the Department of Defense Preliminary Design Review and Acceptance Group (PDRAAG) review in May, 2016. The CHE-R activities at the Laboratory will continue this accelerated pace so that the entire W88 Alt 370 program will enter phase 6.4 in mid-2017. The Laboratory successfully completed a Hydro test in November, and was

instrumental in the successful flight test DASO-26; they accomplished it under enormous schedule constraints. The Laboratory also successfully completed a very quick Customer Requirements Review with the Navy. Additionally, the Laboratory coordinated closely with SNL to ensure complete integration of the leveraged System qualification program between the original scope of the ALT 370 and the CHE Refresh addition. In support of the W88 Alt 370, the Laboratory and SNL jointly performed the JTA8B and JTA9B concept and cost study. The JTA8 was redesigned by the Laboratory to replace scarce hardware with surrogate components to save NNSA time and substantial production costs, while preserving War Reserve hardware for future rebuilds. The Laboratory is leading the effort on JTA9B design to capture all Nuclear Explosive Package (NEP) surveillance data as an effort to save mid cases. Unfortunately, due to funding constraints the Laboratory is having to look at other viable alternatives for the JTA9B.

In support of the B61-12, the Laboratory DA supported the successful completion of all major B61-12 6.X milestones in FY 2016 including: B61-12 System Baseline Design Reviews, System Pre-Production Engineering Gate, Preliminary Weapon Development Report, and the USAF led Preliminary Design Review and Acceptance Group (PDRAAG). These successful reviews led to NNSA authorizing Phase 6.4, Production Engineering, on June 23, 2016. The Laboratory also contributed to the successful AF Nuclear Weapon Safety Study Group (NWSSG) Preliminary Safety Study conducted in August 2016. The Laboratory provided a significant contribution and effort to B61-12's derivation of the Strategic Thermal temperature in lieu inadequate responses from DOD to specify this environment and have provided subject matter expertise to USAF to facilitate understanding of radiation environments during storage and in flight.

The Pantex Plant experienced challenges formulating new PBX9502 to meet Legacy PBX 9502 requirements and the Laboratory assisted with troubleshooting the formulation problems associated with new raw materials. The Laboratory recommended the B61-12 utilize existing stores of PBX 9502 to avoid impacting the B61-12 LEP schedule and worked with Pantex to resolve those issues.

The Laboratory partnered with Sandia National Laboratory to improve system engineering and integration and restructured the System PRT. The new System PRT has resulted in more timely resolution of issues and management of system requirements, qualification and system assembly and disassembly activities at Pantex Plant. Additionally, the Laboratory successfully partnered with SNL to execute the B61-12 system's test program in FY 2016 including completing the third B61-12 LEP Flight Test Development Unit (FTDU) #3 test at the Tonopah Test Range (TTR).

The Laboratory conducted subsystem/component development and production activities supporting the B61-12 Life Extension Project (LEP), and is doing an excellent job mitigating schedule risks supporting Sandia National Laboratory (SNL) address 12S Actuator procurement issues. The Laboratory Production Agency (PA) has provided a stamping delegation plan to reduce product acceptance schedule risks.

The Laboratory Design Agency (DA) completed the CSA Pre-Production Gate and Baseline Design Review in November 2015. The Laboratory has aggressively worked to resolve a CNS Y-12 process development concern with the component weld. The subject matter experts have proposed an optimized weld parameter set that will be assessed in FY 2017 allowing Y-12 to resume pilot production without impact to the B61-12 LEP FPU schedule.

Lastly, the Laboratory is providing excellent leadership for the GTS product realization team to finalize the component design, complete production engineering ahead of schedule, and identifying options, including 12S mitigation actions that save costs to the federal government.

Issues

The Laboratory struggled with Microclad procurement, but did develop mitigation strategies to reduce risk that the vendor will not meet specifications, and providing detonator cable assembly (DCA) schedules.

The Laboratory experienced issues related to component development, including detonator pellet and pellet cup manufacturability. Issues related to the loss of an NSC Production Agency Vendor led to a six-month delay in delivery of component level development hardware, delaying development activities. The Laboratory Design Agency & Production Agency and the NSC have developed a NNSA approved recovery schedule for the 1E40 detonator, including potential revisions to component specification. The Laboratory is working to ensure detonator vendor activities support the First Production Unit (FPU), all activities are on or ahead of schedule to meet FPU.

Local test schedules at the Laboratory supporting the B61-12 LEP system qualification are running a significant schedule variance. Delays in delivery of development hardware from the PAs resulted in late execution of several local tests and a full scale hydrodynamic experiment. Causes are somewhat outside of Laboratory DA control resulting from development hardware delays at the Laboratory PA and KCNSC. A recovery plan is being implemented on-schedule, and major milestones, including local test LT-33 Lite and an associated full scale hydrodynamic experiment, necessary to meet FPU are on schedule or have been met.

Key Outcome 1.1

Accomplishments

The Laboratory exceeded expectations in their application of experimental and simulation capabilities to support stockpile sustainment and stewardship. The Laboratory completed experimental testing of at least 25 of 33 Pu samples using Kolsky Bar, Static, Quasi-static, and Shock Physics platforms at TA-55 in support of both ASC PEM dynamic materials response models and the B61 LEP aging assessment. The Laboratory conducted Pu aging studies supporting the B61 LEP, annual assessment review (AAR), and pit reuse options. Experiments included physical properties (strength, damage, and EOS), surface science, and defect characterization). Aging data supports physics and engineering model updates used for assessments. In February and March the Laboratory successfully ran tri-lab (LANL, LLNL, and SNL) open science projects on the Trinity Haswell partition as part of system stabilization and functionality efforts, preparing for full-scale classified tri-lab production science in the summer of 2016. Completion of the Trinity Haswell partition supercomputer installation and testing is the successful first step in the current effort to advance the nation’s supercomputing capabilities. Trinity is the first of the NNSA's Advanced Simulation and Computing (ASC) program's advanced technology systems, which are on the DOE Exascale roadmap. Trinity is the first DOE/NNSA system specified by the memory requirements to make it the first platform large and fast enough to begin to accommodate finely resolved 3-D calculations for

full-scale, end-to-end weapons calculations, running the most demanding large-scale applications within Stockpile Stewardship.

The Laboratory also installed and began utilization of a D-Wave adiabatic quantum computer this summer, consistent with the requirement to support advanced, next-generation computing technologies as mandated in the 2015 National Strategic Computing Initiative. The Laboratory proposed guidelines to structure Tri-Lab usage of the machine, and these guidelines were successfully reviewed and approved by HQ. The Laboratory has started engaging the other weapons laboratories in training and utilization planning.

Separately, LANL is meeting expectations through its participation in the management of the Exascale Computing Project (ECP) jointly managed by DOE NNSA and DOE Science.

The Laboratory is on track to demonstrate rapid setup for a 3D simulation capability that will allow simulations to be run on wider ranges of meshes, and new synthetic radiograph capabilities that aide with diagnostics and verification and validation. 3D mesh generation and spin/paint methods are fully functional and are now being tested and optimized. The capability is on track for completion, and will enable studies of features important to LEPs, reuse concepts, component defects, and annual assessments.

In March, the Laboratory submitted objective evidence to NNSA regarding the Level 2 Milestone to complete the Lyra Series 3667 and Orpheus diagnostic data package. The Laboratory distributed the data package to the LANL, LLNL, and AWE design communities. NNSA responded with concurrence to document successful completion of the Milestone.

Issues

With respect to the infrastructure projects related to these machines, the Laboratory has struggled and must improve its efforts to submit ASC-related infrastructure projects in a timely manner, such that the review and approval of these projects at HQ (and at the Field Office) can proceed within the normal order of business and the appropriate fiscal year.

Key Outcome 1.2
Accomplishments

The Laboratory met expectations by continuing to make progress on LEPs including aspects of Earned Value Management implementation and reporting guidance, compliance with the Phase 6.X Process and Product Realization Processes. The Federal Program Manager for the W88 ALT 370 indicated that the Laboratory has met or exceeded all expectations for this measure. The Laboratory provided the "2015 Surveillance Strategy Review for the B61-12: Canned Subassembly" in support of the Baseline Cost Report. This analysis was effective in assuring proper balance between risks, costs and needs for future surveillance.

Issues

The Federal Program Manager noted that the Laboratory PA does not yet have an approved baseline. There is room for improvement in linking classified detailed schedules to facilitate logical linkages to Earned Value Management analysis. During the rating period, the Laboratory was late in delivering the Basis of Estimate supporting the Baseline Cost Report for B61-12 LEP.

Key Outcome 1.3

Accomplishments

The Laboratory exceeded expectations in sustaining and supporting its plutonium capability. With resumption of Pit Flow Sheet Operations achieved, pit disassembly staff successfully completed deliberate operations and received approval to enter Normal Operations early in December. They then disassembled a pit for the surveillance program during the week of December 7, 2015. Following completion of Federal Readiness Assessment activities for Pit Flowsheet and remaining plutonium operations, the Laboratory successfully assembled a production development pit in August (Phoenix Build). The Phoenix Build puts the Laboratory on track to produce two development units in FY2017. Until the rest of the ARIES line is operational, pit disassembly staff will be performing work funded by the surveillance program and working on a second lathe for ARIES.

Issues

None

Key Outcome 1.4

Accomplishments

The Laboratory exceeded expectations for strengthening the technical foundations for future LEP design options by successfully completing the Level 2 Milestone: Generation 1 Subcritical Experiment Six Foot Confinement Vessel Final Design Review. This accomplishment will advance dynamic experiments involving Plutonium by enabling the fielding of larger scale integral Sub-critical Experiments. The larger scale allows the integration of a new reactivity measurement diagnostic. During this rating period, the Laboratory delayed execution of a hydrodynamic experiment supporting design activities for the B61-12 LEP due to a faulty component received from another production site. The Laboratory was able to correct the fault and successfully executed the experiments, after a two-week delay.

The Laboratory has performed new design work on two primary designs concepts as future LEP options, and are currently initiating work on a third design proposal to strengthen the technical foundation for a broad-range of future LEP options. Two hydrodynamic experiments to evaluate these design concepts are now on the schedule. This work supports the Joint Technology Demonstrator initiative and Stockpile Responsiveness goals and is supported by the Certification Readiness Exercise 1 and 2 within the Science Campaign. The Laboratory presented two seminars, “US Stockpiled Weapons without Full Nuclear Testing,” and “What Constitutes a Nuclear Tested Weapon?”, at NNSA to help provide context for future LEP options.

Issues

None

Key Outcome 1.5

Accomplishments

The Laboratory significantly exceeded expectations for activities associated with TRU waste management at TA-55. Certification of waste drums using the High Efficiency Neutron Counter (HENC) 3 has exceeded the plan for the fiscal year and the mobile loading demonstration in TA-55 was completed five months ahead of schedule. The plan was to complete certification of 20 TRU drums per quarter using the High Efficiency Neutron Counter (HENC) 3 at TA-55 and to date the Laboratory has completed measurements of 145 TRU drums using this system; this is 65 more than planned for FY 2016. The Laboratory also completed the first step for determining if TA-55 can use the TRUPACT II Mobile Loading Unit (MLU) on November 24, 2015, by successfully demonstrating five months ahead of schedule that a TRUPACT II MLU can be introduced into the TA-55 security area, and the trailer can be driven to the HENC pad from both roads that access the pad.

The Laboratory is taking proactive action to increase waste storage capacity within TA-55 to lessen programmatic impacts, however models are contingent upon assumptions with extremely narrow margins with little flexibility to avoid significant impacts. The Laboratory is completing the analysis to support double stacking of TRU waste drums on the HENC pad which will provide for another six months of storage based on projected generation rates.

The Laboratory has also completed an update to the Enduring Waste Management Strategy after completing two in-depth workshops with the NNSA. This strategy is an integrated Laboratory wide approach to waste management storage and disposition that will support and enable weapons and other program activities. The Laboratory is developing an implementation plan and formed seven Integrated Project Teams both demonstrating implementation of the Enduring Waste Management Strategy.

Issues

None

Goal 2: Reduce Nuclear Security Threats, *10% of fee allocated*

Successfully execute authorized global nuclear security mission work in a safe and secure manner to include the Non-Proliferation, Emergency Operations and Counterterrorism missions. Integrate across the Laboratory, while maintaining an NNSA enterprise-wide focus, to achieve greater impact on a focused set of strategic national security priorities.

Under this goal, Los Alamos National Security, LLC. (LANS), earned a rating of Very Good, and 87% of the award fee allocated to this goal. LANS exceeded almost all of the Objectives and Key Outcomes under this Goal in the Performance Measurement and Evaluation Plan, and has met overall cost, schedule, and technical performance requirements of the contract under this Goal in the aggregate. The Laboratory has continued to be successful in its performance under the contract as described below.

Objective 2.1

Accomplishments

The Laboratory exceeded expectations in support of mission objectives to secure, account for, and detect the illicit movement of nuclear/radioactive weapons and materials. The Laboratory provided successful leadership in the sealed source recovery as well as training and equipment to aid in effective border security and source accountability.

Laboratory work provided to the Off-Site Source Recovery Project (OSRP) exceeded expectations. The effort to recover disused radioactive sources that pose a risk to national security, via three different Office of Radiological Security (ORS) activities, is noted as well as the difficulties surrounding recovery and disposal of these sources. Despite these challenges, the Laboratory recovered 2,528 sealed radioactive sources totaling 52,072 curies through the end of August. Through their success, the Laboratory has become lead for this recovery program for domestic transuranic and large beta and gamma sources that do not have a commercial disposal pathway. The technical guidance and management provided in the recovery of disused radiological sealed sources has been outstanding.

Additionally, the Laboratory has continued to support DNN in FY 2016 in its Nuclear Smuggling Detection and Deterrence (NSDD) efforts to detect and prevent illicit trafficking of nuclear/radiological materials by providing consistent, skilled support for the installation, calibration, and maintenance of radiation detection systems. They have supported visits to over 76 countries to include the Netherlands, Kyrgyzstan, Lithuania, Moldova, Vietnam, China, Barcelona, Lithuania, Bangladesh, Poland, Bulgaria, Malaysia, Jordon, Philippines, Thailand, Germany, Italy, Croatia, and Austria.

