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National Nuclear Security  
Administration

Los Alamos National  
Security, LLC

Fiscal Year 2014  
Performance Evaluation  
Report (PER)

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NNSA Los Alamos Field Office

Performance Period:  
October 2013 – September 2014

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November 14, 2014

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## Executive Summary

This Performance Evaluation Report (PER) provides the assessment of Los Alamos National Security, LLC performance for the period of October 1, 2013 through September 30, 2014, as evaluated against the objectives defined in the Fiscal Year (FY) 2014 Strategic Performance Evaluation Plan (PEP). 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. The five basic Performance Objectives (POs) in the PEP were graded using adjectival ratings as described in the Federal Acquisition Regulation. Comments on the performance of each Contributing Factor (CF) and Site Specific Outcomes (SSO) under each PO identified in the PEP are provided as well. Los Alamos National Security, LLC submitted a Performance Self-Assessment Report that covered the rating period; detailing the many accomplishments of the institution and forthrightly disclosing noteworthy shortcomings.

In Performance Objective 1, the Laboratory exceeded expectations in managing the nuclear weapons mission, performed well in Research and Development work, and delivered significant gains to Stockpile Management and Stewardship Programs. The operational pause in nuclear facilities impacted some outcomes and limited some beneficial impacts, leading to a Very Good rating.

In Performance Objective 2, The Laboratory exceeded expectations in broader National Security Missions, providing significant support to NNSA programs engaged in Nuclear Non-proliferation, Emergency Response, Nuclear Counterterrorism and Counter-proliferation, and to NNSA's Inter-Agency partners. The operational pause in nuclear facilities impacted plutonium oxide production and resulted in an overall rating of Very Good.

Performance Objective 3 includes Science, Technology and Engineering and Other DOE Missions, including key environmental remediation work. The Laboratory advanced the state of research, using the exceptional scientific resources of the Laboratory, aligned with the Science Strategic Pillars, and enabled by programs such as Laboratory Directed Research and Development. However, the Laboratory failed to properly manage the processing of transuranic waste, adversely impacting the operation of the entire nuclear weapons complex. Major self-disclosed failures in transuranic waste management overshadowed this performance objective, leading to a rating of Satisfactory.

Performance Objective 4 includes operational activities, where performance was well below expectations. Areas of concern include nuclear and high hazard operations, the earned value management system, and capital projects management. The Laboratory failed to demonstrate effective formality of operations as evidenced by the improper remediation of transuranic waste associated with the contamination event at the Waste isolation Pilot Plant (WIPP). The Laboratory struggled with the timely resumption of mission activities at plutonium facilities. Although there were noteworthy positives in security, legal work, some project work, and aspects of business operations, the overall rating, driven by a major failure in formality of operations, is Unsatisfactory.

Performance Objective 5 involves institutional leadership, in which NNSA acknowledges many areas of excellence. However, the severity and impact of the operational challenges identified throughout the report overshadow those contributions and result in an overall rating of Satisfactory for the year.

## Performance Objective 1: Manage the Nuclear Weapons Mission

### Summary

Overall, the Los Alamos National Laboratory exceeded expectations in managing the nuclear weapons mission. Research and Development (R&D) work proceeded according to expectations. The Laboratory performed with significant success in supporting Stockpile Management and Stewardship Programs. Highlights include support that helped the Pantex Plant to achieve and surpass the recovery schedule for W76-1 production, execution of the Leda experiment at the Nevada National Security Site, advances in the Plutonium Strategy culminating in a Critical Decision phase 0 re-affirmation, and excellent progress on interim deliverables supporting the B61-12 baseline design and project controls. The majority of the performance supporting Stockpile Management and Stewardship was excellent.

**Very Good**

During this year, the Laboratory was challenged by the continued pause in operations at the Technical Area 55 (TA-55) Plutonium Facility. The Laboratory was unable to achieve operational capability at the Weapons Engineering Tritium Facility, reducing the facility's ability to support the nuclear weapons mission. In performance year 2013, the Laboratory initiated a pause in operations at several nuclear facilities. The pause substantially continued through performance year 2014, impacting nuclear weapon program implementation, and requiring the renegotiation of milestones involving production, research, and surveillance activity.

With respect to weapons activities, the Laboratory completed 127 Level 2 Milestones as captured in the Defense Program Milestone Reporting Tool, achieving a 100% success rate. One plutonium sustainment milestone was re-negotiated due to the unavailability of TA-55 facilities for plutonium operations.

The Laboratory completed all activities, deliverables, and milestones for Enhanced Surveillance and R&D Certification/Safety within the budget, scope, and schedule provided by NNSA.

The Laboratory performed above expectations by accomplishing negotiated work with program sponsors; achieving the expected level of quality to ensure safe, secure, reliable weapon performance and transportation; and providing cost-effective operations. Specifically, the Laboratory added capabilities that enabled the Pantex Plant to complete two additional W76-1 units above the recovery plan for FY 2014. The Laboratory was proactive in deploying a Manufacturing Resource Planning (MRP) system for expanded detonator production support in the Future Years Nuclear Security Program and assisted during the Configuration Management Audit by the Department of Energy Inspector General (DOEIG). While the Laboratory has demonstrated satisfactory performance regarding interim delegation of non-acceptance stamping authority and provided adequate Nuclear Explosive Safety Study Group membership support, the Laboratory did not adequately integrate all site-wide Weapons Quality Assurance submittal/stamping activities and did not provide timely notifications to NNSA for required product acceptance/stamping support.

Other NNSA operating sites benefitted from the Laboratory's teaming efforts. Examples include the W-78 Nuclear Explosives Safety Study and weapons response activities supporting anomalous units and the Potentially Inadequate Safety Analysis (PISA) for the W-76 cell disassembly. The Laboratory also supported B-83 surveillance activities and production agency explosive experiments at Nevada.

The Laboratory exceeded expectations for W76-1 LEP program deliverables by completing required activities to authorize the build of reaccepted Canned Subassembly (CSAs) into War Reserve assemblies at the Pantex Plant, while remaining within budget. The Laboratory exceeded expectations for the Legacy Upgrade Project by providing technically valuable input for the efficient and effective completion of project goals and objectives.

The Laboratory performed above expectations in increasing knowledge of the state of the stockpile, through successful execution of the stockpile surveillance program and robust scientific and engineering work in support of the annual stockpile assessment despite an extremely challenging budget environment. The Laboratory kept high priority surveillance programs on track for the W76-0, W78, W88, B61, B83, and W80 by meeting directive documents schedule requirements, by supporting the Integrated Weapons Evaluation Team, through annual assessment activities, and through activities in support of future assessments. Specifically, the Laboratory executed W76-1 Retrofit Evaluation System Test and stockpile surveillance requirements for Annual Assessment and Weapon Reliability activities. The Laboratory provided excellent support for the B61 joint flight test program. The Laboratory completed five of eight required W78 non-destructive laser gas units.

Materials aging model updates were completed and provided for inclusion into ChemPaC simulations. A number of cyclic compression and tension experimental tests with associated modeling/simulation efforts were completed, resulting in the development of an improved, next generation high explosive constitutive model for engineering analysis.

The Laboratory performed above expectations in executing deliveries for nuclear weapons stockpile work to meet limited-life component exchanges and dismantlement of components. Accomplishments involved component and system lifecycle management, analysis and improvements, adding to reliability and safety of the nuclear weapons stockpile. The Laboratory met the cost, schedule and performance requirements for the component disposition program and for retired systems management. The Laboratory provided engineering support to the Production Agencies to produce Laboratory-designed components ensuring that NNSA met the FY 2014 W76-1 warhead production requirements and DOD warhead delivery schedules. The Laboratory delivered Qualification Engineering Release (QER) documents for required W76-1 Kansas City Responsive Infrastructure Management and Sourcing requalification activities. The Laboratory exceeded expectations regarding release of a QER to Pantex to facilitate the completion of a W76-1 warhead with a non-destructive laser gas sample canned subassembly, ahead of schedule and within budget. The Laboratory provided excellent support for the B61 Joint Test Assembly Modernization project and provided excellent support for the Legacy Upgrade Project. The Laboratory advanced W78 design definition toward a model-based design definition. The Laboratory supported W78 sustainment through a Product Realization Team to address lifetime provisioning issues. The Laboratory performed the W78 Detonator Cable Assembly and Gas Transfer System activities. Physics and engineering baseline model activities were completed on schedule and continued to improve understanding of system responses. In aggregate, these many initiatives and programs robustly supported the sustainment of a safe, reliable nuclear weapons stockpile.

