



National Nuclear Security
Administration

Lawrence Livermore
National Security, LLC

Performance Evaluation
Report (PER)

NNSA Livermore Field Office

Evaluation Period:
October 1, 2018 –
September 30, 2019

December 12, 2019

Executive Summary

This Performance Evaluation Report (PER) provides the National Nuclear Security Administration (NNSA) assessment of Lawrence Livermore National Security, LLCs (LLNS) performance of the contract requirements for the period of October 1, 2018 through September 30, 2019, as evaluated against the Goals defined in the Performance Evaluation and Measurement Plan (PEMP). The NNSA took into consideration all input provided (e.g. CAS, Program Reviews, etc.) from NNSA Program and Functional Offices at Headquarters and in the field.

LLNS earned Excellent ratings on Goals 1-4, exceeding expectations on nearly all Objectives and Key Outcomes. It continued to successfully deliver on our nation's challenging stockpile requirements and lead the Weapons Laboratories in strengthening the underpinning and future of stockpile stewardship. LLNS also continued to successfully deliver at a very high level across the balance of the NNSA mission portfolio including Non-Proliferation, Emergency Management, Incident Response, and Nuclear Counterterrorism while effectively supporting DOE and Strategic Partnership Project (SPP) programs. The National Security missions were successfully executed by leveraging and advancing the frontiers of Science, Technology, and Engineering (ST&E). LLNS earned Very Good ratings on Goals 5 and 6 by exceeding expectations on many Objectives and Key Outcomes with relatively few issues.

Performance against the Goals summarized below resulted in an overall rating of Very Good for LLNS. Specific observations for each Goal are provided in the following pages.

Goal-1: Manage the Nuclear Weapons Mission LLNS Amount of At-Risk Fee Allocation: \$10.58M

LLNS earned a rating of Excellent and 91% of the award fee allocated to this Goal. LLNS exceeded nearly all of the Objectives and Key Outcomes and met the overall cost, schedule, and technical performance requirements with accomplishments that significantly outweigh very minor issues. No significant issues in performance exist.

LLNS successfully completed nearly all of the nuclear milestones (142) for the year including the NNSA Defense Programs (DP) Level 1 (L1) milestone (Predictive Capability Framework (PCF) Pegpost: Comparisons of Off-Nominal Performance), with only three (L2) milestones not completed. LLNS performed at an exemplary level on the Defense Programs "Getting the Job Done List" (GTJDL) activities.

LLNS successfully completed the Cycle 23 Annual Assessment in support of GTJDL activities. LLNS also successfully completed surveillance deliverables for the B83, W80, and W87 to support weapon assessments, and provided the required technical support for Limited Life Component Exchange maintenance. LLNS continued to perform assessment activities for the Cycle 24 Annual Assessment. LLNS was on track to close out high priority Significant Finding Investigations in accordance with the currently approved baseline

closure plans.

LLNS exceeded expectations in its support for the new W80 Joint Test Assembly (JTA) post-test debris shipping/removal process. LLNS successfully completed data analysis of the 50+10 Study to improve the W80 annual assessment. LLNS provided technical support for the W80 ALT 369 Nuclear Explosives Change Evaluation, the Trajectory Sensing Signal Generator path forward, and dispositioned production and non-conforming product issues. LLNS supported the W80 Integrated Surety Architecture Product Realization Team (PRT). LLNS provided critical support to NNSA and Pantex in addressing high priority B83 Issue Resolution Group and successfully completed Phase 1 activities that supported the JTA build. LLNS shipped a significant number of classified parts to support the weapon component disposition project.

LLNS completed work as negotiated with program sponsors and partners, meeting requirements for Weapon Surety and Quality based on implementation of Assurance and Surety milestones. LLNS supported Nuclear Explosive Safety activities. LLNS successfully completed requirements for Nuclear Enterprise Assurance Program Activities.

LLNS provided excellent design and prototype support on all Ground-Based Strategic Deterrent integration activities, engaging with the Air Force and Joint Environmental Test Unit (JETU) Product Realization Teams. LLNS also baselined designs for JETU to support Stockpile-to-Target Sequence development.