The Laboratory is also providing support in improving technical aspects of the NSDD program. In particular, the Laboratory recently completed the testing and analysis of alternate neutron detection material and developed a comprehensive test plan that incorporated bringing expertise from other labs to analyze the feasibility of various neutron detectors to enable to program to move away from the more costly and scarce Helium-3. The Laboratory is also leading the effort to test equipment that could potentially improve the secondary inspection process.

The successful grand opening of the China Center of Excellence for Nuclear Security (CCOE) in Beijing on March 18, 2016, represented a major milestone for NNSA. Laboratory staff played a key role in this success by providing the nondestructive assay (NDA) instrumentation for the Analytical Laboratory in the CCOE, as well as facilitating the set-up and commissioning of this equipment. Additionally for the Kazakhstan nuclear security cooperation project, the Knowledge Security project, and the Institute for Physics and Power Engineering project, Laboratory staff consistently delivered timely, valuable, and mission critical input that has worked to ensure successful project execution.

The Laboratory also successfully served in leadership roles for a number of international events. For example, a Laboratory chemist had a leadership role at APEX Gold, a major highly successful event with ministers and other senior delegates from 37 nations and representatives from the IAEA, European Union and United Nations held in Livermore, California, in January 2016 in advance of the 2016 Nuclear Security Summit. The Laboratory chemist provided a well-received nuclear forensics briefing to the participants. Additionally Laboratory staff members led a "scientist to scientist" conference at the European Commission Joint Research Centre (JRC) in Karlsruhe, Germany on the subject of alarm adjudication and reach-back associated with the NSSD mission with wide reaching international participation. The Laboratory also supported Global Material Security-NSDD's international nuclear forensics work and is leading three bilateral engagements, as well as engagements with the International Atomic Energy Agency (IAEA) in support of the development of guidance documents.

Issues

None

Objective 2.2

Accomplishments

The Laboratory exceeded expectations by providing international and complex wide leadership and technical capabilities to support the efforts to reduce global nuclear security threats consistent with NNSA mission objectives.

Laboratory staff were instrumental in the 5th conventional explosion experiment as part of the NNSA's Source Physics Experiment (SPE) series on April 26, 2016. The SPE series, conducted at Nevada National Security Site (NNSS), advances the United States' verification mission for detecting and understanding underground nuclear explosions.

The Laboratory provided key technical integration and leadership in support of the classified sensor development campaign. During FY 2016, the Laboratory executed the Spektre collection campaign with sponsors. This effort was aligned with the Quantum Smoke II effort and data will support high level funding decisions on future work in this area. The Laboratory also developed a cohesive data management and acquisition plan that establishes a single repository for data gathering, management and distribution, as well as provided exploitation team and process engineering support of the U.S./UK field campaign.

Laboratory staff exceeded scheduled technical performance by analyzing an operationally interesting seismic event in collaboration with U.S. National Data Center (USNDC) researchers and presenting these

results to the Seismic Review Panel, an independent panel advising the USNDC. Subsequent to this meeting, the Laboratory has been tasked by DOE with the lead of a DOE multi-lab technical publication on the analysis of this event. The Laboratory also delivered a critical and complete seismo-acoustic database update in a useful and timely manner.

The Laboratory met expectations by delivering a peer-reviewed high fidelity test article design critical for future research and development activities in areas of national priority as well as delivering an appropriate high explosive experimental campaign plan that adequately captured optical and radio frequency (RF) data requirements for integration and validation of end to end simulation.

In addition, Laboratory staff published a number of outstanding reports to include: a technical report on the diagnostic value of various gallium measurements in nuclear forensics contexts; a landmark paper in Geophysical Journal International on source physics and surface-wave energy scaling; and a classified paper in the Defense Research Review, of improved technical methods to locate and characterize nuclear explosions and to discriminate them from earthquakes and other detectable events. Staff also presented at the April 2016 Defense Nuclear Nonproliferation (DNN) R&D nuclear forensics program review.

Issues

None

Objective 2.3

Accomplishments

The Laboratory exceeded expectations in their efforts to manage and minimize the use and availability of nuclear materials in support of the DNN/ Material Management and Minimization's (MMM) mission objectives.

The Laboratory supported DNN's Gap Removal Office by providing support for fast critical experiments with our Japanese partners. These experiments negate the need for Japan's Fast Critical Assembly (FCA) facility to have to start up again with highly enriched Uranium (HEU) and plutonium fuels, and thus support the timely removal of all HEU and plutonium from the FCA. The Japanese partners routinely praise the Laboratory team and the joint research they are performing at the National Criticality Research Center (NCERC).

The Laboratory has continued to provide outstanding support to the NNSA Mo-99 Program. In particular, Laboratory staff's unique research into novel uranium detection techniques has provided important support to one of the Program's cooperative agreement (CA) partners and has included education and mentorship of student researchers into their effort. The electron accelerator effort has been conducted in outstanding coordination with another DOE National Laboratories while maintaining the highest standards of professionalism and scientific cooperation.

Issues

None

Objective 2.4

Accomplishments

The Laboratory exceeded expectations by providing leadership and technical expertise in the development of programs and strategies to prevent proliferation and reduce nuclear/radiological dangers throughout the world, as well as to help ensure that the use of nuclear material is peaceful.

This was demonstrated by Laboratory staff who served as subject matter experts for international engagements, supported high-level technical exchange, and provided noteworthy technical and project management support for engagements designed to build partner country capacity in the detection and prevention of illicit trafficking in export controlled commodities. The Laboratory was involved in activities with representatives from Indonesia, Malaysia, Turkey, Kenya, Morocco, Bulgaria, Armenia, the Republic of Korea, and Iraq, among others.

Specifically in Chile, the Laboratory provided technical support for two international export control-related events: 1) a University of Georgia (UGA)-led event consisting of briefings for government officials, and 2) an International Nonproliferation Export Control Program (INECP)-led Commodity Identification Training (CIT) Instructor Training and National Course Development workshop for export control enforcement agencies.

Additionally, the Laboratory demonstrated leadership by successfully hosting a multitude of events that brought in experts from throughout the world to discuss important proliferation issues. For example, in December, Operation Sputnik was conducted at the Laboratory in support of DNN's effort to provide deployable plutonium characterization, stabilization, and repackaging capability in a Mobile Plutonium Facility (MPF) to assist in a nuclear rollback scenario. Laboratory staff, along with staff from two other national laboratories, exercised deployment of the MPF on special nuclear material standards and sources, in preparation for a full deployment at a later date. The Laboratory continues to provide verification toolkit development and stewardship support.

The Laboratory hosted the Nuclear Suppliers Group (NSG) Information Sharing Systems (NISS) Users Meeting March 22-24, 2016. The purpose of the meeting was to share current NISS functionality, maintenance, and security best practices with NISS Users. Nine NSG participating governments were present, and their representatives provided useful feedback on the mobile app concept demonstration.

In May, the Laboratory hosted a Warhead Verification Workshop on behalf of the Office of Nuclear Verification facilitating access of participants from different laboratories and the UK, and providing overall direction to accomplish workshop objectives in the allotted time. In addition, Laboratory staff members participated directly in the workshop and provided outstanding technical contributions to help achieve workshop goals.

In August-September, staff members were key members of the U.S. delegation at CTBT Working Group B (WGB-47) in Vienna, Austria. Experts also attended and contributed to the discussion at the CTBT P5 experts meeting on the margins of WGB-47.

The Laboratory provided the project manager for the multi-Laboratory U.S.-UK Portal Monitor for the Authentication and Certification (PMAC) project. This is a complex multi-year project involving multiple

laboratories and sites as well as the UK, and the Laboratory project manager continues to do an outstanding job overseeing and directing activities to accomplish project objectives. The Laboratory has met the cost, schedule, and technical requirements for 16 technology development projects that aim to increase the efficiency and effectiveness of international safeguards.

The Laboratory also hosted a number of training sessions and workshops that provided participants opportunities to learn about nonproliferation fundamentals, programs, and techniques. Examples of this include the 59th and 60th Nondestructive Assay IAEA Inspector Training Courses held at the Laboratory's National Security and Nonproliferation Center and the Laboratory held the 138th, 139th, and 140th Nuclear Non-Proliferation Workshops. The Laboratory also successfully hosted a Counter-Proliferation Investigations Training (CPIT) in August for federal agents and prosecutors. Following the CPIT, LANL hosted twelve subject matter experts from DNN's International Nuclear Export Control Program (INECP) for tours and discussion.

In addition, the Laboratory provided outstanding support for multiple safeguards policy and human capital development projects ranging from work on Acquisition Pathway Analysis to building a pipeline of new technical international safeguards talent through internship and young professional opportunities.

Within DOE and the USG more broadly, the Laboratory has collaboratively and successfully worked on a number of initiatives. Notable examples of this include DOE nuclear software code reviews, the provision of outstanding input to proliferation-sensitive software studies and policy discussions on control and regulation of such software, and the significant contributions made to DNN's "End-to-End" Campaign to develop and test a systems approach to warhead monitoring, from initialization into a treaty regime through dismantlement of the warhead. The project team has done an outstanding job establishing and executing the analytical framework for their approach, and has received very positive feedback from multiple inter-Laboratory peers.

Issues

The Laboratory, along with Lawrence Livermore National Laboratory (LLNL) and the Oak Ridge National Laboratory (ORNL), continued to lead the transition of the Proliferation Information Network System to United States Export Systems (USXPORTS) in line with a U.S. Government directive to move all licensing agencies to a single licensing system. In concert with retiring PINS, the Laboratory was also to develop a searchable SRD level archive system that would allow access to the PINS data on an as needed basis. Development of the new system was delayed due to the need for various coordination activities that ultimately required attention from Headquarters to resolve. As a result, the successor system will not be available until December 2016, four months past the scheduled delivery date. Continued attention is required to ensure that this new date is met. Although the Laboratory has also offered creative solutions to sharing data and resources across DOE including a technical review wiki application, implementation and deployment of these solutions lag considerably and has not met expectations.

Objective 2.5

Accomplishments

The Laboratory continues to exceed expectations by demonstrating effective counterterrorism and counterproliferation technology and expertise, emergency management, incident response, and nuclear forensics mission support capability through active participation in local, national, and international exercises designed to validate the ability to protect proliferation-sensitive technologies. Staff members provided leadership in addressing technical meeting outcomes, participated in vital international meetings to advance global counterterrorism efforts, provided key leadership to ensure continued enhancements to NNSA emergency response capabilities, and demonstrated effective teamwork across the NNSA complex.

This effective teamwork across the NNSA complex is particularly notable in the cooperation with the Kansas City Plant (KCP), in the planning and production of the MC-15 multiplicity counter, a diagnostic tool for specific render safe missions. KCP and the Laboratory partnered in the development of pre-production units of this tool, and the Laboratory subsequently trained KCP personnel to produce a larger number of units at KCP for delivery to partnering organizations and agencies in future years.

The Laboratory additionally performed Materials Analysis, Pre-Detonation, and Post-Detonation tasks in accordance with written guidance as well as maintained operational readiness for the DOE Forensics Operations team (DFO) and the Disposition and Forensic Evidence Analysis Team (DFEAT). The Laboratory provided excellent planning and execution support to NA-83 Nuclear Forensics Post-Detonation exercise Prominent Hunt 16-1, Render Safe Response Watchbill and the TSSCI comms initiative.

A major technical success for the Laboratory is within the Prometheus program. Laboratory staff successfully delivered the first two satellite vehicles for the Prometheus Block 2 effort in July. These next-generation 1.5U cubesats were delivered to CalPoly San Luis Obispo in California, where they were integrated into their launch dispensers for an anticipated launch to Low Earth Orbit on September 15, 2016, out of Vandenburg Air Force Base. The delivery of the first two vehicles occurred on time despite serious mechanical issues encountered during environmental testing; these issues stemmed from the more difficult launch environment anticipated for the September launch, as compared to the typical launch environments (NASA GEVs standard). Those issues were rapidly diagnosed and addressed through a concerted effort by the entire technical team, resulting in successful delivery despite unanticipated design changes prior to delivery.

The Laboratory has had significant and productive interactions with the UK in FY 2016. A Laboratory staff member was present during ESPIAL-3, which was the tri-lateral exercise held in the UK that tested emergency -response-team capabilities to assess and render safe an improvised nuclear device (containing category-1 quantities of Special Nuclear Materials). After the exercise, the staff member briefed outcomes to White House staffers, among others. The Laboratory hosted US/UK “Second Levels” meeting in November to discuss status and goals for future collaborations, as well as participated in the US/UK Action Officer’s (AO) meeting and a “P3 Meeting” with France.

Issues

The Laboratory completed 91% of its deliverables for the Technology Integration Program during FY 2016; of these, 70% were completed on time. For the Radiological Assistance Program (RAP), LANL completed all deliverables, only 67% of them on time. Only three of six Lincoln Blue deliverables were completed by the end of the FY. While it is understood that SME resourcing at the Laboratory is an issue, this is an area that needs improvement.

Key Outcome 2.1

Accomplishments

The Laboratory exceeded expectations by demonstrating special initiative and flexibility with regard to the NNSA-Air Force schedule and performance requirements for delivering Space Nuclear Detonation Mission-related activities. All operational payload production milestones were achieved on time and in accordance with performance requirements

This was demonstrated through several activities that included the successful launch of the eleventh Global Positioning Satellite (GPS) Block IIF satellite into orbit from Cape Canaveral in October. This satellite carries the Laboratory BDV (electromagnetic pulse) and CXD (x-ray/particle) sensing systems that were delivered to the Air Force for integration with the satellite in 2012. Additionally, in November 2015, the Laboratory successfully completed early orbit-orbit testing of these systems on GPS IIF-11. In February 2016, the final GPS Block IIF space vehicle, GPS IIF-12, was launched aboard an Atlas V rocket. Following the launch, the Laboratory successfully executed and completed early on-orbit testing of the GBD payload, including the Laboratory BDV and CXD units. This deployment marked the successful completion of more than 17 years of design, development, and production of sensing payloads for the GPS Block IIF satellites. A spin-off of the technology refresh and innovation activities that are part of this work, the Laboratory has begun applying for a patent for a space-based processing development.