The Laboratory exceeded expectations in the application of new strategies, technology and science to support the nuclear weapons stockpile. The Laboratory completed a challenging milestone; fielding the first beryllium capsule experiment at the National Ignition Facility (NIF), an achievement that required joint support from and collaboration with the Lawrence Livermore National Laboratory and General Atomics. The Laboratory also exceeded expectations by designing a 2-shock driven capsule for use at the NIF.

The Laboratory met expectations by: completing work on plutonium aging with progress toward meeting Energy Balance II Predictive Capability Framework goals through comparisons of relevant underground tests; by expanding on the Scaling and Surrogacy effort supporting advanced certification of stockpile systems; by completing a broad range of dynamic materials properties work including work on radiation damage in polymers; by developing next generation burn models for insensitive high explosives; and, by executing a hydrodynamic test at the Dual Axis Radiographic Hydrotest facility for a pit reuse concept, a key NNSA 2014 priority. Overall work was completed on schedule. The pause in operations at TA-55 and the phased-approach to restarting operations continued to negatively impact Science Campaign work. The challenge to meet schedule and to accomplish needed small-scale science work, particularly with plutonium, hampered the Laboratory's performance in this area.

The Laboratory performed above expectations with regards to the Advanced Simulation and Computing (ASC) Program and has completed all assigned level 2 milestones. The Laboratory's new Higher Order Lower Order algorithm, implemented with Eulerian Application Project (EAP) codes for thermal radiation transport, allowed for speedups of 10X on relevant test problems, which will enhance future investigations of advanced architectures. The Laboratory met expectations in modifying relevant Eulerian integrated codes to support improved energy balance modeling, and developed innovative methods to improve run-time performance, including an Integrated Codes subprogram. The Laboratory developed the capability to define the performance effects of physical phenomena that govern boost initiation and burn efficiency. This effort directly supports both a Predictive Capability Framework (PCF) level 1 milestone in FY15 for certification capability of pit reuse, and a PCF level 1 milestone in FY18 for evaluating boost predictive capability in nominal performance.

The Laboratory met all Independent Nuclear Weapons Assessment Process requirements. After an upgrade to the engineering analysis cluster memory, the Abaqus three-dimensional model of the W88 was preloaded based on reentry accelerations. The resulting mesh was used in Monte Carlo N-Particle Transport Code simulation to calculate time-dependent power deposition throughout the nuclear explosive package for the Nuclear Survivability Subprogram.

The Laboratory performed above expectations in demonstrating the application of new strategies, technologies, and scientific understanding to support stewardship of the existing stockpile and future stockpile needs. Specifically, advances were made on material compatibility and on solutions for safety and use-denial. In the area of R&D Certification and Safety, the Laboratory completed FY 2014 objectives on or ahead of schedule, and partnered with NNSA to manage scope. The Laboratory also made advances in Detonator technologies in collaboration with Argonne National Laboratory.

The Laboratory's efforts in R&D work underpins advances in the Predictive Capability Framework through maturation of weapons design codes, including the utilization of data from the Gemini experiment. The Leda experiment was adversely impacted by a part that was damaged during fabrication and assembly. The issues were resolved quickly, which allowed the Laboratory to maintain schedule. As with Gemini, communications with NNSA on Leda were effective.

The Laboratory met expectations for Integrated Surety Solutions by advancing development of several technologies for future stockpile use and by integrating with DOD activities to maximize information at minimal cost. In addition, the Laboratory met expectations by contributing to the ongoing Joint Integrated Lifecycle Surety assessments to develop a "surety evaluation priority" tool.

The Laboratory exceeded expectations in strengthening unique science and engineering capabilities by completing important boost physics experiments, by providing base characterization and strength data for enriched uranium, by progressing the efforts for obtaining essential nuclear physics data through the Chi-Nu and Time Projection Chamber efforts, and by completing an analysis of opacity experiments. Of particular merit were the Laboratory's cooperative efforts with other NNSA sites to provide proposals, analyses, and operational information necessary to arrive at the national decision on advanced radiography at U1a. Working around the pause in nuclear operations at TA-55, the Laboratory produced scientific samples needed for key experiments. The Laboratory also provided important contributions to a Congressional report on the potential reuse of nuclear weapon secondaries. The Laboratory completed a technical evaluation on virgin and recycled high explosives that provided important insights on the re-use of this key material.

The Laboratory met expectations by completing all level 2 Internal Confinement Fusion (ICF) milestones on schedule. These milestones included: work on laser-plasma interactions; the shear campaign at the NIF; and, experiments on the Omega laser facility to study fuel-ion segregation in imploding ICF capsules.

The Laboratory met the Material, Recovery & Recycle Program re-negotiated goals by completing calibration of the High Efficiency Neutron Counter Pilot at TA-55, by initiating the first disposition of an experimental Confinement Vessel, and by de-inventorying 35 items from the Chemistry and Metallurgy Research facility.

The Laboratory met expectations for the Plutonium Sustainment Program by executing base pit material processing and W87 development; by completing key plutonium sustainment equipment upgrades; and by continuing with Power Supply development. There was continued progress by the Laboratory in bounding the Plutonium Strategy and the associated requirements to develop a phased approach for upgrades and the integration between PF-4 and the Radiological Laboratory Utility Office Building (RLUOB) facility.

The Weapons Engineering and Tritium Facility has unresolved technical and operational challenges that have prevented the resumption of operations and that have continued to incur significant costs without benefit.

The Laboratory exceeded expectations in its support of specific weapons initiatives. Contributions to the B61-12 Life Extension Program (LEP) included transparent engagement with stakeholders, an update of the draft New Material Stockpile Evaluation Plan, support for the B61-12 LEP Surveillance

Review, support for the first B61-12 LEP Programmatic and Technical Review and progress on design and Air Force integration issues. The Laboratory Design Agency supported changing schedules for Vibration Fly Around flight dates. They also established a very comprehensive test protocol to address thermal risks associated with new mission profiles and successfully completed the first tests in this series which were successfully completed in FY14. The Laboratory produced and delivered the Nuclear Explosive Package cutaway to NNSA within 30 days of request. This was unplanned scope and it was executed within site budget. The Laboratory provided technical oversight for the first War Reserve material load of a 3X Acorn Gas Transfer System approximately 2 years ahead of schedule, allowing for data collection to support Life Extension Programs. The Laboratory held a Stress Cushion Stakeholder Review to exchange study results and provide stakeholder recommendation to the Laboratory for down select decision, developing a clear path to certification and reducing a high-level risk.

The Laboratory exceeded expectations for the W88 ALT 370 program by rebuilding and delivering the FCET-50 missile Joint Test Subassembly to Sandia National Laboratory. They were proactive in anticipating the rebuild and appropriately provisioned hardware. The Laboratory continued to be very resourceful in locating and utilizing "less than Mark Quality" hardware for the qualification program while limiting draw down of limited Mark Quality hardware.

The Laboratory fully met the expectations of the W78/88-1 LEP by coordinating with Lawrence Livermore National Lab to successfully complete critical design work needed to close out the program. The Laboratory successfully out-briefed interested stakeholders and provided final reports to meet the Federal Project Manager's requirements.

The Laboratory exceeded expectations for the completion of W78/88-1 LEP 120-Day Study & Model by providing excellent briefings to the DOD and United Kingdom stakeholders.