LLNS provided Product Realization Integrated Digital Enterprise (PRIDE) Program support as the PRIDE Chair and Site representative as well as ongoing support for Collaborative Authorization of the Safety basis Total Lifecycle Environment (CASTLE-PX). LLNS led the Enterprise Modeling and Analysis Consortium (EMAC), Nuclear Explosive Package (NEP) commodity model, supported an EMAC analysis for DoD Nuclear Posture Review, and completed its analysis on weapon risk years for inclusion in the 2019-20 Planning and Production Directive

LLNS completed the joint L1 milestone (SCDS Pegpost) – Secondary Off-Nominal Performance. The milestone supported the evolving stockpile and broadens the option space for the future deterrent. Work included a joint investigation with the Los Alamos National Laboratory (LANL) of three sets of underground nuclear tests, execution and analysis of HED experiments, and application of new modeling methodologies. LLNS completed Primary Assessment Technologies, Dynamic Materials Properties, and Secondary Assessment Technologies requirements, including collection and analysis of nuclear data, experiments and analyses related to plutonium aging and weapons' boost, ramp compression experiments.

LLNS support of the Hydro and Enhanced Capabilities for Subcritical Experiments program was outstanding. LLNS successfully completed the Ediza subcritical experiment, which was the first LLNS subcritical experiment in 15 years. The experiment provided excellent results in spite of an initial delay due to regulatory/safety issues related to the containment vessel.

LLNS successfully completed work at the National Ignition Facility (NIF) by executing 393 total shots, including 160 High Energy Density (HED) shots, and 94 Inertial Confinement Fusion (ICF) shots. LLNS performed 3 NIF shots in support of High Z Opacity Measurements and Secondary Assessment Techniques. In addition, LLNS completed all 11 ICF milestones on schedule. LLNS made significant progress in NIF target fabrication in Science, Technology, and Engineering. LLNS also completed the installation of two new gloveboxes at NIF that will allow it to make twice as many diffraction targets while supporting both material strength and Equation of State (EOS) campaign target fabrication, increasing both fabrication and throughput capacity by at least 50%. However, three scientific milestones (6513 Readiness of Ramp Compression Platform at NIF for High Z Experiments, 6526 Joint Actinide Shock Physics Experimental Research (JASPER) Operations, and 6527 Sound speed data from JASPER) were not completed due to Superblock issues. Contributing factors included, late material deliveries from LANL and Device Assembly Facility (DAF) operation issues. Work related to thermodynamic impacts of aging plutonium not completed on time due to scheduling issues which were ineffectively communicated to HQ.

In Plutonium Sustainment, LLNS successfully completed all nine L2 milestones on schedule. LLNS supported pit production schedules by completing activities related to Design production support and process qualification. In addition, LLNS provided PRT support and management. LLNS started certification testing on special material received from LANL and began qualification testing by processing material to support fire resistant pit tests. LLNS redesigned and tested the gate assembly in time to be remanufactured by Kansas City National Security Campus and supported LANL's final build of the fiscal year.

LLNS successfully completed all Stockpile Responsiveness Program L2 milestones. LLNS did an excellent job in Advanced Certification & Qualification with an emphasis on demonstrating the use of advanced manufacturing techniques to accelerate prototyping and production.

LLNS completed all of its Weapon Technology Development (WTD) L2 milestones and played an integral role in maturing technologies for future systems and participating in Technology Realization Teams.

LLNS completed all hardware deliverables and deadlines and contributed expertise to the Joint Technology Demonstrator (JTD) and Air Force/NNSA Demonstrator Initiative programs. LLNS constructed an NEP for the JTD Work Stream 2 Ground Test Unit with Mock components, completed deliverables for NEP Activities, and successfully tested 3 of 3 shots using laser detonators and explosives. There have been some communication issues both internal to LLNL and to HQ involving exchange of information and with WTD activities. All parties are engaging to rectify this and establish a path forward for FY2020.