In support of these activities, Laboratory staff participated and hosted a number of different reviews including: the GBD-III-04 Consent to Ship review (CTS) in October 2015; the Preliminary Design Review (PDR) for the GBD-III-Prime Payload Processor (GPP) in November 2015 with Sandia National Laboratory; the Critical Design Review (CDR) for the SENSER experiment payload in January 2016; and the GBD-III Prime Payload System PDR in August 2016.

Issues

None

Key Outcome 2.2

Accomplishments

The Laboratory met expectations for supporting Material Disposition Programs during this rating period. The Laboratory made significant progress in the restart operations of the Advanced Recovery and Integrated Extraction System (ARIES) by receiving restart approval for milling, blending, and sampling operations and successfully completing two disassemblies. The Laboratory completed the evolutions on the robotic lathe to meet the requirements of the deliberate operations phase of restart ahead of schedule, being released to enter into normal operations during the first performance period of FY 2016.

These evolutions included both ARIES pit disassemblies and a disassembly in support of the surveillance program. Additionally, ARIES continues to provide staffing and resources that support surveillance activities in PF-4.

The Laboratory is providing very good support for NNSA's request for cost, schedule, scope, and risks data in support of the Pre-conceptual Analysis of the Downblend and Disposal option for surplus plutonium disposition. The Laboratory participated in joint efforts with Savannah River National Laboratory to study Technology Readiness of their operations that would directly support dilute and dispose process. The Laboratory supported the development of a cost analysis and approach for a second throughout case as well as supported numerous risk management workshops and meetings.

The Laboratory continues to execute the majority of projects on schedule and within priorities against the readiness restart schedule. The simple pit cutter glovebox design was completed ahead of schedule allowing for the early start of the procurement of the glovebox. The replacement Direct Metal Oxidation furnace limited volume circulating chilled water system was completed.

The Laboratory successfully completed five out of six Level 2 Milestones to include pit disassembly completion of the ARIES Oxide Production Program Risk Management Plan, completion of the ARIES Contractor Readiness Assessment, installation of the Limited Volume Circulating Chilled Water System, and completion of the pit cutter glovebox 60% fabrication design. The remaining Milestone, Anchoring of the Diebold Safes, will extend the project into early FY 2017.

The Laboratory supported program financial reviews and FY 2016 work planning during the reporting period.

Issues

The sixth Level 2 Milestone which is incomplete has been inundated with numerous issues causing schedule and cost overruns to the program. During the moving of the safe, it fell onto a glovebox causing a breach of a panel which resulted in the room being unavailable for an extended period of time. This activity affected the completion of the DMO Limited Volume Chilled Cooling Water System which was on track to be completed before this happened. The cost to repair the glovebox is estimated to be over $300,000.

Key Outcome 2.3

Accomplishments

The Laboratory met expectations in the implementation of fuel fabrication capability process optimization activities for the U.S. High Performance Research Reactor program (USHPRR) supporting reactor conversions. The Laboratory had success on some efforts and was challenged on others during FY 2016. Efforts to improve the Hot Isostatic Press (HIP) for the USHPRR program has been technically beneficial. Cost and schedule improvements are also occurring. There has also been progress with castings for the high carbon rolling studies to evaluate the effect of varying levels of carbon on the rolling process.

The Laboratory also completed a second quality assurance review of its use of nuclear quality assurance methodology in sample fabrication for Mini Plates (MP)-1, the major irradiation test for the National Conversion Program. The Laboratory is assisting BWX Technologies in developing a new in situ, non-destructive method that uses X-ray fluorescence to characterize the thickness of zirconium (Zr) coating on reactor fuel, an important contribution to the Material Control and Accountability of the new uranium fuel for the USHPRR.

A Laboratory researcher in the Sigma Division was announced as the recipient of the 2016 Reactor Conversion Program Achievement Award. The citation reads: "The success of the HIP can optimization project led the USHPRR program to down-select to the optimized HIP can prior to the fabrication of the MP-1 experiment, which cut the future fabrication requirements in half for the next six irradiation experiments. This translates into an estimated savings of $30 million for these experiments. Once the reactors are converted, your work is expected to result in a cost savings of $3.5 million/year in annual fuel fabrication costs for the baseline design."

The Laboratory provided superior technical support for the casting of Uranium Molybdenum low enriched uranium (LEU) material, provided support in the development of a plasma spray process for applying zirconium to LEU material, and prepared the plasma spray system for the application of zirconium to uranium molybdenum (U-Mo) fuel plates for the MP-1 experiment scheduled for the fall of 2017. The Laboratory also successfully produced additional Depleted Uranium master alloy. The completion of this activity allowed M3 to carry out additional LEU castings at Y-12 in August 2016.

Issues

None

Key Outcome 2.4

Accomplishments

The Laboratory exceeded expectations through the successful execution of the nuclear threat device "task list" and material work through stabilization drills and training as well as through data collection and analysis.

During FY 2016, Triage has processed 62 actual events (56 from the RAP) and 249 drills. The Nuclear Weapon Accident/ Incident Exercise (NUWAIX)-16, a major Accident Response Group drill, was successfully completed. Additional training events that staff participated in include: the Mercury Acid Training Event at Pantex Plant, a Directors' level Capability Exercise (CAPEX) held at Sandia National Laboratory, and other stabilization exercises. Laboratory staff additionally participated in a number of National Special Security Events: Super Bowl 50 in the San Francisco Bay Area, El Paso during the Papal Visit to Juarez Mexico, the Nuclear Security Summit in Washington, and the Republican and Democratic National Conventions.

The Laboratory participated heavily in the further refinement of the nuclear threat device (NTD) "task list" in exploring extensions of the task list to be driven by both technical challenges and operational or policy challenges. For example, the Laboratory hosted a tri-lab, multi-NNSA office "Spiral" meeting to explore in technical detail the weapons laboratories' capabilities and gaps in addressing a particular NTD

class, and participated in a Spiral discussion in late August at LLNL. Furthermore, the Laboratory presented technical details of how such gaps drive the Laboratory's research program (in the area of improvised devices) in materials work. The materials research shifted within NNSA during the first performance period, and the Laboratory worked with NNSA in a recasting of the materials (and high explosives) program into the formats and processes utilized by NNSA. The Laboratory has a key point of contact for the three year Venture Life Cycle Plan (LCP) for materials, and has the tri-lab Venture Manager for the high explosives R&D. Both LCPs were submitted on time. These LCPs accepted by NNSA NCTIR R&D in consideration for FY 2017 funding.

The Laboratory provided significant contributions to the drafting of the Dilute and Dispose and End States papers, efforts that provide critical input to multiple DOE programs. Staff sustained excellent leadership and cooperation with interagency partners (DOD, FBI) towards provision of a continually improved Block 8 training course with the latest offering in June 2016 and ensured a continually improved course offering, to include curricula improvements. The Block 8 training course currently serves as a model program for its excellent practices.

The Standoff Disablement program was in planning mode during 1QFY 2016, awaiting a final budget from US Congress. Despite the budget delays, the Laboratory provided effective and efficient execution of the activities, including continued timely delivery of critical assessments requested by DoD and several scenarios were refined as well as a roadmap for the program was completed. Once budgets were finalized and the programs were permitted to ramp up, a number of tri-lab program meetings were held. Most recently, the August meeting at LLNL synchronized NNSA expectations with the tri-lab plans for closing out FY 2016 and the FY 2017 integrated plans and multi-year roadmap.

The Laboratory participated in bilateral international meetings at LLNL in March, and then hosted a successful bilateral Nuclear Threat Reduction meeting focused on materials research in May. The Laboratory meeting compared the implementation of dynamic materials models (derived from data) in threat simulation and assessment codes. This followed a meeting regarding open source information with the UK and LLNL, and a nuclear threat reduction P-3 meeting in December at NNSA to discuss such issues common to the P-3 countries and explore solutions unique to each country or applicable to all.

The Laboratory effectively maintained equipment, personnel training and readiness, and supported short-notice optional tasking.

Issues

None

Goal 3: DOE and Strategic Partnership Project Mission Objective, *5% of fee allocated*

Successfully execute high-impact work for DOE and Strategic Partnership Project Mission Objectives safety and securely. Provide objective evidence that demonstrates the value of the work in addressing the strategic national security needs of the U.S. Government.

Under this goal, Los Alamos National Security, LLC. (LANS), earned a rating of Excellent, and 95% of the award fee allocated to this goal. LANS exceeded almost all of the Objectives and Key Outcomes under this Goal in the Performance Evaluation and Measurement Plan, and met the overall cost, schedule, and technical performance requirements of the contract under this Goal in the aggregate. The Laboratory has continued to be successful in its performance under the contract as described below.

Objective 3.1

Accomplishments

The Laboratory exceeded expectations in support of DOE/NNSA mission objectives in the area of Science and Energy. The Laboratory's new innovative diagnostic imaging systems at Germany's Wendelstein 7-X stellarator represents a key contribution towards clean and reliable fusion power production.
Laboratory scientists and collaborators achieved results in a study that have the potential to successfully address the nearly 30-year old technical problem associated with determining the suitability of the bedded, Permian-age salt in southeast New Mexico for storage of heat-generating nuclear waste (HGNW). This capability is significant to help address the bedded salt formations at WIPP. The Mini-CAPTAIN experiment has the potential to double the nation's energy productivity. Laboratory scientists demonstrated for the first time a new synthesis method to produce significant efficient detectors for optical wireless communication to increase telecommunication bandwidths. Additionally, the Laboratory has been researching different techniques for mechanical testing, one being the transmission electron microscopy (TEM) in situ straining technique. This research supports the April 6, 2010 Obama Administration mission to maintain the nuclear arsenal. The Laboratory and collaborators have also fabricated enriched uranium pellets for test irradiations of accident-tolerant nuclear fuels, an activity that has the potential to help produce safer fuel for power plants while improving nuclear reactor performance. The Laboratory is improving safety and reducing environmental and nonproliferation concerns by predicting nuclear fuel service cycles and by improving modeling, which provides confidence in the safety and reliability of nuclear power. The Laboratory has improved the electron transfer efficiency of biofuel cells, enhancing the viability of this alternative source of clean and efficient power.
The Laboratory showed in field observations for the first time that mixed emissions impact climate warming on a regional scale, underscoring the importance of including region specific and dynamic impacts in climate assessments. The Laboratory provided measuring, modeling, and predictive simulation capabilities to assist policy makers and defense and intelligence stakeholders in understanding the impact of climate change and the changing energy demand on national security.

Issues

None

Objective 3.2

Accomplishments

The Laboratory exceeded expectations in pursuing and performing high-impact Strategic Partnership Projects that integrate with the DOE/NNSA mission. Laboratory researchers have developed and demonstrated a lexicon that morphologically differentiates complex uranium materials derived from different processes, achieving a nuclear forensics capability that is of significant scientific value in addressing global security and nuclear deterrence missions. The Laboratory's Genome Science Program has continued its international leadership role by successfully leveraging its technical expertise to assist other nations in reducing health security risk from the spread of dangerous infectious diseases by advancing genomics and bioinformatics capabilities in partner countries to enable cooperative biothreat reduction and scientific engagement on a global scale. Advancing the basic science of interrogation methods, the Laboratory developed a filter Bragg grating interrogation system, which demonstrated increased interrogation speed for dynamic events under extreme conditions by several orders of magnitude. The Laboratory also developed a new and more thorough method for detecting underground nuclear explosions. By combining seismic and gas-flow models, this more sensitive detection method has the potential to significantly reduce the global nuclear security threats. The Laboratory also delivered scientific discoveries in support of national security, science, and energy. For example, Laboratory researchers delivered scientific discoveries that help understand HIV evolution and how to combat the virus, therefore, improving public health. Additionally, the Laboratory utilized genome sequence analysis capabilities to understand pathways for more efficient lipid production for biofuels and for the discovery of new antimicrobial compounds for increasing alternative fuel production and nutritive food sources.

Issues

None

Key Outcome 3.1

Accomplishments

The Laboratory exceeded expectations by providing support to ensure the success of DOE crosscutting efforts; providing leadership and collaboration that aligns with its core mission/ST&E capabilities. Laboratory staff contributed to Secretary of Energy's Grid Modernization Multi-Year Program Plan (MYPP), a blueprint for modernizing the nation's power grid, by participating in setting goal and strategic directions in System Operations, Power Flow, and Control; Design and Planning Tools; Sensing and Measurements; Security and Resilience; and Institutional Support. The Laboratory was awarded eleven projects to support research and development in advanced storage systems, clean energy integration, standards and test procedures, and other grid modernization areas. The Laboratory actively supported the delivery of major scientific tools through its involvement in the Exascale Computing Project (ECP) and through the deployment of high performance computing (HPC) platforms. The ECP will enable finer resolution and more comprehensive models; as well as expand data analysis to solve problems related to nuclear deterrence, stockpile stewardship, cancer treatments, advanced alternative vehicles, and other

national and global security mission areas. The Laboratory also led the Fuel Cell Performance and Durability Consortium, with progress toward overcoming cost and durability barriers in polymer electrolyte membrane (PEM) fuel cells; improvements that are needed to achieve widespread commercialization of this clean, resilient source of energy. The Laboratory involvement in the SubTER project is making progress toward a better understanding of the adaptive control of the Earth's subsurface in support of the future energy stability.