The Laboratory met expectations through execution of B61-12 Life Extension Program technical reviews, design review, development of assembly requirements, production of assemblies, shipment of hardware, qualification testing, submission of disassembly procedures, submission of weapon safety specifications, production of detonator cable assembly, and completion of detonator powder production. The Laboratory executed Phase 6.2 and Phase 6.3 activities in accordance with approved schedules; including mechanical interface testing under abnormal environments, data evaluation from static ejection and fit tests with various aircraft, development of component-level Baseline Design Review/Final Design Review schedules, and B61 Dismantlement Life Extension Program requirements, and Vibration Fly Around flight dates.

The Laboratory met overall expectations in advancing the Predictive Capability Framework by completing subcritical experiment (SCE) design work for both Lyra and Red Sage, performing post explosive shot analysis work on the Gemini SCE, and executing the Leda scaled experiment. The Laboratory delayed processing and release of plutonium samples needed for critical Z experiments. The challenges in restarting operations at TA-55 negatively impacted critical small-scale science work required for the Science Campaign; although samples were provided, the samples could not be modified on short notice to support changing mission parameters because required facilities were not available.



The Laboratory performed above expectations with regard to the Advanced Simulation and Computing Program. The Laboratory continued to improve the user tools and services needed for the tri-lab codes to run on the Cielo supercomputer via the Capability Computing Campaign process. The Laboratory also deployed and supported use of proxy applications by Fast/Design-Forward vendors which facilitated understanding of unique ASC application programming requirements.

The Integrated Codes/Verification & Validation level 2 milestone is on track for timely completion and performance met expectations. The Laboratory submitted the Trinity supercomputer Critical Decision phase 2/3B package on time and the Strategic Computing Complex facility upgrade is progressing on schedule. Despite the HQ/LAFO/LANL guidance, which reduced the number of Developmental Pits from four to be completed in FY2014 to starting one by September 30, 2014, LANS has not started the fabrication of the Developmental 3 Pit.

The Laboratory met expectations for progress in developing the Plutonium Strategy and in advancing recapitalization and modernization of the plutonium infrastructure at the site. The Laboratory exceeded expectations by providing timely support for Critical Decision Phase 1R for the Chemistry and Metallurgy Research Replacement line items, fostering program collaboration through an integrated Nuclear Planning Workshop. The Laboratory successfully responded to requests for additional technical information to support briefings to senior management and key stakeholders on short notice.

The Laboratory met expectations by developing and implementing surveillance metrics for the surveillance program early in FY 2014. Surveillance data collected during the rating period informed the metrics, which were used to inform this year's Stockpile Stewardship Annual Assessment Report process and form the basis of planning for FY15 Stockpile Surveillance activities.

The Laboratory engaged in effective weapon system, subsystem and component improvement, and is commended for integrating a resource-loaded schedule into the Weapons Development Cost Report ahead of schedule. The Laboratory submitted a site Performance Measurement Baseline and final site schedule information for the NNSA Integrated Master Schedule in a timely manner and completed an Integrated Baseline Review (IBR) of project controls system. The IBR delivered value by developing several key recommendations to support the B61-12 Project Controls System Description. Both the Laboratory Design and Production Agencies are leveraging the Active Risk Manager database to meet the NNSA's expectations for risk management. The Laboratory worked with NNSA to refine site contributions to the baselined NNSA Integrated Master Schedule (NIMS), improving compliance with the Project Controls System Description and the Project Controls Manual guidance and supporting critical path management.

The Laboratory exceeded expectations for Project Controls Implementation in FY14 for the W88 ALT 370 by performing a detailed cost and feasibility study for the Conventional High Explosive Refresh Option, and in performing post-study follow-up work. The Laboratory rebaselined and updated the project schedule with resource loading, while actively managing program risks. The Laboratory also implemented a streamlined Earned Value Management System for Weapons Programs work as directed by NNSA.

The Laboratory continued to meet expectations with respect to W88 ALT 370 Project Controls by delivering high quality monthly reports in a timely manner, by actively managing risks, and by maintaining project schedules with required resource loading information.

## Performance Objective 2: Broader National Security Mission

### Summary

The Laboratory exceeded expectations in the broader National Security Mission, providing significant support to NNSA programs engaged in Nuclear Non-proliferation, Emergency Response, Nuclear Counterterrorism and Counter-proliferation, and to NNSA's Inter-Agency partners. The Laboratory's efforts were high-impact and largely successful, especially in the areas of Nuclear Safeguards and Security, the Nuclear Counterterrorism Program, the Nuclear Noncompliance Verification Program and Non Proliferation Research and Development.

**Very Good**

However, a major non-proliferation program's goals were not met due to nonavailability of the TA-55 Plutonium Facility. The ARIES mission has been paused for the entire fiscal year, with no dismantlement, oxide production, quality measurement, or shipment goals met.

The Laboratory's support to the Global Threat Reduction Initiative (GTRI) Off-Site Source Recovery Project fully met expectations. The technical guidance provided was excellent and the Laboratory identified potential paths forward for several high priority source recoveries, both domestically and internationally. The source recovery metric was surpassed, and successes included several high priority large beta/gamma recoveries, overcoming unforeseen risks that hampered some planned FY 2014 activities.

The Laboratory consistently performed at a high level in support of the GTRI project to remove all highly enriched uranium and plutonium from Japan's Fast Critical Assembly.

The Laboratory provided support to the GTRI U.S. High Performance Research Reactor program in two key areas: Fuel Development and Fuel Fabrication Capability. However, the Laboratory achieved only 20% of deliverables for both sub-programs, and required multiple Baseline Change Requests to move balance between spending overruns and underruns.

The Laboratory exceeded expectations in providing technical support for the International Nuclear Security Engagement Project by providing subject matter expertise to the International Atomic Energy Agency (IAEA) in revising technical documents, training, technical assistance and working collaboratively with personnel from DOE/NNSA, other agencies, and for more than ten countries. Work was performed on schedule and within budget. The Laboratory provided outstanding expert technical support in the area of Material Control and Accountability to foreign partners.

Laboratory efforts on Nuclear Safeguards and Security work exceeded expectations by materially advancing program goals while accomplishing base planned work generally within cost, schedule and technical requirements. The Laboratory provided excellent support and follow-through in transferring non-destructive assay equipment to Armenia and Malaysia. The Laboratory also provided critical technical leadership and invaluable program management support for nuclear safeguards engagement with Japan and the Republic of Korea. The Laboratory provided excellent technical and program management support for Confidence Building Measure bilateral engagements. The Laboratory was responsive to NNSA short-fuse support requests and was flexible in changing

course when unforeseen obstacles arose. The Laboratory provided excellent support in maintaining and enhancing computer information networks serving Nuclear Suppliers Group and Australia Group multilateral export control regimes, as well as the secure Proliferation Information Network System that supports export control technical and end-user reviews by the Departments of Commerce (DOC) and State for export license applications, as well as DOE programs. The Laboratory led an excellent multi-lab effort to develop the Nonproliferation Policy Analysis and Interdiction Resource commodity analysis and identification capability. The Laboratory provided excellent contributions in support of Weapons of Mass Destruction interdiction activities and export reviews, including DOE nuclear software code reviews.

The Laboratory supported the Global Initiatives for Proliferation Prevention by providing very good technical oversight of collaborative R&D projects and support for the development of solutions for the orderly closeout of projects, and the International Nonproliferation Export Control Program (INEPC), leading engagement in Iraq, Southeast Asia, and Turkey. The Laboratory provided technical and project management support for the Indonesia Commodity Identification Training National Course Development Workshop in Jakarta, supporting program goals and expanding program effectiveness. Laboratory experts also supported other INEPC capacity building activities domestically and internationally, and continued to provide leadership in INEPC curriculum development activities.

The Laboratory continued to support Second Line of Defense (SLD) program efforts to detect and prevent illicit trafficking of nuclear/radiological materials through excellent support for the installation, calibration, and maintenance of radiation portal monitors, by providing key expert SLD advice, and through important equipment testing campaigns for SLD, including implementation and sustainability initiatives.