LLNS completed all of its Delivery Environments and Nuclear Survivability L2 milestones. LLNS utilized the Livermore Flight Test Unit Perception system to develop and deliver a sensor process system capable of monitoring a device to provide operational information for tracking, detecting, and classifying structural changes or anomalies in a weapon during

mission flight. LLNS also demonstrated significant progress in developing experimental configurations utilizing Sandia National Laboratory's Annular Core Research Reactor. These capabilities will directly support certification and qualification activities for the W87-1 and other future weapons programs.

For the Phase 6.X, product realization processes and activities in support of Life Extension Program (LEP). LLNS successfully completed all work as planned. LLNS exceeded expectations for the W80-4 LEP as it executed the scheduled W80-4 Phase Gate and Design Reviews. LLNS also provided all required deliverables to the Federal Program Office in addition to supporting early development/design efforts. LLNS exceeded expectations related to program warhead-to-missile interface/support and facilitated and executed Joint DOE/DOD Hydrodynamic tests to validate missile/warhead design and performance parameters/requirements.

LLNS supported all W87-1 Programs, LLNS supported all program goals and plans through monthly reporting; program plans; work breakdown structure development; Product Realization Team formation; Integrated Product Teams; support of Navy Feasibility Study; surety down-select analysis; and participation in W87-1 Project Officer Group. LLNS technical highlights included significant progress in maturing the LEP, developing design options and developing advanced manufacturing techniques for key components. LLNS completed the W76-2 Inter-laboratory Peer Review ahead of schedule in December 2018 in support of the compressed Phase 6.3/6.4/6.5 NWC authorization. LLNS provided excellent support for the B61-12 Independent Peer Review feedback for nuclear components.

LLNS executed 4 Integrated Weapon Experiments (IWE) at the Contained Firing Facility and 2 IWEs at LANL's Dual Axis Radiographic Hydrotesting Facility in support of LEPs. LLNS executed 650 experiments at HEAF, primarily in support of the LEPs. At JASPER, LLNS successfully executed a development experiment to validate the new Flash X-Ray and Continuous X-Ray capabilities.

LLNS completed all Advanced Simulation and Computing deliverables on time and on schedule. LLNS excelled in the activities to deliver the Sierra HPC system and successfully completed high priority and high resolution weapon calculations. LLNS developed new computer models, techniques and algorithms that will support future Directed Stockpile Work applications and other external stakeholders. LLNS effectively transitioned Sierra to the classified environment and made significant progress on non-recurring engineering for the El Capitan Exascale class computer. LLNS performed high priority weapons calculations on Sierra, achieving processing times up to 30 times faster on 3D simulations. LLNS efforts on integrated codes, physics and engineering models and verification and validation demonstrated substantial progress. The acquisition of NNSA's first Exascale system, code named El Capitan, was on schedule with the awarding of two contracts (Non-recurring Engineering and Build contracts) in July 2019.

Goal-2: Reduce Nuclear Security Threats
LLNS Amount of At-Risk Fee Allocation: \$1.51M

LLNS earned a rating of Excellent and 95% of the award fee allocated to this Goal. LLNS exceeded nearly all of the Objectives and Key Outcomes and met the overall cost, schedule, and technical performance requirements with accomplishments that significantly outweigh very minor issues, if any. No significant issues in performance exist.

LLNS provided effective programmatic support to key functional areas to enable nuclear security infrastructure and capacity building activities with international partner countries. LLNS furnished subject matter expertise for physical protection, cyber security, insider threats, and transportation security for nuclear material in transit. LLNS led efforts to secure nuclear materials and radiological facilities in the Europe, Africa, South and Central Asia, and Middle East regional portfolios. LLNS initiated radiological security scope at facilities in Algeria, renewing bilateral cooperation. LLNS led the regulatory documents and procedures team and co-led the international forensics work for Nuclear Smuggling Detection and Deterrence. LLNS accomplished a number of time-sensitive deliverables and demonstrated effective cost control.