The Laboratory also provided S&T leadership through support of SubTER by leading two successful multi-lab projects that were selected for FY 2016 funding Development of Novel 3D Acoustic Borehole Integrity Monitoring System and Mapping Changes in Subsurface State of Stress. In addition, the Laboratory provided S&T support to four other multi-lab initiatives led by other National Laboratories. These activities leveraged core Laboratory S&T strengths (e.g., science of signatures) to address specific subsurface challenges identified in the multi-year work plan.

The Laboratory provided other relevant S&T leadership for DOE's subsurface initiative through its leadership and contributions to the National Risk Assessment Partnership (NRAP). NRAP is developing novel approaches to quantifying the long-term behavior of subsurface reservoirs (relative to risk). The Laboratory continued to provide technical contributions to this multi-lab effort by leveraging core capabilities in science of signatures and integrating information, science, and technology. The Laboratory continued to provide institutional leadership to the effort through its contributions to the NRAP Executive Committee; the Laboratory was also asked by DOE to serve as chair of the executive committee.

Issues

None

Goal 4: Science, Technology, and Engineering (ST&E), *10% of fee allocated*

Successfully advance national security missions and advance the frontiers of the ST&E in accordance with budget profile, scope, cost, and schedule and risk while achieving the expected level of quality, safety and security. Effectively manage Laboratory/Plant Directed Research and Development (L/PDRD) and Technology Transfer programs to advance the frontiers of ST&E.

Under this goal, Los Alamos National Security, LLC. (LANS), earned a rating of Excellent, and 95% of the award fee allocated to this goal. LANS exceeded almost all of the Objectives and Key Outcomes under this Goal in the Performance Evaluation and Measurement Plan, and met the overall cost, schedule, and technical performance requirements of the contract under this Goal in the aggregate. The Laboratory has continued to be successful in its performance under the contract as described below.

Objective 4.1

Accomplishments

The Laboratory exceeded expectations for this performance period. The Laboratory's Materials of the Future science pillar is refreshing the strategy in FY 2016, creating focus areas aligned with DOE/NNSA priorities and advanced Science Technology & Engineering. LANL achieved a 60% increase in postdoctoral conversions in 2016. This increase was balanced by an 87% increase in strategic, high-quality mid-career R&D science and engineering hiring, and continued improvements in mentoring quality and early career learning circles for postdoctoral associates and new staff. In addition, the Laboratory achieved a 14% increase in female postdoctoral associates in FY 2016 supporting increased diversity goals. The number of LANL articles in journals such as the Nature series, Science and Proceedings of the National Academy of Science of the U.S.A., has increased substantially to averaging 60 articles per year over the last three years compared to 40 in previous years. This increase reflects successful implementation of the laboratories research strategy and the high quality of ST&E and research staff. The Laboratory has increased its number of partnerships with universities by 35%, providing needed capabilities and recruits that feed the scientific and engineering pipelines enhancing the Laboratory's future ST&E success.

Issues

None

Objective 4.2

Accomplishments

The Laboratory exceeded expectations by executing a successful experiment at NIF that provided a significant contribution to the Inertiel Confinement Fusion (ICF) program, delivering exceptional experimental results supporting the path to ignition for fusion energy, a long-term energy source... High-impact, cutting-edge experiments of considerable significance to the US/UK nuclear weapons programs were successfully performed at LANSCE. The outcomes of these experiments greatly exceeded expectations, resulting in valuable, high fidelity data in support of Stockpile Stewardship.

Issues

None

Objective 4.3

Accomplishments

The Laboratory exceeded expectations for this performance period. The number of external awards increased by 32% in FY 2016 over FY 2015 (79 vs 60), with a large number of prestigious awards. A few notable awards are one Presidential Early Career Award for Scientists and Engineers (PECASE); one DOE Early Career Award; one scientist was bestowed the honorary title of knight in France's Academic Order of Palms; one NSSA Fellow (Neutron Scattering Society of America). Laboratory scientists and collaborators from UNM, ORNL, and Rutgers University demonstrated a new, simple, and novel water-removal drying technique that resulted in dramatically enhanced electro catalytic activity, leading the way towards higher performing, transformational next-generation nanomaterials for fuel cells and batteries. This LDRD-funded research provides the first comprehensive understanding of water's role within functionalized graphene oxide nanosheets. Work was performed at the Laboratory CINT and the ORNL CNMS, premier DOE Office of Science User Facilities. Work supports DOE's Science and Energy goal, through developing more efficient alternative energy resources. This work also supports DOE's and the Laboratory's Energy Security mission areas through providing sustainable and clean alternative energy sources and the Laboratory's Materials for the Future science capability pillar.

A transformative breakthrough by Laboratory researchers in controlling ion beams allows small-scale laser plasma accelerators to deliver unprecedented poser densities, offering benefits in a wide range of applications including nuclear fusion experiments, cancer treatments, study of warm dense matter, and a detection of smuggled nuclear materials.

Issues

None

Objective 4.4

Accomplishments

The Laboratory met expectations for this performance period. The Laboratory has shown progress in enriching and enhancing its engineering career pipeline through the development of its Undergraduate Female Engineering Career Pipeline Program. Its purpose is to resolve the problem of under-utilization of female engineers at mid-career levels by building a cohort of women who can grow into more advanced positions, enhancing the Laboratory's recruiting toolbox. During the summer of 2016, the Laboratory hosted its first cohort of six students in the program. The Laboratory has one of the most versatile neutron scattering spectrometers within the DOE complex, and upgrades to Asterix @ LANSCE allow researchers to characterize chemical and structural properties on surfaces and in experimental environments to control a wide variety of experimental conditions (e.g., oxidation, hydration, temperature, pressure), supporting stockpile stewardship, materials in extremes, and mesoscale.

Issues

None

Objective 4.5

Accomplishments

The Laboratory exceeded expectations for the performance period. Two industrial vendors, Scality and Seagate Technology, are advancing the Laboratory and NNSA's supercomputing strategies and initiatives through enabling storage, archiving, and management of high-impact solutions for the Trinity supercomputer's large-scale computing environment, supporting mission-critical calculations. The Scality RING is the IT industry's only web-scale storage that supports any file and object application, on any hardware, with zero downtime. RING gives Trinity the persistence and durability needed for simulation runs. Under a CRADA, Seagate and the Laboratory are developing dynamic power-managed disk and software solutions for deep data archiving, which represents one of the most challenging HPC storage problems. This collaboration will enable the exploration of data archiving methods at mission-critical levels, and provide solutions for other industries such a cloud storage. The work support NNSA's Nuclear Weapons Stockpile mission pillar and STE Crosscut, DOE's Science and Energy goal, the Laboratory's Nuclear Deterrence, Global and Energy Security missions. The Laboratory is supporting DOE's goal to accelerate the transformation to a clean energy economy through direct involvement in the Small Business Vouchers (SBV) pilot program in the Fuel Cell technical area. Work is funded by DOE's EERE.

In collaboration with DOE Office of Technical and Scientific Information, the Laboratory implemented and improved the policy for technical publications which supports the DOE Public Access Plan. Implementation began in June 2015 and is continuing as planned through FY 2016. The policy describes the Laboratory's Scientific and Technical Information Program (STIP). The STIP ensures that STI is appropriately identified, disseminated, preserved, and accessible to those in the scientific community, and the public within the boundaries of laws, regulations, executive orders, program needs, and institutional processes.

The Laboratory increased Invention Disclosures by 80% in FY 2016 over FY 2015 (128 vs 71) and was awarded 48 US Patents in FY 2016, an increase of 4% over patent awards in FY 2015.

Issues

None

Goal 5: Operations and Infrastructure, *35% of fee allocated*

Effectively and efficiently manage the safe and secure operations of the Laboratory while maintaining an NNSA enterprise-wide focus; demonstrating accountability for mission performance and management controls; assure mission commitments are met with high quality products and services; and maintain excellence as a 21st century government-owned, contractor-operated facility.

Under this goal, Los Alamos National Security, LLC. (LANS), earned a rating of Good, and 74% of the award fee allocated to this goal. LANS exceeded many of the Objectives and Key Outcomes, and is generally meeting the overall cost, schedule, and technical performance requirements of the contract under this Goal in the aggregate. The Laboratory has continued to be successful in its performance under the contract as described below.

Objective 5.1

Accomplishments

The Laboratory met expectations by providing effective, timely communication and high quality documentation for implementing/completing Corrective Action Plan elements relating to the Waste Isolation Pilot Plant (WIPP) Accident Investigation Board Phase 2 report. The Laboratory continued to work effectively with NNSA and New Mexico Environment Department (NMED) in on-going negotiations for a groundwater discharge permit for the Radioactive Liquid Waste Facility (DP-1132) and the Sanitary Wastewater System (DP-857). NMED issued a discharge permit for septic tanks in July 2016 (DP-1589). The Laboratory had no findings in audits or inspections for the Air Quality Title V permit, Above-Ground Storage Tanks, EMS/ISO14001, and the NNSS Low-Level Waste certification.

The Laboratory continues to deliver effective institutional level safety and health management, utilizing an effective methodology for tracking and communicating organizational safety and health performance and implemented continuous improvements based on effective metrics. As a result, the majority of safety and health programs managed by the Laboratory continued to perform well. The Laboratory has instituted a "Learning Team" concept that has been used very effectively; individuals involved are afforded the opportunity to learn from events, resulting in advancing additional rigor in assessing, communicating, and executing work. In addition, a mockup facility has been developed that enables work teams to identify potential human performance issues in a controlled environment that has aided in the identification of hazards and implementation of controls.

Significant improvements in the Nuclear Criticality Safety Program were realized this fiscal year. Staffing increases and qualification efforts have improved the division capability. However, the program remains insufficiently implemented to meet its safety function in many areas. Staffing resources available to support the program are about half that needed in terms of numbers and significantly under-resourced in terms of staff experience. Lack of experienced engineers to serve as mentors resulted in delays in qualification of new staff. Overall, criticality staff moral and capability has improved.

The Laboratory's ES&H policies and processes are satisfactory and are routinely updated based on experience and lessons learned. However, the desired compliance by workers at all levels remains elusive, as demonstrated by several higher-profile occurrences that were the result of less than adequate observance of the requirements. Appropriate managerial attention is given to incidents with the potential for serious consequences; however, trending of lower-level leading indicators is lacking. (e.g.: LOTO and work control violations).

The Laboratory completed the field work for the Radiation Protection (RP) Triennial Assessment. The assessment teams performed in-depth reviews with no systemic failures of the RP Program identified. The RP and Deployed Services Division has had challenges with maintaining adequate staffing levels at several facilities. The recent development of the Radiological Control Technician Academy is a positive action to help mitigate this challenge. Actions are being taken to address weaknesses self-identified during a routine internal assessment. The Laboratory is actively working to resolve deficiencies identified during the 2015 Beryllium Management Assessment. The Laboratory completed an annual Biosafety Emergency Response Drill; the drill was realistic, effective, and identified several short-comings in the program that are being addressed. Improvements are being made to the Medical Surveillance Program.

The Laboratory continued to maintain a fully compliant and effective Packaging and Transportation Program. The Laboratory continued the development of a safety analysis report for the new, unique 380-B Type B package for the Off-site Source Recovery Program, effectively closing formal comments from an NNSA review committee.

The Laboratory successfully renewed the Laboratory-wide Title V Major Source Air Permit, providing high quality technical support at the administrative hearing, where permit issuance was appealed.

With respect to Resource Conservation Recovery Act (RCRA) compliance, it is noted that the Laboratory efforts have resulted in sustained improvement during the period as compared to previous years. There has been a noteworthy positive trend in improved RCRA compliance during FY 2016.

In support of the Environmental Management (EM) activities, the Laboratory provided quality and timely response to National Pollution Discharge Elimination System spills and releases of hazardous materials from operations. A trend of spills and releases occurring from rental equipment being utilized in EM operations was identified. The Laboratory EPC Team is working with the EM contractors to perform corrective and preventative action.

The Laboratory re-evaluated the LANMAS/LAMCAS software non-safety categorization at NNSA's request and determined the software to be "safety software" thereby invoking the safety software quality requirements. Laboratory facility evaluations performed to date (SM-40, LANSCE, Science and Technology Operations (STO) TA-46, and Waste Facility Operations (WFO)) are good examples of comprehensive value added reviews with positive management engagement across both assessing and impacted organizations.

The Laboratory annual Integrated Safety Management (ISM) Declaration has been provided and the Laboratory's Safety Performance Objectives, Performance Measures, and Commitments have been approved by NNSA, as required by DEAR 970.5223-1, Integration of Environment, Safety, and Health into Work Planning and Execution.

Issues

The Laboratory did receive notice of violations for Resource Conservation Recovery Act (RCRA) compliance (FY 2015 and preliminary NOV for FY 2016) and continues to complete corrective actions in RCRA, National Pollutant Discharge Elimination System (NPDES) and Clean Water Act Section 401/404 activities. The Laboratory has faced interdisciplinary challenges for project/activity planning of waste pathway disposal and authorizations (e.g., Pit 38, Casas 2&3, and TA-55 Cheesecloth). While the Laboratory Environmental Permitting and Compliance (EPC) Team provides strong support to project teams when requested, the lack of integration results in urgent and near-misses for permitting compliance activities completed by projects, including demolition. Improvements are necessary to improve environmental permitting and compliance performance across the Laboratory.

The Laboratory review of waste disposal records for Pit-38 revealed that a mixed low-level waste (MLLW) drum was disposed of in Pit-38 in 2014 in violation of state regulations. Although the forensics work undertaken to discover this information was commendable, MLLW disposal an unpermitted manner is not acceptable. Additionally, the Laboratory has faced interdisciplinary challenges on demolition projects with respect to sampling plans and subsequent discovery in of accumulation of waste containers at one site over the past several years. Finally, the Laboratory received a Corrective Action Report (CAR) from NNSS for a shipment of debris waste whose container had sufficiently poor integrity and failed the NNSS Waste Acceptance Criteria (WAC). The Laboratory is in the process of developing a new procedure where containers of questionable integrity will be rejected prior to being brought to this site. Shipments to NNSS were allowed to continue.