The Laboratory supported Nonproliferation Research and Development programs by meeting performance and schedule milestones. Some work exceeded planned technical delivery, such as treaty monitoring capabilities development. Of special note was the Laboratory's participation in the "Bulldog" campaign with United Kingdom partners to develop remote sensing capabilities for the detection of uranium conversion activities. The Laboratory met the cost, schedule, and technical requirements established by the Air Force in delivering capabilities related to the Space Nuclear Detonation Mission and in providing R&D technology solutions for treaty monitoring, minimizing the use of proliferation-sensitive materials, and in technical applications for nuclear safeguards and security.

The Laboratory supported Nuclear Noncompliance Verification, exceeding expectations in several areas, including outstanding FY 2014 explosives tests that outperformed cost and schedule requirements by orders of magnitude; and through field exercises in which the Laboratory accomplished mission goals on or ahead of schedule despite limiting conditions beyond their control.

The Laboratory provided good support to the Warhead and Fissile Material Transparency program, leading a multi-laboratory cooperative project with the United Kingdom that provided high quality technical contributions while adhering to performance milestones, cost, schedule and expected work quality. The Laboratory provided strong support in preparation for the Comprehensive Nuclear-Test-Ban Treaty Integrated Field Exercise 2014, including leadership of the Scenario Development and Control Teams.

The Laboratory worked to reduce nuclear and radiological danger, providing subject-matter experts, foreign partner training, and project support for the nation's non-proliferation partners, including the International Atomic Energy Agency (IAEA), China Center of Excellence (COE) project, and the Institute for Physics and Power Engineering. For these activities, the Laboratory consistently delivered timely, valuable, and mission critical input that has benefitted technical exchange projects and worked to ensure successful execution of project activities. On the COE Project, the Laboratory undertook a great effort to procure Non-Destructive Assay (NDA) equipment and conducted a superb six-week training program for Chinese NDA experts. By providing this training, our non-proliferation goals were significantly advanced. The NDA training was particularly noteworthy in that Laboratory staff went above and beyond in the execution of the training course itself and in building a respectful, productive non-proliferation dialog, which benefitted U. S. policy goals.

During the performance period the Laboratory successfully conducted a full-scale exercise to test and validate emergency response capabilities. The event engaged on-site operations, the off-site Los Alamos County support team, and NNSA Headquarters elements. This exercise was evaluated by DOE's Independent Oversight staff and was observed by Defense Nuclear Facilities Safety Board staff. All site exercise objectives were met, and the exercise revealed a robust Laboratory response capability.

The Laboratory provided improved support for Consequence Management (CM) Home Team and Response Team missions. Notable achievements included: additional planning to support the CM training provided during Radiological Assistance Program Training for Emergency Responders exercises; purchase of a High Purity Germanium Detector for the Aerial Monitoring System Program; acquisition of Electronic Current Awareness Publications for support of the Consequence Management Response Team; and, support for the Vibrant Response Exercise. The Laboratory met expectations in training support for a primary component measure effort and supported a bi-lateral field training exercise, Tempest Wind. The Laboratory supported technical drills for the U. S. Secret Service and Home Team personnel.

The Laboratory completed 88% of its deliverables for the FY 2014 Technology Integration program, which is average across the complex; however, only 42% of the deliverables were completed on time, which is below average for the program.

Radiological Assistance Program (RAP) Team 4, led by the Laboratory, provided scientific expertise and emergency response personnel for a Preventive Radiological/Nuclear Detection operation supporting the City of Albuquerque during the city's 4th of July celebrations. RAP 4 provided scientific expertise and emergency response personnel for an emergency response deployment, and identified that no threat existed. RAP 4 initiated planning for preventative radiological and nuclear detection support of the annual Albuquerque International Balloon Festival in October 2014 and for the Super Bowl scheduled for Phoenix in February 2015.

The Laboratory maintained operational readiness in support of the DOE Forensics Operations team and the Disposition and Forensic Evidence Analysis Team. In the Bulk Special Nuclear Materials Analysis program, the Laboratory only partially completed one task more than one year past the FY 2013 due date and failed to complete another requested task for the yearly review meeting. Additionally, there are concerns by NNSA and customers about the cost reasonableness of Laboratory work in this area.

The Laboratory proactively contributed to the tri-lab Nuclear Counterterrorism High Explosives and Nuclear Materials roadmaps, which are being used to guide national programs. Laboratory support of the NNSA's international mission was well coordinated and executed. The Laboratory successfully leads the Tier Threat Modeling Archive-Validation project, an ongoing experimental effort to predictively model disablement actions. Special recognition is noted for Laboratory participation in Rodeo Moment, a large-scale proof-of-concept experiment in support of standoff disablement efforts, and for Laboratory work in hosting a Block 8 training course, which provided render safe training for emergency responders.

The Laboratory provided significant support to NNSA's Inter-Agency Partners, including the Departments of Defense, Homeland Security, and the Department of State. Specific projects included placing 8 "CubSat" micro-satellites in orbit to support a DOD test campaign, taking a leadership role during the Marble Challenge National Exercise involving all levels of emergency response, and successfully operating the National Infrastructure Simulation and Analysis Center in support of DHS.

Except for several situations previously noted, the Laboratory met contractual cost, scope and schedule requirements for Broader National Security Missions.

With respect to plutonium oxide production and certification, the pause in nuclear operations at TA-55 prevented any new plutonium oxide from being produced during the performance year. However, the Laboratory was able to certify 25 kg of plutonium oxide that had been produced in FY 2013. The Laboratory resolved criticality safety concerns with the Direct Metal-Oxide -3 conversion unit by March 31, 2014, which substantiated previous program decisions for equipment redesign and provided a clear, expedited path-forward for resumption of the ARIES process. Criticality Safety Evaluations essential to the resumption of plutonium oxide production were not completed by the end of the performance year, resulting in a failure to meet programmatic goals.

The Laboratory produced a Space and Air Burst Detector package on schedule. This product enhanced nuclear detection capability and met Air Force launch schedule requirements.

The Laboratory demonstrated excellent performance and provided almost all research ahead of schedule for the Nuclear Counterterrorism (NCT) Program's task list items, including completion of assessments of specific nuclear threat devices. The Laboratory provided strong leadership for the Block 8 NCT training course with the majority of all FY 2014 work completed. The Laboratory provided proactive engagement in the development of a standoff disablement experimental program by participating in multiple interagency planning sessions, successfully conducting this work in a time and budget constrained environment.

The Laboratory fully participated in all requested planning and execution events for the Nuclear Weapons Accident-Incident Exercise 14. This exercise served to assess readiness and national capabilities for responding to a nuclear incident. The Laboratory made important contributions to the successful conduct of this multi-agency, national exercise, with staff acting as exercise controllers, evaluators, safety officers and as exercise role players.

The Laboratory Field Intelligence Element successfully completed all assigned and required tasks, as outlined in the Performance Evaluation Plan.

## Performance Objective 3: Science, Technology, and Engineering and Other DOE Mission Objectives

### Summary

The Laboratory advanced the state of research and development in support of the national security missions of the NNSA and the Department of Energy. This was achieved using the exceptional scientific resources of the Laboratory, aligned with the Science Strategic Pillars, and enabled by programs such as Laboratory Directed Research and Development. The Laboratory has reinforced its stature as one of the preeminent scientific institutions of the nation. Taken alone, the Laboratory's achievements in Science, Technology, and Engineering surpass the Laboratory's excellent performance demonstrated during FY 2013. However, the Laboratory failed to properly manage the processing of transuranic (TRU) waste, adversely impacting the operation of the entire nuclear weapons complex, incurring very large costs which have not yet been adequately determined, and adversely affecting the region's economic health. The pause in TA-55 nuclear operations has had a negative impact on several science and research activities, including high mass glove box operations, nuclear fuel development, novel material detection capabilities, nuclear emergency response, and Am-241 research. Due to the significance of the issues related with the processing of transuranic waste, the Laboratory's performance for this objective is below expectations.