LLNS provided scientific leadership in nuclear test monitoring, including the Source Physics Experiment and the Low Yield Nuclear Monitoring venture, managed a unique international scientific collaboration to demonstrate a detection capability, and played a leading role in international scientific symposia. In addition, LLNS set the standard within the DOE complex in detection materials research and development for improved gamma and neutron detection, leading to new detection systems with increased sensitivity and effectiveness. LLNS improved nuclear data libraries, and successfully transitioned nuclear forensics applications and analysis techniques to users. LLNS provided principal technical leadership and project management of Defense Nuclear Nonproliferation Research and Development's Advanced Data Analytics for Proliferation Detection project, overseeing efforts to develop artificial intelligence capabilities to detect and characterize proliferation-relevant activities including nuclear test preparation and radiochemical processing.

LLNS provided valuable contributions to the Comprehensive Nuclear-Test-Ban Treaty Organization's International Monitoring System and International Data Centre, including presentations at expert meetings. LLNS effectively maintained the Chemical Weapons Convention analytical laboratory certified by the Organization for the Prohibition of Chemical Weapons and received an A grade. LLNS led Health and Safety team and equipment readiness to support Nuclear Verification missions. LLNS provided expert support for nuclear safeguards and security by supporting the 9th Annual Joint Steering Committee meeting, and the 31st United States-Japan Permanent Coordinating Group Meeting for Cooperation in the Field of Nuclear Nonproliferation.

LLNS also provided quality support to the Graphite Isotope Ratio Method (GIRM) Project, hosting a successful 2019 GIRM Program Review and ensuring readiness of Secondary Ion Mass Spectrometry measurement techniques. LLNS provided timely, effective, and efficient

review of Department of Commerce export licenses. LLNS effectively executed and analyzed data from the successful field trial of headspace gas sampling in support of the Uranium Hexafluoride Age Dating Project and led the tri-laboratory Uranium Sourcing Project.

LLNS successfully sponsored the Federal Radiological Monitoring and Assessment Center Laboratory Analysis Working Group Meeting. LLNS provided response team and technical support to the contamination incident at the Harborview Medical Center in Seattle, WA, and to the Woolsey Fire occurring near the Santa Susana Field Laboratory. LLNS planned and participated in the Oak Ridge Site Office exercise, a recovery exercise as a follow-on to Cobalt Magnet 2019, and the Donald C. Cook Nuclear Power Plant exercises. LLNS participated in planning and executing an exercise to validate our ability to support the Office of Foreign Disaster Assistance. LLNS supported activities in support of the July 4th celebration in Washington, DC and the Stabilization program with technical experts in the field. LLNS supported various technical drills and several public events in support of the Counterterrorism and Counterproliferation program and incident response.

Goal-3: DOE and Strategic Partnership Project Mission Objectives
LLNS Total Fee Allocation: \$1.50M (\$.45M FF + \$1.05M AF)

LLNS earned a rating of Excellent and 95% of the award fee allocated to this Goal, exceeding nearly all of the Objectives and Key Outcomes and meeting the overall cost, schedule, and technical performance requirements with many accomplishments that significantly outweigh very minor issues, if any. No significant issues in performance exist.

LLNS successfully executed high-impact work for DOE and SPP Mission Objectives. This work is strategically integrated with the national security mission of NNSA and leverages, sustains, and strengthens many of the laboratory's unique capabilities and skill such as computations, advanced manufacturing, laser science and technology, and bioengineering. LLNS earned numerous prestigious awards from professional societies and U.S. Government sponsors demonstrating the quality of the work and its strategic value. Two scientists from LLNS were recipients of the DOE's Office of Science Early Career Research Program award.