The Laboratory continued to monitor polychlorinated biphenyl limits at Outfall-001 the Sanitary Effluent Reclamation Facility (SERF) due to previous exceedances of National Pollution Discharge Elimination System (NPDES) permitted limits. In August 2016, the Laboratory exceeded temperature at outfall 03A027 from TA-03 which is covered under a NPDES permit. NMED was notified and the Laboratory is working on a mitigation plan to address the permit exceedances. Mitigation for the exceeded PCB levels includes additional sampling, evaluating sampling protocols and investigating to find the source. Additionally, evaporation basins installed as part of the SERF process continue to exceed expected flowrates, and have suffered from repeated leaks. The Laboratory installed additional mechanical evaporators to increase the evaporation rates from the SERF evaporation basins. Mitigation for the pH exceedance is to evaluate operations to identify the source.

The Laboratory submitted the Hazardous Waste Facility Permit Instances of Noncompliance and Releases for FY 2015 to the NMED in January 2016. While there were no releases within or from a permitted unit, there were 417 instances of noncompliance; however those instances did not pose a threat to human health or the environment. The Laboratory developed a tactical approach to address these noncompliance's as well as a strategic approach to determine the underlying cause and address broader

issues with RCRA compliance. While a RCRA assessment team has been meeting weekly and is making progress towards identifying root causes of RCRA noncompliance's, the Laboratory continues to struggle with establishing efficient processes for corrective action implementation, tracking, and training. The Laboratory utilizes secondary tracking systems to manage RCRA issues identified during routine inspections, this precludes appropriate tracking/trending of performance concerns and does not adequately identify permit compliance issues for required corrections. RCRA issues need to be better defined to separate compliance requirements from FOD issues. At the close of FY 2016, the RCRA assessment and operational record evaluations had not been completed, which contributes to delayed corrective actions and precludes timely performance improvements. The Laboratory provided a response to the notice including information regarding the completed and scheduled corrective actions. At the close of FY 2016, no response had been received from NMED to finalize the 2015 NOV. When the January 22, 2016 Settlement Agreement was finalized, addressing RNS, the Laboratory communicated expediently and effectively with NNSA to complete the Ordered Action deliverables ahead of schedule. This required an immense amount of effort and communication to complete eight deliverables, some including multiple attachments and hundreds of pages, in order to meet the deadlines. Progress towards completing the corrective actions is reported to NMED monthly. All corrective actions are on-schedule to be completed by October 31, 2016. NMED conducted a 2016 RCRA compliance inspection in June 2016 and provided an out brief of the inspection results and preliminary findings in September 2016. Initial indications identified recurring issues for containment and labeling and failure to complete corrective actions at TA-54 (EM-operations). It is noted that these issues are recurring and on-going from previous FYs which could result in increased penalty rating.

The Laboratory EPC Team has improved deliverable planning and execution activities in FY 2016, resulting in delivery of less critical path items for Field Office action. The data available on the Laboratory Dashboard lags behind the PEMP submittal and does not include sufficient detail to assess institutional risk and liability for EPC performance. Comparison of RCRA performance within the Dashboard showed significant discrepancies for institutional issues and performance under Legacy Cleanup Bridge Contract. The Laboratory's efforts to address performance issues directly through Learning Teams is a step in the right direction; however, lessons from Learning Teams need to be communicated broadly or they serve only to educate the staff involved in the review.

Objective 5.2

Accomplishments

Considering the dollar value of the PEI and REI2 projects compared to the smaller infrastructure projects and the management effort at year end to maintain accountability the Laboratory meets expectations overall.

The Chemistry and Metallurgy Research Replacement (CMRR) Plutonium Equipment Installation (PEI) and Radiological Laboratory Utility Office Building (RLUOB) Equipment Installation 2 (REI2) projects are rated as Meets Expectations and the Laboratory's performance on these projects are detailed in Key Outcome 5.4 on this subject.

While the TA-55 Reinvestment Project (TRP) II Phase C had significant cost and schedule performance

issues, NNSA and Laboratory management reached mutual agreement allowing a path forward that creates the opportunity for the Laboratory to complete this project within the project's original Total Project Cost, supporting a critical NNSA mission need. The TRP II Phase C project was not on track to meet congressional commitments with regard to Total Project Cost and the CD-4 Date due to poor Laboratory performance and inability to perform cost and schedule control in response to NNSA requested recovery plans. Late in this trimester, the Laboratory initiated negotiations that between a federal reprogramming and a $10.6 million settlement to federally questioned costs that now puts the project on track to deliver the full project scope within DOE Root Cause Analysis project success metrics. The Laboratory has acted in good faith to ensure project success and programmatic needs are met, meeting expectations for the year.

Issues

The Laboratory did not meet expectations on two of six line-item capital asset projects, driven by poor performance in the two projects in particular, the RLWTF Low Level Waste [LLW] and the RLWTF Transuranic Liquid Waste [TLW], with the former currently in the construction phase (i.e. post CD-3) when most of the project costs are typically incurred. The latter TLW project is about six months behind schedule and the Laboratory repeatedly missed design milestones and the quality of the design effort and deliverables have been inadequate with incomplete or missing design elements. Moreover a third project, the TA-3 Substation recovered late in the Fiscal Year with the re-assignment of a new Laboratory project manager but only after the Federal Project Director (FPD) consistently raised project support issues not only to the Laboratory's management but also through the CPEP Interim Feedback Reporting process.
The RLWTF LLW project is above budget and behind schedule with the project's FPD estimating it will exceed its performance baseline by $900K. NNSA has repeatedly documented its concerns with the Laboratory performance and the Laboratory response and/or actions have consistently been inadequate and unsuccessful in improving its performance.

The RLWTF Transuranic Liquid Waste (TLW) project which is preparing for CD 2/3 and the Laboratory performance is also rated at below expectations repeatedly missing design milestones. In addition, the quality of the design effort and deliverables have been inadequate with incomplete or missing design elements. The Laboratory failed to hold the design agency to the Title II subcontract requirements. During the federal Technical Independent Project Review and as well as LANS parent company reviews, each review reported similar issues with design maturity being behind reasonable expectations and documented Engineering Standards Manual design deliverables. Each review also reported issues with the acquisition strategy and configuration management. While the Laboratory did fill lacking key management positions, as well as attempting to better define the project's Integrated Master Schedule, there is considerable concern regarding the readiness of the design and design team to meet the commitment date for CD-2/3 with the FPD's forecast as being over three to five months late.

Objective 5.3

Accomplishments

The Laboratory exceeded expectations for this performance rating period. The DOE Office of Enterprise Assessment (EA-22) conducted a comprehensive and independent safeguards and security assessment of the Los Alamos National Laboratory during February-March 2016. The overall objective was to measure the effectiveness of the site safeguards and security programs in protecting personnel, property, facilities, classified matter, and Special Nuclear Material. EA-22 found the protection posture at the site to contain several positive program measures supporting the overall protection of assets through performance tests of normal and emergency activities. A number of positive safeguards and security best practices in physical security systems, nuclear material control and accountability, unclassified foreign visits and assignments. The protective force program produced several noteworthy achievements. The assessment revealed a minimum amount of program deficiencies or non-compliant conditions. The 2016 Safeguards and Security Periodic Survey report resulted in an overall Satisfactory rating. Five findings were identified, overall site security programs have improved since the last survey with many positive aspects. This comprehensive assessment takes credit for and at times includes or summarizes portions of the thorough assessment completed by the Office of Enterprise Assessment (EA), in March 2016.

During 2016 the Laboratory Nuclear Materials Control and Accountability Group effectively reconciled all bi-monthly physical inventories that have remained "open" from June 2013 through August 2015 due to the TA-55 pause in operations.

The Laboratory hosted a Threat and Security Simulation Information Exchange with their United Kingdom Ministry of Defense counterparts. This effort significantly contributed to the NNSA-United Kingdom nuclear defense exchange agreement.

The Legacy Field Panel Replacement Project, Package 2/3, is on schedule and continues within budget, and the TA-72 Firearms Cleaning Facility project has been completed within scope, cost and delivery.

The Laboratory leads the enterprise in deployment of Unmanned Aerial Surveillance (UAS) technology to aide in rapid assistance to observe and report activities over difficult accessible terrain. This enhancement provides live feed and enhanced tactical assessment. This is a benchmark for future deployment considerations at other sites in the enterprise and the Laboratory is partnering with Defense Nuclear Security to develop policies and procedures in use of UAS for site operations.

Incidents of Security Concern program continued to report and categorize incidents to include specific concerns involving foreign national employees. Timely reporting and resolution are cornerstones in program execution. Trends for the year for Category A/B remain flat with the exception of May 2016. More emphasis should be placed on improving incidents involving classified email spillages and escort roles and responsibilities.

Due to international threat incidents, the Laboratory has managed to provide enhanced security measures increasing random search and detection applications with explosive K-9 and physical security

patrols. The results provide increased security present in deterrence and the detection of an unauthorized UAS within the site boundary.

Significant progress has been made in the Sensitive and Special Operations program to address and close security deficiencies from FY 2014 and FY 2015. EA-22 conducted a program assessment that reported no Findings and noted marked improvement in areas previously considered deficient.

The Laboratory 2016 Site Certification required by the National Defense Authorization Act validated the site Category I Special Nuclear Material (SNM) facility is secure. The certification was based upon a detailed and comprehensive assessment of the major elements of Laboratory's SNM protection program.

The Laboratory Counterintelligence Office provides excellent support for cyber counterintelligence, foreign travel, foreign visits and assignments (FV&A), CI information reporting, and insider threat. The CI office sponsors an effective Local Insider Threat Working Group in 2016 that has enhanced, developed, and implemented capabilities to deter, detect, and mitigate insider threats. The Group has the appropriate stakeholders engaged and meets on a frequent basis. The CI Office also actively participates in the Safeguards and Security Counter Threat Working Group. The staff actively promotes CI awareness across the Laboratory including specific support for cyber security and information technology programs. The FV&A works closely with the Laboratory S&S staff in personnel security matters by managing the largest foreign national resident population and visitors in the Enterprise. The CI Office works very closely and effectively with the FBI and other US Intelligence Community partners to leverage their resources and enhance our ability to mitigate foreign intelligence and terrorism threats to the Laboratory and US Government equities. The CI office provides situational awareness to the Field Office Leadership team on sensitive matters of program importance.

Issues

In May, during a radiological survey at TA-18 a quantity of Category IV Special Nuclear Material was discovered in an abandoned 55 gallon drum. The bag containing the material was property marked and indicated a measurement dating back from nine years prior to the discovery. The inquiry revealed that the material was reported as part of a program deinventory in 2007 to the Nuclear Materials Control and Accountability team but was never properly brought into accountability and resulted in the Laboratory neglecting to provide the appropriate security protection assigned to a Material Balance Account. The incident also resulted in safety reporting as a loss of control of radioactive materials.

The Laboratory was not consistent in providing the Field Office with timely notifications on security events resulting in the Field Office failure to keep Senior NNSA Leadership abreast of security events. There was a single point failure in Central Alarm Station oversight at TA-55 resulting in perimeter sector not being returned to "secure mode" following alarm maintenance and performance testing. Process and procedure improvements were made to eliminate the possibility of recurrence.

Objective 5.4

Accomplishments

The Laboratory met expectations for Operations and Infrastructure during this performance period. The Balance of Plant Maintenance Program has made positive strides in the areas of Preventative Maintenance (PM), Deferred Maintenance (DM) and Safety. Additionally, the Laboratory continues to make progress in support of PF-4 Seismic/Structural Upgrades. The most significant progress has been made in the wrapping of interior roof girders and has developed and implemented innovative methods to conduct the work safely with minimal mission impact.

The Laboratory led, hosted, and organized the FY 2016 Maintenance Managers Working Group, which successfully hosted all NNSA and Senior DOE Office of Science sites to discuss key maintenance issues from across the complex. The leadership exhibited by the Laboratory resulted in a significant improvement in the quality of the content of the FY 2016 workshop, identification of best practices, and improved complex-wide collaboration.

Laboratory crafts continue to implement and upgrade the Maintenance Work Package & Control process by converting from a paper work package to a system that uses electronic tablets to process work packages. Continued implementation of Mobile Work Packages (MWP) has proven beneficial to the overall execution of maintenance work packages as was identified as a best-in-class approach in the NNSA Complex-Wide Maintenance Manager's Working Group.

The Laboratory supported various Recapitalization projects over the course of this year and was proactive and positive in reporting ongoing activities with the exception of the delayed notification of the $8,800K overrun on Dynamic Equation of State Facility. The Laboratory has made significant progress in reporting Recapitalization project status and structuring portfolios of work, however, the Laboratory continues to have difficulty communicating project details beyond the G2 reporting metrics.

The Laboratory has continued to reduce the site footprint through shutdown, decontamination and demolition (D&D) of unneeded assets. Due to issues in receiving the Isotopes of Carbon, Oxygen and Nitrogen (ICON) Facility from the current lessee and delays of Fenton Hill (TA-57) D&D execution into early FY 2017, the Laboratory decreased original FY 2016 SQFT D&D goal by 10,000 SQFT and decreased the SQFT Shutdown goal by 5,000 SQFT. $5.13 million indirect dollars was allocated to both facility shutdown and D&D. Over the course of this year, the Laboratory has demolished 30,307 SQFT and exceeded the revised goal of 30,000 SQFT. The Laboratory also shut down 16,702 SQFT and exceeded the revised goal of 15,000 SQFT. Issues stemming from waste characterization and removal impacted the execution of Casa-2 and Casa-3 D&D. Although the technical solutions ultimately resulted in additional project cost, the Laboratory was able to coordinate demolition of the two Casa structures in a timely manner.

The Laboratory submitted the FY 2016 Site Sustainability Plan (SSP) on time. The Laboratory continues to make efforts to meet the DOE Sustainability goals by investing in projects that have a high return on investment.