**Satisfactory**

In terms of implementing a research strategy that aligns discretionary investments with DOE priorities, the Laboratory executed the first pulsed-power driven implosion experiment diagnosed by the pRad technique at the LANSCE facility. The experiment captured 21 proton radiographs during the implosion with a remarkable 100% data return. This experiment significantly enhanced the suite of stockpile stewardship tools available to weapons designers for validating weapons design codes. The Laboratory successfully demonstrated direct assay of plutonium in actual spent nuclear fuel rods using a new High Resolution X-Ray Pu Assay Method. This new technique accurately discriminated between background radiation and Pu sample-generated radiation, for significantly improved detection of very small samples of actinides within spent fuel rods. This achievement is a significant accomplishment that aids in the prevention of nuclear material trafficking.

The Laboratory adapted to an externally imposed 25% reduction in Laboratory Directed R&D funding by terminating seven funded projects, transferring staff to other programs, and reducing the scope for ongoing Exploratory Research and Directed Research projects. To preserve early career growth opportunities, postdoc and Early Career project categories were fully funded. The Laboratory effectively managed the discretionary research program project selection process to ensure alignment with the key Laboratory research strategies, and to align with DOE and NNSA strategic goals. Specific focus was applied to advance research on Matter in Extremes, providing a basic understand of materials that is directly applicable to weapons stockpile issues and will also inform planning for the future Matter-Radiation Interactions in Extremes facility.

The Laboratory engaged in cutting edge research. The Laboratory participated in a project to re-analyze decay spectra from a supernova explosion, focusing on titanium-44, which was created in the core of the supernova engine. The Laboratory's 3-D simulation of the supernova explosion led to the conclusion that it was not symmetric, as previously thought, and that low-mode convection processes



are required to explain the explosion dynamics. This demonstrated the Laboratory's expertise in the three dimensional simulation of processes involving particle radiation hydrodynamics, which is relevant to the simulation of nuclear explosion processes.

The innovative ChemCam system has provided the ability to evaluate the materials on Mars so that those materials can be analyzed to understand the ancient environment. This new technique is providing transformative data and highlighted the Laboratory's remote sensing and detection capabilities which support national security applications. New data shows hydration of Martian soils, providing additional evidence of past water on Mars. This work was reported in prestigious international periodicals, including Science Magazine. The Laboratory developed the next generation of groundwater models related to groundwater contamination remediation. These new models consider uncertainties and implementation costs to support final remediation decision making.

Laboratory researchers supported national security science by demonstrating a new in-situ x-ray diagnostic for studying how voids affect explosive performance under shock-loading, and for directly measuring terms in turbulence model equations using a shock-tube technique. The development of explosive void data constitute the first experimental step in developing physics-based predictive models for high explosive performance, and the turbulence measurements provide further insights into turbulent mixing, a topic relevant to nuclear weapons processes, internal confinement fusion, and supersonic engines.

The Laboratory continued to excel as a recognized leader in scientific discovery and innovation, achieving a number of noteworthy accomplishments. Improved plutonium-238 analytical chemistry operations provided support for the fuel requirements of NASA and others. The Operation of the Godiva 4 critical assembly machine, a fast-burst reactor with application in criticality experiments has enhanced Laboratory capabilities and workforce knowledge. High-Energy neutron computed tomography at LANSCE, which was installed at the Weapons Neutron Research facility, has increased neutron imaging capabilities for researchers. The development of the ATHENA surrogate organ system, a desktop human body for testing pharmaceuticals and toxic materials, with initial organs including a liver, heart, lung and kidney, could reduce the need for animal drug tests and increase the speed and reliability of drug testing at lower cost. Laboratory technical staff members have received achievement awards or have been named Fellows by several scientific societies, indicating the continued capability and quality of Laboratory Science, Technology, and Engineering. Individual awards include the E. O. Lawrence Award and DOE Early Career Scientist Award, both presented by the Secretary of Energy. Science, Technology and Engineering Metrics include 397 peer-reviewed publications, 20 invention disclosures, 8 patent applications, 10 patent awards, and 474 Laboratory publications. The Laboratory Post-Doctoral research population has been maintained at a robust 383, despite fiscal challenges.

The Laboratory research program successfully re-established and demonstrated the process to manufacture the silicon-32 isotope to abate the inherent risks of limited availability associated with a sole source of supply in the market. The isotope is used to investigate oceanic and atmospheric circulation and to probe groundwater infiltration rates, supporting the Energy Security mission. This work leverages the radiochemical separations capability developed by the Laboratory's isotope production program.

Laboratory researchers successfully solved the “burst buffer” problem which will allow increased efficiency of high-performance computing simulations. The Trinity Supercomputer, now being installed at Los Alamos, will incorporate burst buffer technology.

The Venture Acceleration Fund targeting the Northern New Mexico region, through which the Laboratory is considering 54 venture proposals, demonstrated the Laboratory’s community commitment. The Laboratory conducted a successful demonstration of muon imaging that provided an application of new and advanced technology to address critical challenges such as imaging the reactor cores of the damaged Japan power facilities. Additional technology transfer efforts include direct methanol fuel cell technology and Swept Frequency Acoustic technique for oil and gas production.

A new detection technology combining magnetic resonance imaging and x-ray techniques that advanced the capability to screen liquids at airports was successfully demonstrated and used. Once commercialized, this technology will make travel safer and make screening more efficient than current scanning technologies.

Several specific research results demonstrate that Science, Technology, and Engineering capabilities and resources are being applied to topical problems supporting national Energy Security goals. These important results include investigations of climate-driven tree mortality, the pRad of melting metals, and the genetic effects of naturally occurring carbon-14.

The Laboratory has accomplished significant scientific advances documented in the previous contributing factors while maintaining appropriate management of costs and scope in a Research and Development environment. This strength was highlighted by the DOE Office of Science Isotope Sales Program with respect to the Am-241 Clear Line construction project.

The Laboratory proactively managed a congressionally mandated reduction in funding for the LDRD Program by reducing scope on Directed and Exploratory Research categories, while preserving post-doctoral and Early-Career projects.

The Laboratory excelled in applying Science Technology and Engineering to Energy Security Problems. The Laboratory issued an Energy Security Strategy Plan, drawing on key Laboratory capabilities. The Laboratory addressed critical national needs, preserving and enhancing capabilities required for Laboratory missions in energy security; specifically addressing gaps between fundamental research, technology development, technology demonstration, and technology deployment.

For the first time, Laboratory researchers used remote sensing technology to observe and discern stack emission inventories from two separate coal-fired power plants. The ability to assign stack emissions to the individual plants will have important and broad reaching application to future air pollution monitoring, domestic public policy, and international green-house gas emission efforts.

Laboratory researchers successfully identified the mechanism for efficiency losses in Quantum Dot – Light Emitting Diodes (QD-LED), and further developed two nano-engineering strategies for circumvention of loss mechanisms. They applied these strategies to the development of an advanced QD-LED with increased efficiency.

Most operations in the plutonium facility were paused for the entire fiscal year, including all high mass glove box operations. Research in the areas of nuclear fuel development, novel material detection capabilities, nuclear emergency response, and training of first response assets have all been adversely impacted by the pause. The unavailability of plutonium research facilities also impacted Am-241 startup planning and execution, negatively impacting DOE mission objectives.

The Laboratory failed to complete the disposition of 3706 cubic meters of transuranic waste by June 30, 2014, as called for in an environmental Framework Agreement with the State of New Mexico. In addition the Laboratory was noncompliant with the Site Hazardous Waste Permit by improperly treating nitrate salt waste streams; and by its failure to reevaluate the Acceptable Knowledge Determination for the waste stream. These noncompliances are suspected as either the cause or a significant contributor to the February, 2014 radiological release at Waste Isolation Pilot Project, which has resulted in the curtailment of legacy transuranic waste processing at Technical Area 54 (TA-54). As a direct result of the waste incident, the nation's only transuranic waste repository has suspended inbound shipments, adversely affecting all facilities that generate these wastes nationally, incurring large costs that cannot yet be accurately computed, and degrading an important regulatory relationship. In addition to the direct and indirect costs and the adverse impact on the regional economy, there is a very high likelihood that the government will ultimately be responsible for significant fines and penalties.