LLNS made numerous key scientific and technical achievements for DOE and SPP sponsors. This work was strategically integrated with the national security mission of the NNSA and leverages, sustains, and strengthened many of LLNS' unique capabilities and skills, such as, computations, advanced manufacturing, laser science and technology, and bioengineering. LLNS provided key support and leadership to the DOE Exascale computing initiative, a \$3 billion effort to develop the next generation of supercomputers. For the first time, LLNS and collaborators demonstrated a method to stabilize the Z pinch, a technology that sustains fusion using a column of plasma with an electrical discharge. The approach provided a path to nuclear fusion without magnetic coils or large lasers with the potential to be used for long-duration fusion burns in a compact and low-cost device. Additional noteworthy accomplishments included the creation of polymer-based membranes with

1.5-nanometer carbon nanotube pores that mimic the architecture of cellular membranes; the development of a table-top laser-based carbon-14 spectrometer interfaced to liquid chromatography that was 200 to 300 times more sensitive than tools on the market today; and the discovery of a way to determine how many cancer cells it took to initiate metastatic tumors. To develop defenses against cyberattack, LLNS developed Skyfall, a combined cyber-physical hardware-in-the-loop testbed that connected real-world equipment with high performance computers. Skyfall helped researchers learn how to build security into the design of critical infrastructure, strengthening the fidelity of simulations that help the United States prepare for disaster. LLNS published its findings in a number of scientific journals including *Scientific Reports*, *Advanced Materials*, and *Journal of Advances in Modeling Earth Systems*.

High impact work for Strategic Partnership sponsors included LLNS' neuro-tech innovation, the flexible implantable neural multi-electrode arrays, which was featured at the Defense Advanced Research Projects Agency 60th Anniversary Symposium, Systems-Based Neuro-technology for Emerging Therapies (SUBNETS) program. LLNS, in collaboration with other researchers, successfully utilized the arrays to monitor, record, and stimulate brain regions in patient volunteers who were undergoing neurosurgical procedures as part of its clinical treatments for epilepsy and other neurological conditions. LLNS implantable arrays enabled a precise therapy to produce specific neural and behavioral responses, which is central to the SUBNETS program. Through a second partnership in support of efforts to defend soldiers and first responders against bioterrorism and biowarfare, LLNS made exciting breakthroughs in subunit vaccine research. The LLNS team became the first to demonstrate a subunit vaccine capable of providing 100 percent protection in test animals against *Francisella tularensis*, the pathogen that causes the dangerous disease tularemia, for which there is no approved vaccine.

Goal-4: Science, Technology, and Engineering

LLNS Total Fee Allocation: : \$15.97M (\$12.95M FF + \$3.02M AF)

LLNS earned a rating of Excellent and 95% of the award fee allocated to this Goal. LLNS exceeded nearly all of the Objectives and Key Outcomes and met the overall cost, schedule, and technical performance requirements with accomplishments that significantly outweigh very minor issues, if any. No significant issues in performance exist.

LLNS' research strategy and investments, including the Laboratory Directed Research and Development (LDRD) program, successfully advanced the frontiers of science while maintaining a strong foundational expertise in core competencies, and developing the skills of the workforce. LLNS' research developed excellence in core capabilities and impact DOE/NNSA missions; produced new intellectual property, resulting in high profile publications; enabled workforce development and staff retention; and expanded the frontiers of ST&E. LLNS launched a pilot "disruptive research" (DR) component to the LDRD Program, which will embody new concepts with a high level of technical risk in the hope of achieving high-reward results that may yield transformative science and

technology to advance LLNS missions, with nine DR's funded.

National Ignition Facility's (NIF) high-energy density experiments generated results that are critical in support of the W80-4 Life Extension Program. A LLNS team showed how certain characteristics in high explosive materials can significantly impact performance and safety. LLNS' partnership with UC Santa Cruz delivered a first-of-its-kind, high-power, fiber-based sodium laser guide star. The device operated five to ten times more efficiently than the state-of-the-art dye-based sodium laser guide stars currently used at observatories. LLNS researchers and collaborators developed a breakthrough high-speed additive manufacturing method, which significantly advanced the science.