Additionally, the Laboratory supported the Roof Asset Management Program for roofs (RAMP) and Cooling and Heating Asset Management Program (CHAMP). With several RAMP activities occurring at the Laboratory, the site has been proactive and effective in overseeing work and ensuring safety and security are enforced. Additional roofing projects outside of RAMP have shown positive results for additional funding sources. The Laboratory has made great strides in integrating sustainability into its CHAMP work, demonstrating a best practice in intra-site communications and coordination to ensure HVAC projects are sustainable and effective. Design is currently complete for the pilot with execution planned for early 2017.

Over the course of FY 2016, the Laboratory greatly reduced its backlog of condition assessments for Other Structures and Facilities (OSFs) in the Facility and Infrastructure Management System (FIMS) by improving coordination between the relevant organizations and has successfully planned to conduct follow-on assessments for existing entries within the requisite five-year intervals. Additionally, the Laboratory has made efforts to bring FIMS into compliance with the latest guidance by submitting Request for Disposition Packages (RFDs) or De-Excess Forms for 65 of the noncompliant assets excluding only three that are planned for near term D&D.

Issues

Safety incident rates for both construction and general craft rose steadily and are now the highest they have been in over a year, however this increase correlates to increased capital construction and craft labor activities across the Laboratory. Despite this increase, overall Laboratory TRC and DART rates remain well below comparable industry standards.

The facility service request system was insufficiently utilized to track and prioritize work at all levels and was not consistently implemented.

The Corrective Maintenance (CM) backlog grew steadily over the past year and continues this trend. TA-55 was unable to continue in Mode 1 operations, or entered LCOs, multiple times due to ML-1 & 2 equipment failures indicating inadequate maintenance/trending on safety class and safety significant systems. Shortages of qualified Cognizant System Engineers contributed to ML-1 & 2 system downtime, insufficient post maintenance testing, poor extent of condition on equipment failures, and PMs being recycled as troubleshooting work orders.

Maintenance procedures exist for the facilities but do not apply to programmatic organizations and neither institutional nor programmatic elements performed reviews or prioritization of the backlog and work requests.

Objective 5.5

Accomplishments

The Laboratory exceeded expectations in Business Operations and Financial Management. The Laboratory provided enterprise-wide leadership in developing and executing an approach to support the

NNSA Congressional Efficiencies Documentation Process, producing a credible list of innovative, material FY 2015 efficiencies achieved. The Laboratory delivered efficient, effective, and responsible financial management services and had specific milestone successes in core financial indicators including success in addressing Departmental Financial Statement Audit issues, in achieving rapid approval of its FY 2015 Statement of Costs Incurred, and in receiving very favorable performance reviews by NNSA's financial evaluation team. The Laboratory achieved new material savings, including savings on medical expenses. The Laboratory earned praise from several NNSA programs for valuable financial input supporting budget information needs and other financial data calls.

The Laboratory continued to lead on achieving savings through Strategic Sourcing, exceeding their savings target by over 300%, for savings of $64.2M; accounting for approximately one-third of all NNSA savings achieved through this program. The Laboratory also contributed to further improvements in the effectiveness of the Supply Chain Management Center program; including participation in improved outreach to New Mexico vendors through an Industry Day event collaboratively sponsored with the New Mexico Congressional Delegation. The Laboratory performed well in segregating duties formerly executed under this contract to a new procurement vehicle with DOE's Office of Environmental Management. The Laboratory also successfully collaborated with NNSA to extend the term of the prime contract for the convenience of the government; and several issues of questioned contract costs were bilaterally settled during the performance period.

In personal property stewardship, the Laboratory implemented measures to achieve increased accountability at lower cost. Two such measures were the installation of GPS devices to track government vehicles, and a novel electronic validation-by-wire system for certifying the existence of unclassified IT equipment which replaced costly and labor-intensive visual validation.

In Human Resources, the Laboratory launched a longer-term staffing strategy and approach, as well as tactical efforts to recruit key technical specialties, reflecting a positive move forward on effective planning and risk management. The Laboratory was recognized in several national rankings and reviews as a STEM employer of choice, which specific recognition for Native and Latina communities. Another positive step, the Laboratory partnered with the Wounded Warriors organization, and has increased target veteran hiring as a result. The Laboratory was successful in filling Key Personnel positions.

The Laboratory Internal Audit program identified dozens of issues for correction, including many that were classified as "high risk"; with this program of rigorous self-identification driving resources to the improvement of internal controls across many institutional programs. In Financial Management, the Laboratory achieved efficiency savings that resulted in overhead rate reductions of approximately 2%, which help improve customer value and improve strategic competitiveness in the market. To build on those value proposition improvement, the Laboratory initiated a constructive, pro-active approach to growing revenue (up ~$300M this year) which can further help absorb fixed overhead costs.

The Laboratory Procurement System and associated monetary consent thresholds were recertified in FY 2016. Several Laboratory staff elements, including the Chief Counsel, the Ethics an Audit Division, and the Procurement Division are engaged in structured evaluations and remediative efforts to further build reliability in the Procurement System, with particular areas of focus including the effectiveness of pre-

award activities (LANL-EA Audit IA-15-03) and the integration of functions across organizational boundaries, particularly for capital projects and large service contracts.

While the status of CAS remains below expectations, the Laboratory has taken affirmative action to begin addressing this issue with a renewed vigor by developing a formal plan for improving CAS. That plan was subjected to a rigorous review by the LANS, LLC Board of Governors, resulting in many improvements. Efforts included a renewed focus on meaningful and disciplined metrics, a new Facility Evaluation program, a renewed Risk Working Group and a new focus on Causal Analysis. Improvement has already been noted in several higher risk areas, including Laboratory NHHO Event Notification and in an aggressive questioning attitude found in the new Facility Evaluation process. Some organizational components within the Laboratory (e.g., ES&H, Criticality Safety) have embraced structured approaches to performance improvement, including the new Facility Evaluation process, and those inroads represent benchmarking opportunities for further improvement.

Issues

While the Laboratory has developed a detail Performance Assurance Implementation Plan, it did not fully field an effective Contractor Assurance System (CAS) that is embraced and utilized institution-wide to foster an agile "learning organization" and which can identify risks and opportunities and that can respond effectively and comprehensively. Numerous internal and external reviews have pointed to key longstanding shortcomings in the CAS, including both the qualities of the system and the consistency with which it is applied.

While the Laboratory managed many operational aspects of the protective force subcontract transition well; a formal challenge to the procurement identified errors that while not fatal to the selection, resulted in delays and costs.

Objective 5.6

Accomplishments

The Laboratory met expectations for this performance rating period. Legal Counsel (LC) provided exceptional legal support and advice on matters related to the 2014 Waste Isolation Pilot Plant (WIPP) incident, including participation in finalizing and executing a settlement agreement/stipulated final order resolving Administrative Order 14-20, and providing effective legal support to timely meet the requirements of the agreement. LC continued to engage in effective communication with NNSA, promptly responding to NNSA needs and requests. LC took the initiative to request NNSA approval to hire a consultant firm to conduct a bias survey of surrounding counties, which could, if bias is demonstrated, be used to support change of venue motions. The Laboratory took the initiative to set up a database accessible to the NA-LA Counsel's Office, allowing the review of bills and litigations costs on an ongoing basis.

Issues

None

Objective 5.7

Accomplishments

For the year, the Laboratory met expectations in cyber security toward addressing the 27 of 27 Implementation Factors (IF) within the Program Execution Guidance (PEG). The primary areas of focus within the cyber security program were Programmatic Baseline Performance Objectives which included NNSA enterprise collaborative efforts to identify viable solutions addressing program activities such as Continuous Diagnostics Monitoring (CDM), Ongoing Authorization for Information systems, cyber data fusion, and PEG implementation factors.

An independent cyber security inspection was completed this Fiscal Year by the Office of the Associate Administrator for Information Management and Chief Information Officer (NA-IM) Inspection Team. The inspection focused on programmatic and technical aspects of the unclassified cyber security program and the progress in implementing the unclassified cybersecurity program in accordance with national and departmental policies. The Inspection Team credited the Laboratory for improvements made across the management, operational, and technical security controls of the unclassified program. The results of the Inspection Team reported evidence demonstrating continuous progress in executing corrective actions through their formal program management process for password management, risk management framework tolerances and processes, and implementation of vulnerability management.

The Laboratory met expectations for Information Technology (IT) toward addressing the 18 of 18 Implementation Factors (IF) within the Program Execution Guidance (PEG). The Laboratory met all critical and high cyber/IT IFs.

The Laboratory submitted the One NNSA Interconnection Plan and deployment of HSPD-12 logical access in which 10,000 card readers have been deployed. Windows work stations have been configured to allow PIV authentication. Current PIV deployment is 16% for standard users. The Department has slipped the overall execution for unprivileged users to February 2017. As a result, enforcement of multifactor authentication cannot be fully achieved by configuring systems to require PIV. The Laboratory has enforced MFA through the elimination of domain passwords for systems and application.

The Laboratory deployed over 4,000 secure thin client systems using a standard baseline and configuration management practices which accounts for 90% of the total Mac population on the Yellow network. The Laboratory reduced the number of non-compliant privileged accounts by about 65%; 13,662 non-compliant account reduction over the past 12 months which reduces the insider threat.

The Laboratory identified quantitative key performance indicators (KPI) providing operational and management dashboard views related to vulnerability/patch management and cyber security incident management. These KPI's allow the Laboratory to make data driven cyber security risk decisions and gauge operational performance areas for improvement.

Roadmaps and a corrective action plan were developed to address and mitigate vulnerabilities identified following a significant prior year incident. Blocking of critical and high web application vulnerabilities on publically accessible network was implemented to prevent similar incidents.
The Laboratory conducted Red Team penetrations of unclassified and classified information systems. The benefits of conducting Red Team activities significantly reduced the vulnerabilities the Laboratory's infrastructure.

The submission and approval of the Laboratory's Implementation Plan to transition to National Institute Standards and Technology 800-53 Rev 4 and CNSS Instruction 1253 Version 3 is the first step towards enhancing protection of information systems and federal data.

In an effort to streamline OMB reporting, the Laboratory volunteered to coordinate with DOE/NNSA in developing a Capital Planning and Investment Control (CPIC) report to OMB which details the Laboratory's combined IT investment of institutional expenditures into a single consolidated CPIC Exhibit 300/Major investment of $211 million annually.

Issues

The delayed submission of formal certification determination(s) and supplementing risk assessments and testing results for local services being elevated for iJC3 use to the DOECISO and NNSA Enterprise AO is concerning to NNSA. Formal documentation of local assessments must be assessed in the event the collaboration of the iJC3 is compromised.

Key Outcome 5.1

Accomplishments

The Laboratory exceeded expectations for this performance rating period. Preparations for and conduct of Readiness activities at Plutonium Facility-4 and Weapons Engineering Tritium Facility (WETF) exceeded expectations. Positive comments have been received from multiple Federal Readiness Assessment teams, noting improvements observed in Conduct of Operations and in the ability of the Laboratory to adequately prepare for a facility restart. PF-4 resumption efforts were completed with authorization to restart Pit Flowsheet, Furnace, Casting, ARIE's Operations, and Pyrochemistry (was resumed approximately three months after the baseline schedule date).
The Startup Authorization Authority approved restart of WETF Tritium Gas Transfer Operations in December 2015 and since then WETF has begun a deliberate and safe resumption of operations in accordance with the approved Startup Plan. Resumption of operations has culminated in the first successful Function Test since 2010. Approval of restarts for TA-55 and WETF were based on effective corrective action plans and closure of all prestart findings. WETF readiness activities were essentially accomplished as planned. PF-4 successfully completed all scheduled reviews this year, but has yet to resume all operations/activities authorized. PF-4 also continues to deal with formality of operations shortcomings that impact what should be routine operations.

The Laboratory completed a TA-55 Causal Analysis and Corrective Action Independent Effectiveness Assessment reviewing the effectiveness of readiness activities action development and closure. Adoption of report recommendations could result in fewer repeat issues and could contribute to sustained, successful operations.
The Laboratory effectively supported NNSA targeted oversight of the preparations to restart these operations. The MSA's scope were for the most part appropriate, however, in one case, two safety management programs (SMPs) for criticality safety evaluations and programmatic equipment maintenance were not fully assessed due to lack of full implementation for the operation when the MSA was conducted.

Issues

The Laboratory struggled with execution of criticality safety evaluations to ensure quality evaluations were available to support the scheduled milestones for the readiness process. Readiness assessment preparation activities for Nuclear Criticality Safety were impacted due to several criticality safety evaluations requiring significant rework before the readiness process could be executed. Lack of attention to inclusion of criticality safety controls into programmatic procedures also impacted the readiness process, with criticality safety issues being identified as prestart findings in all of the federal readiness assessments.

Key Outcome 5.2

Accomplishments

Improvements have been made in in the quality of safety basis documentation; there is a decrease in the percentage rate of documents not approved. Based on Unreviewed Safety Question (USQ) assessments performed by NNSA and the Laboratory, the USQ program is reflecting a positive performance trend.

Progress has been made in implementing the Safety Basis Improvement program and additional funding has been obtained to hire additional safety basis staff. The cadre of safety basis (managers, specialists, support,) has increased and there is a positive change being made to ensure priorities are supported. Conduct, formality, and documentation of comment resolution meetings between NNSA and the Laboratory are improving. Sufficient attention to ensure safe storage and eventual processing of Remediated Nitrate Salts (RNS) was hampered due to new information concerning Airborne Release Fractions/Respirable Fractions (ARF/RF) values from a pressurized Waste Isolation Pilot Plant-like event; however, due to (1) the installation of the Pressure Relief Device with Supplemental Filtration on the RNS drums, (2) screening of the aircraft crash based on analysis performed in accordance with DOE-STD-3014, and (3) completion of the peer review of the Wildland fire analysis indicating that there is no concern with the potential thermal flux generated during such an event; the ARF/RF values are no longer a significant concern. Approval of the Safety Evaluation Report for treatment of the RNS containers was accomplished due to a commitment from the Laboratory to support a process for sequestering the Laboratory analysts and NNSA reviewers and performing a Senior Review Board.
Improvements/reductions were seen in the number of fire protection impairments and the number of spurious fire alarms resulting in a fire department response. Replacements of legacy fire alarm systems

with new fire alarm systems contributes to the modernization effort, and could potentially have a positive effect on the numbers of impairments and spurious alarms. Additional modernization efforts continue as evidenced by the completion of TA-59-14 water storage tank refurbishment. Closure of the Fire Protection Program backlog of corrective actions continues, though the rate of closure appears to be hampered by the staff attrition rate and recent hires not yet fully familiar with Laboratory operations.