Under separate circumstances, low-level waste shipments to the Nevada National Security Site (NNSS) were suspended for most of the performance year due to slow progress on corrective actions which delayed NNSS approval to restart shipments.

Regarding Project Management and Work Planning, a key groundwater monitoring well which was improperly installed required extensive and costly rework; and after rework, the well is still not acceptable to the regulatory agency for its intended purpose.

The site environmental remediation Life-Cycle Baseline (LCB) was developed using a sound risk scoring process and a campaign projects strategy. The LCB required some rework to address schedule optimization as NNSA partnering was not included for the original submission. Cost estimation work associated with the FY 2014 Integrated Priority List work scope was less than adequate. The Basis of Estimate submitted in the initial Fiscal Year Work Plan was also inadequate. Contracting Officer direction was necessary to define the requirements for the Basis of Estimate.

The Laboratory performed above expectations for both the Individual Permit for Storm Water and Communities for Clean Water. Chromium Project activities aimed at remediating groundwater contamination are progressing in accordance with schedule.

## Performance Objective 4: Operations and Infrastructure

### Summary

Overall, the Laboratory performed well below expectations with respect to Operations. Areas of concern include formality of operations, nuclear and high hazard operations, the earned value management system, and capital projects management. The Laboratory continues to struggle with the timely resumption of mission activities at plutonium facilities, including the Weapons Engineering Tritium Facility.

**Unsatisfactory**

Laboratory transuranic waste processes and a Laboratory waste stream were contributing or causal to a waste incident at the Waste Isolation Pilot Project that resulted in a failure to meet environmental commitments to the State of New Mexico, including the commitment to ship 3,706 cubic meters of transuranic waste from the Laboratory to permanent storage. This sequence of events had an adverse impact on the Laboratory's relationship with the State of New Mexico, and resulted in significantly unplanned costs, disruption of a key waste management capability with a broad adverse impact on the Department, and the diversion of significant expertise from funded mission work to event mitigation and remediation. Although self-disclosed, the Laboratory's Resource Conservation and Recovery Act violations with respect to transuranic waste management compounded the severity of the transuranic waste incident. This incident highlighted a significant failure in the Laboratory's formality and conduct of operations, driving the overall rating of this Performance Objective to Unsatisfactory.

The Laboratory has not resumed numerous operations in Technical Area 55 plutonium facilities after a self-imposed pause initiated in June of 2013. This delay impacted programmatic customers. Many operations are now categorized as "extended shutdown", requiring federal readiness reviews prior to resumption of operations. Specific costly challenges continued in line item project management involving cost estimating, the Earned Value Management System, and project cost and milestone schedule overruns.

The Laboratory performed well in the areas of physical security, several capital projects, implementation of Nuclear Materials Safeguards and Security Upgrade Project, the management of legal actions, and in many aspects of business operations.

Overall, the Laboratory is meeting expectations in delivering effective environment, safety and health management and processes. The Laboratory continues to implement a mature and effective radiation protection program, and has seen benefits from the initiation of a "Top 10" list of Safety and Health continuous improvement initiatives. Examples include a 5-year Integrated Work Management Improvement Plan and a 5-year Exposure Assessment Improvement Plan; a Safety and Health screening process for Work for Others research proposals; progress toward a major revision and simplification of Electrical Safety Policy documents; and improvements to the technical qualification of professional staff.

Seven of the Top 10 Lab-wide Safety Objectives for calendar year were successfully completed. Through these objectives, the Laboratory is achieving a more purposeful balance between benefit and risk, as appropriate for a Research and Development environment.

The Laboratory conducted extensive safety planning and coordination for the 2014 summer student employee cohort, and achieved a result of zero recordable student injuries. The Laboratory completed an 8-year improvement initiative, and was awarded Star status in the DOE Voluntary Protection Program, under OSHA developed standards for recognizing “worksites with comprehensive, successful safety and health management systems”.

The Laboratory is below expectations overall in capital project execution, including earned value management system performance.

The TA-55 Reinvestment Project (TRP) II Phase C project initially experienced delays in achieving Critical Decision points 2/3 due to poor performance in the preparation of critical project documents and in closing corrective actions from project reviews. After some mid-year recovery, performance at year end was again below expectations due to Post CD-2/3 material procurement and resource issues.

The Nuclear Materials Safeguards and Security Upgrade Project was completed in May 2014 within the revised Total Project Cost of \$244.2M, by deferring scope of approximately \$750K. The project exceeded both the original \$221.2M Contractor’s Budget Base and exceeding the Over-Target Baseline date established early in the performance year.

Radiological Liquid Waste Treatment Facility – Low Level Waste Project achieved a timely May 2014 Critical Decision 2 approval and achieved Critical Decision 3 approval one month behind schedule. The RLWTF - Transuranic Liquid Waste subproject is below expectations overall as the contract for design/Preliminary Documented Safety Analysis was not awarded on schedule and the resolution of differences in proposal values and project estimates remain unresolved.

The Transuranic Waste Facility project had several key milestones finish late resulting in the use of several weeks of schedule contingency. Schedule delays resulted from the closure of corrective actions from an Independent Project Review, delays in procurement award preparation actions for Commercial Grade Dedication and construction contracts, and ongoing negotiations with NNSA on an alternative project delivery method other than the standard M&O cost reimbursement model. Although Critical Decision 3 was achieved, lost schedule was not recovered.

A June 2014 DOE IG report on LANSCE Linac Risk Mitigation efforts found that the Laboratory did not adhere to the DOE Order 413.3B, Program and Project Management for the Acquisition of Capital Assets, and did not employ all project management tools required. The report recommended that this and other projects of similar magnitude be brought into full compliance with standards. In response, the Laboratory began formally reporting Major Items of Equipment projects.

The Laboratory was not uniformly effective in obtaining biological and cultural clearances before proceeding with work, leading to reportable non-compliances. The Laboratory destroyed core habitat for a listed species under the Endangered Species Act without obtaining a required Biological Assessment. In other cases, renovations were undertaken on a historic building without proper clearance and approval procedures and excavation was conducted without the required Cultural

Resources protections in an area containing archeological artifacts. These failures reflect adversely on the Department of Energy and on its commitments to cultural and environmental stewardship.

The Laboratory met Physical Security expectations during the performance year, with significant validation from a DOE Independent Enterprise Assessment concluding that Category 1 Special Nuclear Materials continue to be adequately protected. The assessment included specific positive feedback on Protective Force operations, Nuclear Material Controls and Accountability, Protection Program Management, and Physical Protection. The laboratory security and project team continued to pursue an initiative to build a bypass road to divert unofficial travelers from Technical Area 3.

The Laboratory successfully completed and transitioned the Nuclear Materials Safeguards and Security Upgrade Project to operational status; and NNSA has confirmed the effectiveness of the improved system. The Laboratory successfully combined Unmanned Aerial Systems capability with Protective Force operations to provide an enhanced overview of exercise activities and to conduct ongoing surveillance activities.

The Laboratory met expectations in Cyber Security during the performance year, with several successes and some shortcomings. The Computer Security Incident Response team worked closely with other federal cyber security organizations to address threats and to identify attacks. The Laboratory successfully completed the Oracle E-Business Suite Release 12 upgrade, which helped reduce operational risks. The Laboratory's Risk Management strategy encountered several challenges in 2014 to include quality concerns on the Risk Management Framework Level 2 request for authorization. The Laboratory failed a Command Cyber Readiness Inspection conducted by the NNSA Computer Network Defense Service Provider.

In terms of facilities support, the Laboratory has reduced the level of deferred maintenance, in part by redefining standards for deferred maintenance on utilities, and in part by addressing backlogs with savings from innovative practices, such as electronic work packages.

The Laboratory contributed to the Facilities Disposition Working Group, taking significant baselining actions to support future NNSA facilities efforts.

The Laboratory developed a reliable and efficient system for managing real property, with specific improvements in leasing and disposition. Realty actions are submitted timely, are of high quality and require little or no rework.