LLNS continued to invest in developing its ST&E workforce and attracted, developed, and retained high-caliber employees. LLNS received a Glassdoor Employees' Choice Award for "Best Places to Work U.S." list. LLNS staff received numerous notable awards and fellowships from ST&E communities, including 2018 Fellows of the American Physical Society (APS), Fellows by The Optical Society of America (OSA), Woman of the Year for the 16th Assembly District by Assembly Member Rebecca Bauer-Kahan and Presidential Early Career Award for Science and Engineers (PECASE) the highest honor bestowed by the United States government on scientists and engineers.

LLNS performed well in innovation and technology transfer to industry through partnerships that include both Corporate Research and Development Agreement and licensing agreements. LLNS researchers were awarded three Department of Energy Technology Commercialization Fund (TCF) cooperative development grants, two technology maturation grants, and a Federal Laboratory Consortium (FLC) national award for excellence in technology transfer.

Goal-5: Operations and Infrastructure

LLNS Amount of At-Risk Fee Allocation: \$9.07M

LLNS earned a rating of Very Good and 85% of the award fee allocated to this Goal. LLNS exceeded many of the Objectives and Key Outcomes and met the overall cost, schedule, and technical performance requirements with accomplishments that greatly outweigh issues. No significant issues in performance exist.

Environment, Safety, Health, and Quality programs provided support to mission execution in an effective, efficient, and responsive manner with some issues noted in nuclear operations. LLNS' focus on continuous improvement resulted in NNSA approval of a revised Radiation Protection Program, a transition to a single Radiation Control Manual, and improved safety culture in radiological work activities. LLNS maintained a high level of safety performance in industrial and construction safety despite significant increases in construction workload completing 290,000 man-hours of work with no recordable incidents. The Industrial Hygiene group effectively addressed the lead contamination event in Building 131 and the manganese overexposure incident from welding operations. LLNS continued to enhance and modernize the approach to Explosives Safety Site Plan

development and implemented an excellent, comprehensive Explosives Handling certification program. A series of electrical lock out/tag out (LOTO) events across the site, including two events where workers knowingly worked on 480 volts when they were not protected by LOTO, highlights a need for management attention.

The ES&H Directorate's Environmental Functional Area streamlined processes to ensure more effective and efficient collaboration with external environmental regulatory agencies. LLNS was re-accredited by the Accreditation Association for Ambulatory Health Care and performed a major reconstruction of one of its Select Agent Facilities to ensure that non-select agent work is relegated to appropriate laboratories. LLNS had no gaps in quality performance as it overcame staffing challenges in the Management Assurance System Office, successfully completing ISO 9001:2015 Recertification and ISO 14001:2015 and OHSAS 18001:2007 surveillance audit activities.

While LLNS showed some areas of strength in Nuclear Operations, issues and events in nuclear and radiological facilities highlighted areas of weakness in conduct of operations and work planning and control that need management attention. Poor conduct of operations while testing a furnace in Building 332 resulted in damage to three adjacent gloveboxes requiring operations in those gloveboxes to be temporarily suspended. Poor work planning of radiological work in Buildings 151 and 331 resulted in reportable spreads of contamination; the Building 331 Tritium Processing Station programmatic work was impacted for over 2 months. Deliberate operations for Superblock were declared due to a rise in safety and quality issues across many work activities; some improvements in documentation and processes were noted during and after the period of the deliberate operations. Startup Notification Reports continued to be of good quality and the improvements made to the Readiness Review Board process appear to be enduring. LFO has noted several issues with respect to the quality and timeliness of safety basis related documents due to LLNS staffing challenges. LLNS' Weapons and Complex Integration Directorate did not adequately develop and execute an integrated schedule for material equivalency readiness activities. As previously noted, LLNS could improve performance by increasing integration among its nuclear facility programs, operations, and support organizations for better planning and more effective and efficient use of resources.