The current trend of self-discovery and transparency on weaknesses during Laboratory self-assessments and Facility Evaluations is positive and demonstrates a maturation of Contractor Assurance in this area. The Laboratory NHHO Event Notification system continues to be used as an effective tool in rapidly and transparently disseminating pertinent operational issues. Further trending of this information could be valuable in improving Nuclear and High Hazard Operations.
Support for off-site receipt of Americium-241 and rapid development of safety basis documents and facility readiness exceeded expectations, including engagement by Laboratory senior management. The material was successfully received on February 21, 2016 and acknowledged by both the Governor and the New Mexico Environmental Department. The Laboratory Accelerator facilities (Dual-Axis Radiographic Hydrodynamic Test/Los Alamos Neutron Science Center) continue to operate safely while maximizing facility availability.

The Laboratory effectively managed the Arc Flash accident corrective actions with closure of all actions before the end of the fiscal year. Although the vast majority of work activities are successful, events continue, demonstrating weakness in effective activity level work planning and control. Contributing to this concern are imbedded institutional program weaknesses such as nuclear facility boundaries not well defined (e.g., Radioactive Liquid Waste Treatment Facility) and personnel not trained sufficiently to determine which work is required to be approved and authorized through the nuclear work control processes. However, the Laboratory electrical training has been completely re-written, given several times by the Chief Electrical Safety Officer; Work Planners have received the same training as electrical workers; subcontractors have been trained as well. Electrical Safety Officers recently received their annual training. Additionally, the Laboratory held a mandatory event to address electrical issues at LANSCE; event was effective and exhibited a positive display of management commitment to improving safety culture through personal engagement with the work force. The Laboratory Chief Electrical Safety Officer was instrumental in the identification and implementation of corrective actions to address overall electrical safety performance.

Issues

Criticality Safety program improvement is moving at slow pace, but is gaining traction. Overall, criticality staff moral appears to be improving. Criticality Safety Evaluation quality remains below expectations and significant rework has been needed to address comments developed during federal oversight. The staff was focused on plutonium facility operations at the expense of other facility needs and program improvement activities. While program improvements are evident: evaluation quality is improving, staff are being trained and qualified, and facility implementation at the plutonium facility is improving; the improvements are not universal and the rate of improvement is below expectations. Insufficient attention has also been provided to Nature of Process Facilities causing issues in program implementation. The program improvement plan was delayed from the initial expected date, but was approved on May 6,

2016. The integrated and supported plan is expected to improve the probability of successful revitalization of the program. Now that all restart activities have been completed, criticality safety resources can focus on longer term program improvement.
Management of the Laboratory New Information Process/Potential Inadequacies of the Safety Analysis (PISA) Process, and Evaluation of the Safety of the Situation (ESS)/Justification for Continued Operation (JCO) has reflected improvement. Timeliness in the declarations and completion of New Information/PISAs improved. Although there have been some unforeseen circumstances, the number of ESS/JCOs that exceed the one year expectation was not acceptable. Additionally, requests to extend ESS's are not being managed effectively including timely notification and submittal of extension requests. Often the requests are made just prior to expiration. Management of the number of open PISA/ESS needs additional emphasis by Laboratory management as the number and timely closure is below expectations. Radioassay and Nondestructive Testing Facility remains in cold-standby awaiting facility seismic upgrades. Area-G unresolved PISAs include Composite Source Term, Assay Bias, Pipe Overpack Containers (POC), High Energy Neutron Counter (HENC), and Flanged Tritium Waste Containers (FTWCs). It is noted, however, that identification of POC damage ratio concerns by the Laboratory identified a complex wide weakness. The Laboratory was slow to investigate potential issues with the PF-4 Fire Suppression System that were previously raised by the Defense Nuclear Facilities Safety Board (DNFSB) staff. A PISA was declared and the Laboratory is evaluating the scope of the concern. Repairs could be costly and outages to affect them could have mission impact.

Overall facility preparedness to conduct Fact-Findings needs improvements; such as discipline in including key documents such as: Documented Safety Analysis/Technical Safety Requirements; copy of log entries; procedures in use; governing documents; etc. There are many examples of Occurrence Reporting and Processing System (ORPS) reports that remain open well beyond expected closure timeframes. Contrary to the requirements of DOE Order 422.1, there is not a current approved Conduct of Operations Applicability Matrix in place. The Laboratory has instituted a "Learning Team" concept that has been used very effectively allowing individuals involved the opportunity to learn from events, resulting in advancing additional rigor in assessing, communicating, and executing work.

Significant improvements in Conduct of Operations were achieved in areas receiving significant managerial attention, such as the WETF and the PF-4 restart efforts. However, similar progress is not materializing across the institution as demonstrated by continuing issues with corrective action and conduct of operations implementation. Work Planning and Control continues to demonstrate weaknesses in the areas of hazard identification, control development and execution per the plan.

In the ARIES Plutonium Oxide production program, the sixth Level 2 Milestone which is incomplete has been inundated with numerous issues causing schedule and cost overruns to the program. During the moving of the safe, it fell onto a glovebox causing a breach of a panel which resulted in the room being unavailable for an extended period of time. This activity affected the completion of the DMO Limited Volume Chilled Cooling Water System which was on track to be completed before this happened. The cost to repair the glovebox is estimated to be over $300,000.

Key Outcome 5.3

Accomplishments

The Laboratory met EVMS compliance expectations this performance rating period. The Laboratory achieved EVMS recertification.

Issues

None

Key Outcome 5.4

Accomplishments

The Laboratory met expectations for this performance period. The Radiological Laboratory Equipment Installation Phase 2 (REI-2) and PF-4 Equipment Installation (PEI-1) subprojects continued to execute work authorized prior to reaching Critical Decision (CD)-2/3 and authorized by the CD-3A/3B. For REI-2, the first article Glove-Box bake out milestone for the multiple glovebox vendors was delayed between two to four months and was mainly attributed to GB vendor clarifications and specification requirements taking longer to resolve than planned. This did not impact award milestone of the initial GB trains and delivery schedules from vendors remained stable per the vendor contracts; however risk remains on timely delivery of the glovebox trains and will required continued and enhanced the Laboratory oversight and management of the glovebox vendors. After receipt of CD-3B on REI-2, the procurement of bulk materials to support utility installations was not optimal to keep craft supporting this effort working effectively and caused the need of work arounds as stop gap measures by the Laboratory. The craft access contract was placed on schedule and work is proceeding safely, on plan, and on budget for this early site preparation activity. PEI-1 design work and estimates were completed on plan and on budget to inform the development of the CD-2/3 submittal. CD-3B long lead procurements were managed under budget and on plan. The X-Ray Diffraction (XRD) installation authorized with CD-3B for PEI-1 was started ahead of plan and is on budget. During the first performance period, NNSA noted that a high quality the Laboratory CD-2/3 package to minimize the schedule to achieve CD-2/3 for both subprojects was required.

Issues

The Laboratory submitted the REI2 and PEI CD-2/3 package per plan in March 2016; however quality issues with the schedule and other ancillary documents required resubmittal to address the Major Findings identified during the DOE Project Management (PM)-30 External Independent Reviews (EIR) review. Additionally, the use of critical EVMS Implementation Handbook principles were not fully utilized in the package submission and required later re-work to fully correct. Aggressive Laboratory management attention has been performed to resolve EIR/ICE final recommendations/corrective actions.

Key Outcome 5.5

Accomplishments

The Laboratory met expectations for this performance rating period. The Laboratory implemented the Corrective Action Plan (CAP) for the Waste Isolation Pilot Plant (WIPP) contamination events and provided NNSA with periodic updates. Of particular note, the Laboratory developed a successful treatment strategy for remediated and unremediated nitrate salts (RNS/UNS) including testing of surrogates to validate the strategy, successfully negotiated a permit modification with the NMED for treatment of RNS/UNS, and developed the safety basis documents to demonstrate that treatment could be performed while providing adequate protection to the workers, public, and the environment. The Laboratory performed well by comprehensively integrating the numerous required actions. The Laboratory provided extensive documentation (e.g. objective evidence) for implementing/completing Corrective Action Plan elements relating to the Waste Isolation Pilot Plant (WIPP) Accident Investigation Board Phase 2 report. For example, the Laboratory provided over 30 objective evidence packages for NNSA approval that have demonstrated a strong commitment for developing sustainable corrective actions while producing the required documents pursuant to a rigorous schedule.

Issues

While implementation of the CAP is underway, the Contractor Assurance System tracking system (PFITS) does not support claims of progress.

Key Outcome 5.6

Accomplishments

The Laboratory met expectations by providing robust support for the Supplemental Environmental Projects (SEPs). The New Mexico Environmental Department Settlement Agreement was signed January 22, 2016. Prior to this signing, the Laboratory worked diligently during the settlement negotiation process with technical and legal inputs instrumental in obtaining a sound agreement. The Laboratory has been a strong supporter of the Supplemental Environmental Projects implementation from both a strategic and tactical perspective. Laboratory senior management were directly involved in the early stages of the scope definition sessions, and assigned a senior manager for all five SEPs, which has resulted in strong communications both within and across SEP teams. The Laboratory has supported the participation of highly technical and knowledgeable staff in numerous scope definition sessions with SEP teams and resulted in high quality Draft Work Plans that will become future amendments to the Settlement Agreement. Of particular merit is the strong technical relationships that Laboratory staff have built with NMED staff during the course of developing the SEP work plans and addendums.

Issues

None

Key Outcome 5.7

Accomplishments

The Laboratory met expectations for this performance rating period. The Laboratory formed an integrated team for Enduring Waste Management and key objectives were developed to support the creation of an effective Enduring Mission Waste Management Plan (EMWMP), delivered to NNSA in February, 2016. A high level of participation in Waste Management Deep Dive Workshops increased integration across Laboratory directorates and between Environmental Management (EM) and NNSA. The Laboratory began implementation of the strategies contained within the EMWMP by forming Integrated Project Teams (IPTs) and has committed to providing NNSA with periodic updates regarding EMWMP implementation. One important development associated with strategy implementation is the decision to move towards ceasing on-site disposal of low-level radioactive waste. As part of low-level waste disposition the Laboratory supported the annual Radioactive Waste Acceptance Program (RWAP) surveillance conducted by Nevada August 1-3, 2016. The Laboratory was prepared, thorough, and commended by the auditors on the program.

Negotiations were completed with respect to modifications to the Statement of Work (de-scope) for Legacy Environmental Management work within the Laboratory Prime Contract.

Earlier this year, there was a concern that TA-55 would exceed its capacity to store transuranic (TRU) waste by February 2017. This placed considerable pressure on achieving CD-4 (startup) authorization of the new Transuranic Waste Facility (TWF) by that date in order to prevent impacting TA-55 programmatic operations. The Laboratory was successful in identifying additional storage capabilities and implementing waste minimization techniques to preclude this programmatic impact.

Issues

None

Key Outcome 5.8

Accomplishments

The Laboratory exceeded expectations in infrastructure management improvements. The Laboratory successfully completed BUILDER Phases II and IIIa milestones on time and has taken the lead in the migration of data into BUILDER completing 65% of the Phase IV condition assessments and scheduled to be 100% complete by May 2017, five months ahead of schedule. In addition, the Laboratory has also volunteered to take the lead with the integration of BUILDER with CMMS.

The Laboratory supported the Core Infrastructure Risk Informed Strategic Planning (CRISP) with its continued participation and took the initiative in hosting the annual NNSA Maintenance Managers Working Group workshop. The Laboratory also provided leadership in implementing the new Deferred Maintenance (DM) guidelines and is working to reduce DM. Although the Los Alamos Deep Dive will

occur in FY 2017, the Laboratory has already made significant progress to ensure that the event will be successful and support NNSA's goal to implement a more robust infrastructure planning process.

The Laboratory met all deadlines for assembling and validating IDAC in G2. The Laboratory also effectively supported the Mission Dependency Index (MDI) and Enterprise Risk Management (ERM) efforts, completing the validation of MDI data ahead of schedule and participating in the M&O-led ERM team. The Laboratory also provided recommendations for potential updates to the MDI capabilities list based on their experience in science and engineering. The Laboratory provided data and support to the Experimental Facilities and Capacity sub-team as a part of the FY 2018 NNSA Capability & Infrastructure Front End Analysis.

The Laboratory met expectations for Land Conveyance and Transfer (LC&T). The Laboratory helped to facilitate the conveyance of one tract and prepared the documentation for the conveyance of three additional tracts.

The Laboratory improved the quality of data in G2 over the past year by bringing in dedicated staff. While this has enabled more responsive correcting of G2 issues, there is room for the Laboratory to improve. The new project controls resource is actively working with NNSA to understand the G2 system and its requirements and has been communicative and helpful at resolving issues.

Issues

The Laboratory is currently funding the Manhattan Project National Historic Park (MAPR) with indirect funds to implement park legislation and the Memorandum of Agreement (MOA) between the Departments of Interior and Energy consistent with NNSA guidance. Despite support for near term activities, the Laboratory's longer term plans to ensure success of the MAPR are not fully developed. Work to be completed under an Interagency Agreement was delayed to the next FY due to a lack of early support and coordination for ES&H sampling. The MAPR Working Group was set up to plan, set tasks and deliverables for the MAPR with the Laboratory, however in some instances the Laboratory did not meet deliverables from the MAPR Working Group.