The Laboratory reduced water usage, but remained behind on reduction targets. Specifically, on Energy Intensity, the Laboratory achieved a 17.5% reduction against a 27% target. On Water Intensity, the Laboratory achieved a 2% reduction against a 14% target. On High Performance Sustainable Buildings a 2% sustainable buildings rating was achieved compared to a target of 13%.

The Laboratory completed all required Energy Independence and Security Act energy and water audits ahead of schedule; and met the targets for metering, fleet, pollution prevention, and renewable energy, while making expected progress on Green House Gas reduction and electronic stewardship/data centers targets.

The Laboratory submitted the final application to Nuclear Regulatory Commission through NNSA for a novel Type B container which would enhance safety and security under the NNSA Off-site Source Recovery Project; an effort that resulted in the issuance of a Certificate of Compliance from NRC.

The Laboratory made substantial improvements to existing fire alarm systems, including nine new fire alarm panel replacements and seven full fire alarm system replacements. The Laboratory actively managed fire protection deficiencies, employing a risk-informed prioritization approach. However, the number of Fire Protection System Impairments institutionally remains high and has consistently been rated “red” in the Laboratory’s own metrics.

Efforts to dispose of or repackage excess plutonium at the plutonium facility were significantly delayed as a result of the TA-55 pause in operations, adversely impacting plans to reduce seismic-related risk. Construction of water drainage and collection features at the Radioassay and Nondestructive Testing Facility was not completed as planned.

In terms of Business Operations strengths, the Laboratory continues to exceed DOE socio-economic subcontracting goals in all six business categories. In support of the NNSA Supply Chain Management Center, the Laboratory has exceeded the Strategic Sourcing Savings Target for FY 2014 of 4%, achieving a savings rate of 5.5% with a total savings of \$19.8M through this initiative. The Laboratory also performed excellent self-analysis and self-disclosure of procurement challenges, discovering shortcomings in the timely execution of subcontract changes notices. In response, the Laboratory reengineered the process for subcontract changes, deploying an Acquisition Practice on the topic that supported improvements in timely and accurate financial reporting on line item capital asset projects. The Laboratory also completed development of curriculum for a subcontract administrator and buyer professional certification program, which is a positive step in improving the consistency and reliability of acquisitions actions. The Laboratory’s progress on addressing these and other self-discovered challenges is a noteworthy positive.

Property management performed at a high level, surpassing the property accountability standards for NNSA, exceeding the standards for all six performance measures in this area and achieving an overall property accountability rate above 99%. Supporting this successful program, 15 Laboratory Property Management employees completed a Property Management Certification program in FY 2014. As a significant noteworthy positive, the Laboratory CFO analyzed, self-discovered, and self-reported internal control weaknesses in the Laboratory Treasury function, addressing weaknesses that have been unidentified for several years. The Laboratory Ethics and Audit group continues to benefit the institution broadly, driving institutional improvement.

Several challenge areas remain for Business Operations. In Human Resources, an approved move to retiree health care exchanges that could yield savings has not been implemented. The Laboratory has had some limited success in reducing costs with some cost control measures undertaken, but a more systematic approach to cost management could benefit the institution and its customers. Challenges in self-discovery, issues management discipline, and trending and analysis persist, resulting in lost opportunities for improvement. Improvements to internal controls were implemented in response to a the Laboratory Ethics and Audit review of the use of Intellectual Property Revenue requested by NNSA which identified internal control weaknesses and challenges in the Control Environment. Documented instances of ethical lapses involving senior Laboratory staff were addressed during the year, which led to changes in procedures, internal controls for the award of subcontracts and

heightened ethics training for senior staff. Workforce management challenges remain in some technical and engineering areas.

Laboratory Counsel (LC) is integrated with Laboratory Staff through involvement on cross-discipline and discipline-specific workgroups. LC continued to suggest and lead implementation of risk management strategies through policy changes, training, and engagement with Laboratory Leadership. LC deliverables met 10 CFR 719 requirements and LC regularly exceeded expectations with regard to communications with and prompt responsiveness to the NNSA Counsel.

Overall, implementation of the Laboratory Criticality Safety Program continues to exhibit weaknesses. Criticality Safety Evaluations contained compliance errors which resulted in inadequate justification for derived criticality safety limits and controls. The plutonium facility's approach to labeling nuclear material is not consistent with applicable standards.

Criticality Safety staffing has improved. The Laboratory Criticality Safety Division is staffed at the highest level in the history of the organization. The staff mix is heavy on junior engineers, but training is being conducted at an accelerated pace and the staff in training are being task qualified to provide tangible value to analysis activities and products.

The Laboratory failed to demonstrate effective formality of operations as highlighted by the improper remediation of nitrate-bearing transuranic waste associated with a contamination event at the Waste Isolation Pilot Plant (WIPP). The impacts include the diversion of key staff from mission work, huge financial costs to the Department of Energy that are still accumulating, failure to meet environmental commitments made to the State of New Mexico, damage to an important relationship with a key state regulatory body, broad adverse economic impacts associated with the suspension of normal operations at the Waste Isolation Pilot Project, and a degradation of public confidence in the conduct of nuclear and high hazard operations at the Laboratory.

Systemic weakness identified during readiness reviews for the Chemistry and Metallurgy Research Facility (CMR), the Confinement Vessel Disposition project and for the Weapons Engineering Tritium Facility (WETF) also reflects Formality of Operations challenges. The CMR Containment Vessel Disposition Federal Operational Readiness Review identified 29 pre-start findings, requiring 8 months for the completion of corrective actions and the subsequent initiation of operations. Programmatic weakness were highlighted in the areas of Operations, Criticality Safety, and Engineering.

Overall, preparations for the start-up and restart of nuclear operations have performed well below expectations. The Contractor Readiness Assessment Team for the restart of WETF operations identified 19 pre-start findings and concluded that readiness was not demonstrated in the areas of Management Systems and Safety Culture, Facility and Equipment status, and Conduct of Operations.

The quality of Laboratory safety basis document submittals required resolution of numerous NNSA comments prior to approval. Additionally, implementation of newly-approved safety basis documents was often delayed or prolonged. During an independent Safety Basis training program assessment, 9 findings were identified and 5 of 8 program objectives were evaluated as "not met". The development of inadequate or incorrect Unreviewed Safety Question Determinations (USQDs) continues to be an issue. The Laboratory sometimes delayed entry into the New Information (NI) / Potential Inadequacy



of the Safety Analysis (PISA) process. Evaluations of the Safety of the Situation (ESSs) were frequently extended beyond their initial expiration date because underlying issues were not resolved on a timely basis. As a positive note, the Laboratory developed a Safety Basis Improvement Plan which awaits implementation.

The Laboratory took a positive step in implementing procedures for identifying and managing Other Equipment Important to Safety (OEITS); key equipment that falls below the safety class and safety significant standards. Master Equipment Lists for nuclear facilities have been upgraded to track OEITS, which will allow for improved configuration control on safety systems.

Independent and self-assessment of the Laboratory Fire Protection Program and other indicators have identified significant program deficiencies with respect to program effectiveness and compliance. Examples include inadequate fire suppression system analyses, numerous maintenance-driven false fire alarms resulting in the cycling of Fire Department resources, and fluctuations in fire water supplies to nuclear facilities that challenge Technical Safety Requirement limits.

The Laboratory developed a comprehensive Safety Culture Sustainment and Improvement Plan that identified needed improvements. The Laboratory has integrated improvements in safety culture and safety conscious work environment into its Voluntary Protection Program. In general, the Laboratory self-discovery, reporting, investigation, and follow-up specific to worker safety issues is good, but critique effectiveness, extent of condition reviews, metrics, and trending continue to be challenges.

NNSA approved the Nuclear Materials Safeguards and Security Upgrade Project for the protection of assets with supplemental security measures in February 2014; and full operational capability without supplemental security measures in March 2014. A DOE Independent Enterprise Assessment Team validated the effectiveness of this system in June and July of 2014.

The Laboratory's line item construction project Earned Value Management System (EVMS) performance is below expectations. Throughout the performance year, the Laboratory worked to address 52 corrective actions which had been identified in a DOE EVMS surveillance review. In August 2014, the DOE Office of Acquisition and Project Management (APM) conducted a For-Cause Review of the Laboratory EVMS, resulting in numerous non-compliance findings that could result in decertification of the Laboratory EVMS.

Specific concerns remain about staff qualifications, project data, key project analysis, compliance to Engineering licensing requirements, cost effectiveness, and protection for the government in connection with in-house design work performed by the Laboratory. The Laboratory continues to experience weakness in the area of engineering design and integrated scheduling, particularly with respect to self-performed work. These challenges have resulted in project schedule delays and cost increases.

The 100% Draft Final design for the Transuranic Waste Facility (TWF) was issued for bid prior to approval of a Preliminary Documented Safety Analysis (PDSA), contrary to DOE Order requirements to integrate safety into design. The final PDSA and final design submitted for approval required significant rework based on review findings from the NNSA integrated project review team.

The Laboratory has satisfactorily performed delegated interim non-acceptance Quality Assurance stamping for Evaluation Use Only (EUO) and Cancellation (X) activities. Laboratory Manufacturing Quality metrics developed during FY 2014 captures pertinent data to support informed product quality decisions and to drive quality improvement. Likewise, the Weapon System Engineering Quality organization has taken proactive measures during FY2014 to improve quality within the Laboratory Design Agency and has demonstrated proactive communication and collaboration with applicable production agencies in support of continual quality improvement.

The Laboratory Product submittal/stamping schedule was not adequately integrated site-wide to identify all submittal/stamping activities requiring NNSA engagement; and the submittal/stamping schedule did not provide the requisite timely notification for NNSA approval activities. Multiple products scheduled for delivery throughout the year were submitted at the end of the fiscal year, stressing quality approval processes. The Laboratory was not timely in addressing Corrective Actions. The Laboratory's packaging and shipment of Structural Mock-Up product experienced delays and recurring issues. While the Laboratory's initiative effort to improve product build book documentation is a positive step, failure to involve all stakeholders resulted in a new set of issues and problems with certifying and accepting product. The Laboratory did not meet expectations in the integration planning and execution for United Kingdom (UK) requirements associated with Procurement Atomic Weapons Establishment work.

## Performance Objective 5: Leadership

### SUMMARY

Acknowledging institutional scientific and research excellence and recognizing the Laboratory operator's voluntary commitments to the community, as well as the positive leadership responses to significant challenges, the Laboratory's significant shortcomings during the performance period do not reflect favorably on Laboratory management in the context of this Performance Objective, resulting in a Satisfactory rating.

During the performance period, the Laboratory was operationally, reputationally, and financially impacted by several issues. Deficiencies in regulatory compliance and in the physical management of transuranic waste streams contributed to or resulted in the closure of the only waste repository serving the Department of Energy. The impacts include the diversion of key staff from mission work, huge financial costs to the Department of Energy that are still accumulating, failure to meet environmental commitments made to the State of New Mexico, damage to an important relationship with a key state regulatory body, broad adverse economic impacts associated with the suspension of normal operations at the Waste Isolation Pilot Project, and a degradation of public confidence in the conduct of nuclear and high hazard operations at the Laboratory.

Throughout the performance period, nuclear operations were suspended at most plutonium-related production and research facilities at the Laboratory. NNSA appreciates the Laboratory's 2013 decision to cease operations to address longstanding, documented concerns with Criticality Safety and Formality of Operations, but the Laboratory's application of resources for re-starting resulted in a performance year in which the workforce and facilities did not significantly contribute to productive programmatic use.

During the performance year, there were instances of ethical lapses involving senior Laboratory staff, as was the case in the previous performance year. The Laboratory continued to experience challenges in construction management and in deploying and exercising best industry practices to promote construction management success, including the Earned Value Management System. While there were significant accomplishments during the reporting period, the impact and gravity of documented shortcomings overwhelm those accomplishments and reflect a negative trend in leadership performance; constituting performance that is below expectations.

As positives, the leaders of the Laboratory were successful in maintaining and leveraging the tremendous capabilities of the legacy workforce to deliver discovery and innovation in Science, Technology, and Engineering. Close attention was paid to preserving and building upon the capabilities of the Laboratory's workforce and facilities, and Laboratory leaders pursued voluntary community activities and contributions that built and strengthened stakeholder relationships in the region.

The Laboratory developed and deployed a [Strategic Plan](#), which provided a high-level framework for codifying the Laboratory's broad goals and objectives.

The Laboratory fulfilled most of a longstanding commitment to reduce key personnel staff by eliminating two Assistant Director positions and by eliminating associated support staff positions. This was a positive and constructive step to realign the Laboratory leadership team with the resized overall laboratory workforce.

Laboratory senior management displayed a strategic perspective in decision making with regard to specific initiatives, such as the use of the Supply Chain Management Center, the conversion of void space into laboratory space, and renewal efforts in aging scientific facilities. The Laboratory leadership engaged fully and effectively with NNSA leadership to manage and mitigate the adverse consequences of a highly disruptive lapse in funding early in the fiscal year.

As a key performance and accountability issue, the Laboratory was involved in a waste incident at the Waste Isolation Pilot Project that resulted in a failure to meet environmental commitments to the State of New Mexico, including the longstanding commitment to ship 3,706 cubic meters of transuranic waste from the Laboratory to permanent storage. This sequence of events had an adverse impact on the Laboratory's relationship with the State of New Mexico, and resulted in significantly increased costs, disruption of a key waste management capability with a broad adverse impact on the Department, and the diversion of significant expertise from funded mission work to event mitigation and remediation. Although self-disclosed, the Laboratory's Resource Conservation and Recovery Act violations with respect to transuranic waste management compounded the severity of the transuranic waste incident. Laboratory leadership responded in a proactive manner to deal with this significant challenge. They applied resources to rapidly perform critical self-assessments and acted quickly to remediate issues while being transparent with Federal partners.

The Laboratory has not resumed numerous operations in Technical Area 55 plutonium facilities after a self-imposed pause initiated in June of 2013. This delay continues to impact programmatic customers. Many operations are now categorized as "extended shutdown", requiring federal readiness reviews prior to resumption of operations. Further, specific costly challenges continued in line item project management involving cost estimating, the Earned Value Management System, and project cost and milestone schedule overruns.

The Laboratory experienced several ethical lapses involving senior management staff. In response, specific steps were taken to address challenges associated with high visibility improper payments and improper subcontracts, including revisions to ethics policies, enhanced ethics training, and more prominent distribution of ethics policies. In response to an NNSA-requested audit of intellectual property revenue, additional improvements in internal controls were implemented. The work of the Laboratory Ethics and Audit group and the Laboratory CFO to identify and address internal control weaknesses are noteworthy positives.

The Laboratory made progress in evolving a Contractor or Management Assurance System to support sound institutional resource use and decision making. Attention to Risk Management by the Laboratory senior management team, with transparent visibility to federal partners, stands out as an area of institutional strength. Challenges remain in self-discovery, self-reporting, effective issues management, and trending and analysis. The tempo of maturation of the Assurance System was adversely impacted by repeated organizational and personnel changes within this function.

The Laboratory continues to perform well as a leader across the complex by contributing heavily to DOE socio-economic subcontracting objectives. Likewise, it is a noteworthy positive that the Laboratory operators continue to devote substantial earned fee resources to local and regional community initiatives, when that commitment to the community is no longer required under the contract. This aspect of institutional leadership merits significant positive recognition and consideration as a mitigating factor against other shortcomings.

During the reporting period, the Laboratory continued to display excellence in Science and Technology, in advancing the new Plutonium Strategy, and in a number of support areas. However, in several areas longstanding challenges remain present, including the resumption of Technical Area 55 plutonium operations, Criticality Safety, Safety Basis, Formality of Operations, Project Management and Earned Value Management System Administration, Quality Assurance; and significant, costly challenges associated with Laboratory waste shipments.