Key Outcome 5.9

Accomplishments

The Laboratory's emergency management program demonstrated improvement in conducting several drills of various complexity; upgrading the emergency management to a digital platform; improving emergency response organization training and staffing; and instituting cyber protection measures for emergency management software and equipment. The Laboratory expanded the use of emergency drills throughout the institutional and facility emergency management programs. Laboratory response to facility exercise and real-world events has been strong. The Laboratory continues to communicate with DOE Headquarters emergency management and Watch Office personnel to enhance Headquarters integration in exercises. Situational awareness through information management technologies have improved a common operating picture. The Laboratory conducted challenging Emergency Operations

Center (EOC) functional exercises. These exercises involved Watch Office participation, consistent with the expectations of the headquarters program office.

Progress was made toward formalizing integrated services and emergency planning in conduct of operations. The Laboratory has improved emergency management training area at TA-49 by building additional mock-up hazardous facades.

Emergency management contributed to TA-55 readiness activities by conducting 43 effective related emergency drills which can serve as models for the rest of the Laboratory.

Issues

Exercise after Action Reports have noted all exercise criteria as met. The lack of noted unmet criteria has been observed by NNSA for the past several EOC and facility exercises. In addition, recent program self-assessments and emergency drills have also been noted to similarly rarely cite concerns about the Laboratory's emergency management program performance. The continued, and perhaps expansion, of the lack of self-critical review activities are holding back the ability to improve the emergency management program across the Laboratory. The Defense Nuclear Facilities Board and the Office of Independent Assessments have repeated cited findings and the urgent need for emergency exercise improvement at the Los Alamos National Laboratory.

Federal reviews have identified weaknesses with the Laboratory emergency preparedness and response programs. Concerns noted include inadequate emergency drill documentation at Area G, poor management self-assessment and drill conduct activities at TA-55, and inadequate facility program evaluations. In addition, the initial Corrective Action Plan submittal to address the EA-33 audit report was inconsistent with DOE Order expectations and was not accepted, delaying appropriate corrective actions. Similar concerns were also found with a Corrective Action Plan to address a Finding associated with a Federal readiness assessment at TA-55. Technical reviews of planning documents continue to identify significant discrepancies.

Key Outcome 5.10

Accomplishments

The Laboratory met expectations for this performance rating period. Several new initiatives to address Laboratory production quality issues are ongoing, and some gains from these changes were demonstrated when the first all-electronic submittal, Lot 3353 1E33 Detonator Cable Assembly (DCA) product, was accepted by NNSA.

During the period the Laboratory hired staff to perform institutional software quality assurance and made good progress towards qualifying one weapon quality engineer.

The Laboratory initiated its annual Quality Assurance Program (QAP) review near the performance year end to incorporate quality clarification in multiple areas where questions have arisen during the year.

Issues

The Laboratory submitted a plan for the first phase federal delegation of product acceptance authority to the Laboratory for container kits early in the fiscal year; but at year end delegation had not been granted because of performance challenges. Specifically, at performance year end, the Laboratory remained unable to perform independent weapon quality NNSA delegated Evaluation Use Only (EUO) stamping and X marking without support from the Laboratory manufacturing quality organization.

Near the end of the performance year, the Laboratory informed NNSA of their intent to transition the Laboratory weapon quality roles and responsibilities to a new organization again at the start of FY 2017. However, a transition plan has not been provided and the target implementation date of June 2017, will delay NNSA's intended quality activity Delegation.

During the course of the year, four fuel clads in support of a DOE program were internally rejected and not submitted to NNSA for acceptance.

Goal 6: Leadership, *10% of fee allocated*

Successfully demonstrate leadership in supporting the direction of the overall DOE/NNSA mission, improving safety culture, the responsiveness of the Laboratory leadership team to issues and opportunities for continuous improvement internally and across the Enterprise, and parent company involvement/commitment to the overall success of the 'site' and the Enterprise.

Under this goal, Los Alamos National Security, LLC. (LANS), earned a rating of Very Good, and 84% of the award fee allocated to this goal. LANS exceeded many of the Objectives and Key Outcomes, and is generally meeting the overall cost, schedule, and technical performance requirements of the contract under this Goal in the aggregate. The contractor has continued to be successful in its performance under this contract as described below.

Objective 6.1

Accomplishments

The Laboratory met expectations by embracing a strategic planning and improvement cycle based on a Strategic Plan, a related Multi-Year Strategic Improvement Plan, and a self-assessment document linked to both the strategic and operational objectives. The Laboratory's engagement on this integrated set of activities, which are contractually prescribed to promote continuous improvement, is a constructive step forward in promoting improved institutional management. The Laboratory has also engaged in several effective outreach efforts with its employees and with NNSA stakeholders to build unity of purpose and unity of effort. The Laboratory has continued to be a leader across the complex in several areas. For example, the Laboratory helped to design and prototyped a method for capturing and reporting on institutional efficiencies to fulfill Congressional reporting requirement. The Laboratory CFO and his staff were recognized as leaders and key contributors in developing the NNSA approach for this important initiative. In another instance, the Laboratory Business Innovation Directorate helped to develop and sponsor an economic opportunity outreach event with the New Mexico Congressional Delegation with other Laboratories.

Issues

None

Objective 6.2

Accomplishments

While the status of CAS remains below expectations, the Laboratory has taken affirmative action to begin addressing this issue with a renewed vigor by developing a formal plan for improving CAS. That plan was subjected to a rigorous review by the LANS, LLC Board of Governors, resulting in many improvements. Efforts included a renewed focus on meaningful metrics, a new Facility Evaluation program, a renewed Risk Working Group and a new focus on Causal Analysis. Improvement has already been noted in several higher risk areas, including Laboratory NHHO Event Notification and in an aggressive questioning attitude found in the new Facility Evaluation process. Some organizational components within the

Laboratory (e.g., ES&H, Criticality Safety) have embraced structured approaches to performance improvement, including the new Facility Evaluation process, and those inroads represent benchmarking opportunities for further improvement. Another Board of Governors effort identified challenges and opportunities with the Earned Value Management System, and that evaluation contributed to system recertification late in the performance period.

Issues

In terms of performance outcomes, the Laboratory did not field an effective Contractor Assurance System (CAS) that is embraced and utilized institution-wide to foster an agile "learning organization" and which can identify risks and opportunities and that can respond effectively and comprehensively. Numerous internal and external reviews have pointed to key longstanding shortcomings in the CAS, including both the qualities of the system and the consistency with which it is applied.

Senior Line Leadership attention across the Laboratory is required to address the trends in classified spillages, security escort violations, and incidents involving foreign nationals that result in reportable security incidents. For example, over 20 suspicious package events were experienced in 2016 which expended valuable time and resources while impacting facilities and the workforce. While increased reporting of suspicious packages provides evidence of improved security awareness across the Laboratory, it also points to a need for reinforcement of security requirements (tagging/identification of personal items) across the entire workforce. While IOSC rates have improved marginally over 2015 performance, continuous focus and engagement by senior Laboratory line leadership is needed to sustain and improve overall security culture

Objective 6.3

Accomplishments

The Laboratory director continued to contribute to important and productive Headquarters-driven forums such as the National Laboratory Director's Council, the NNSA Tri-Lab Leadership Group and the NNSA Council. Below the Director level, Laboratory staff continue to be strong contributors in important cross-cutting efforts like the Energy Facilities Contractors Group, Headquarters-sponsored budget development and justification efforts, Safety Groups for industrial activities, Human Resources and Financial Management Savings initiatives. The Laboratory also continues to lead in driving savings through the Supply Chain Management System.

The Laboratory leadership engaged NNSA on the TRP II Phase C project with the goal of completing the project within DOE success metrics. The Laboratory leadership across the organization along with the Board of Governors acted in good faith and committed to complete this critical project within DOE Root Cause Analysis success metrics and programmatic needs. The Laboratory is commended for its willingness to negotiate and gain internal and external approval which led to a $10.6 million settlement on September 30, 2016 meeting expectations.

The TA-03 Substation Project, which is being executed by the US Army Corp of Engineers (USACE), has received support from the Laboratory that is being rated as Meets Expectations for FY 2016 at year end. The Laboratory team's performance has significantly increased since the June reassignment of a new project manager, contrary to its previous overall FY 2016 performance in the first eight months. The

Laboratory team is now working collaboratively with the FPD in supporting design reviews, establishing a records file plan, and supporting the Division of Responsibilities/Interface Agreements. NNSA and the project team encouraged the Laboratory's capital project director to continue supporting collaborative efforts going forward.

Issues

While the parent company has identified project issues and reasonable corrective actions, leadership in the Laboratory corporate organization has not successfully used information provided by the corporate team to resolve them. Lack of successful Laboratory leadership in Project Management was demonstrated onthe RLWTF Low Level Waste (LLW) and Transuranic Liquid Waste (TLW) projects. For the RLWTF-LLW project, the Laboratory has failed to implement actions promised to the NNSA to stabilize cost escalation as well as control Quality Control issues that have caused delays and unnecessary costs. While recent changes in Project Management personnel have slightly improved performance, the project has continued to suffer from the same Management, Planning, Coordination, Schedule, submittals and quality reported previously in FY 2016. Throughout FY 2016 the Federal Project Director of the RLWTF Low Level Waste (LLW) project and federal Integrated Project Team have raised numerous issues with the Laboratory Project Team as well as to Laboratory management. The FPD issued two letters of concern to Laboratory senior management this trimester regarding performance and cost. In both cases the response from Laboratory did not adequately address the identified actions. Despite input from the Laboratory external review, the NNSA Independent Project Review, and the FPD, Laboratory upper management remained generally unresponsive and failed to implement reasonable corrective actions as well as follow-up on the actions items of those reviews and issues.

Likewise on the RLWTF Transuranic Liquid Waste (TLW) project, the Laboratory has provided staffing in key positions as was required however the project has continued to perform below expectations, providing design documents that did not meet requirements yet insist there will be no delays to CD-2/3 request: specifically the project has missed its late April deliverable dates for 90% Design deliverable and the Preliminary Documented Safety Analysis by six months and these are expected to be submitted in October 2016. The federal project team forecasts the CD-2/3 approval will be delayed at least three to six months.

Objective 6.4

Accomplishments

The Laboratory met expectations in professional excellence. As a first accomplishment, the Laboratory leadership team addressed the forthcoming re-competition of the Laboratory contract to the legacy workforce in a constructive, calming manner. The Laboratory also continued to take concrete steps to build the workforce. At the senior level, these efforts included filling vacant Key Personnel positions, and holding a number of workshops and meetings conducted by both prominent external advisors and internal subject matter experts designed to build overall team competencies among the executive cadre in areas such as strategy execution, crisis management, and stakeholder engagement. For emerging leaders, the Laboratory sponsored development programs including the Leadership Institute for high-potential Group Leaders and Program Managers, the Laboratory Director's Leadership Development

Program, and workshops with the Center for Creative Leadership; as well as targeted professional development programs including the very extensive post-doctoral research program, a cohort of MBA students, a radiological control technician program, and an improved nuclear criticality safety training program; as well as targeted critical employee retention programs.

Issues

Leadership in operations management has not prioritized needed criticality safety activities and improvements adequately. There is a notable lack of improvement in procedural and operational implementation of the program for areas not directly engaged in resumption activities. The number and latency of infractions in the plutonium facility is of concern.

The Laboratory continued to have performance challenges in the management of a large portfolio of capital projects. Performance problems were evident on projects like the RLWTF Low Level Waste [LLW] and the RLWTF Transuranic Liquid Waste [TLW] projects and included schedule slips, design milestones missed, design quality deficiencies, budget baseline overruns, inadequate subcontractor oversight, acquisition strategy weaknesses, and configuration management shortcomings. One leadership challenge evident in the persistently challenged area of capital project delivery involved a failure of senior Laboratory executives to integrate, align and collaborate for project success, except in cases where the Laboratory Director became personally involved.

Key Outcome 6.1

Accomplishments

Specific accomplishments include the development of a smart device application (app) that provides a virtual reality visitor experience on the Manhattan Project Main Technical Area and other project sites. This app links with the Los Alamos County Downtown Walking Tour, and is an excellent example of leveraging technology and Laboratory capabilities to support the Manhattan Project National Historical Park (MAPR). There has been engagement in several planning activities and events connected with the establishment of the MAPR. The Laboratory is the only site that has provided indirect funds to support elements of the MAPR, which is commendable.

Issues

While the Laboratory met expectations on establishment of the Manhattan Project National Historical Park, the Laboratory did not aggressively support all site visits or tours by National Park Service representatives.

Key Outcome 6.2

Accomplishments

The Laboratory met expectations by being responsive and effective in separating legacy Environmental Management work scope and by transitioning funding, billing and management of that work scope under the alternate procurement vehicle. A prime contract modification was executed to effect de-scope of the legacy contamination work from the NNSA contract. Furthermore, in response to the issuance of the draft legacy clean up Request for Proposal (RFP), the Laboratory has proactively identified areas of interface

where additional fidelity is necessary to achieve successful EM legacy clean up scope implementation.

Issues

None

Key Outcome 6.3

Accomplishments

The Laboratory met expectations on economic development and technology commercialization goals. As one aspect of this effort, the Laboratory is continuing to support educational initiatives that benefit the local workforce including STEM education and scholarship programs. The Laboratory's Feynman Center for Innovation currently has twenty active solicitations for innovation projects advertised. Period accomplishments include an R&D 100 award made to technology commercialized through the program, and a successful $5M venture capital funding round by a local Laboratory spin-off business. The Laboratory Venture Acceleration Fund supported five of thirty-five applicant companies through a competitive selection program and the award of over $160K; and supported many New Mexico small businesses through an effective technical assistance program.

The Laboratory held an effective regional Supply Chain Management Center Industry Day in Albuquerque which included the entire New Mexico Congressional Delegation and which attracted a large volume of prospective subcontractors.

Issues

None