LLNS continued to safely and compliantly manage waste by meeting its regulatory and program commitments for environmental restoration and long-term stewardship. LLNS worked to secure equipment, develop and implement work control documents and facility authorization documents. LLNS' readiness assessment was of good quality and no significant findings were identified during the follow on federal readiness review. Once readiness was declared, LLNS successfully completed the characterization of over 450 drums and is continuing with the characterization required for certification. Certification is required to start off-site shipments to the Waste Isolation Pilot Plant (WIPP) in Q2 FY 2020. LLNS established an enduring TRU waste WIPP certified program that will allow TRU waste disposal to the WIPP on a yearly basis versus a campaign basis,

LLNS partnered with LFO, NA-19, and NA-50 to create Area Plans for infrastructure and program capital projects. LLNS hosted a successful NA-50 Deep Dive in June 2019, which

was noted as one of the best to date. LLNS has been responsive to an immediate need for additional and higher quality office space and commenced projects for two new office buildings. LLNS' Enterprise Asset Management System Move Management System will foster more efficiency, address immediate and future growth, and update the quality of current and limited office space. However, LLNS did not execute work expeditiously in the direct funded maintenance program and needs to reduce its maintenance carryover. The NNSA Cooling and Heating Asset Management Program costed 20% below LLNS projections.

LLNS met or exceeded expectations on its three capital asset projects. LLNS exceeded expectations on the Expand Electrical Distribution System project which is currently executing the work approximately \$1.8M under budget and three weeks ahead of schedule. The project team reacted quickly to the discovery of a second area of unexpected underground contamination and mitigated impacts. LLNS met expectations on the Exascale Computing Facility Modernization (ECFM) and Advanced Sources and Detectors (ASD) projects. The ECFM project successfully completed CD-3A for long lead items and preparation for CD-2/3B. ASD is a joint project that includes four M&O sites (LANL, LLNL, NNSA, and SNL), for which LLNS met expectations overall. The establishment of the LLNS Project Management Office is a positive development towards strengthening project management and has resulted in more consistent project reporting. LLNS prepared and delivered the Program Requirements Document and Mission Needs Statement for the proposed B256 Digital Infrastructure Distribution Center on time. LLNS demonstrated early progress on the Emergency Operations Center project, meeting expectations. Under a new NA-50 project pilot effort, the team was able to quickly transition to a new approach and management structure. Project planning for D&D projects could be improved. For example, early progress on the B175 D&D project has been slow with the request for proposal delayed (not issued) and demolition not scheduled to begin until late FY2021.

LLNS continued to improve security performance. LLNS effectively managed its fiscal responsibilities while modernizing and upgrading LLNS' physical security infrastructure. This was demonstrated by reducing LLNS' Site 200 Limited Area by 15% without degrading the site's overall security posture. Other accomplishments include the on-time and under-budget completion of the Vasco Post Canopy Project, saving nearly \$181k; completion of the Tactical Operations Center upgrade; replacement of non-compliant Vault-type Room locking mechanisms; enhancement of lighting; and General Access Area expansion surrounding the Advanced Manufacturing Laboratory. LLNS managed security risk by eliminating the need for three active security Deviations, bringing the non-compliant rooms/facilities into compliance in a cost-effective manner. LLNS continued to improve its oversight/management of its locks and keys program. LLNS' work resulted in the identification of 99% of key role holders and the revision of 59% of Locking Plans. The LLNS also implemented a wireless initiative to further improve security management of locks and keys activities. LLNS' commitment to a strong security culture has led to a 33% reduction of significant security incidents (Category A - Security Interest) since last year. This was enhanced by continuous improvement activities such as expos and demonstrations and the recognition of personnel for outstanding attention to security through the Eagle Eye award program. LLNS needs to continue to make improvements to

reduce the risk of unauthorized vehicular access

LLNS met expectations in cybersecurity, employing new software tools and metrics to improve cyber compliance. LLNS continued to lead the development of the enterprise Infrastructure Site to host CERBERUS / NESTOR (ESN 2.0). The Product Realization Integrated Digital Enterprise (PRIDE) program continued to maintain numerous critical IT tools and to process and collaborate with Sandia National Laboratory to verify software upgrades and replacements. LLNS developed the Skyfall project, which investigates and develops defenses against cyber-attacks to the electrical grid and other integrated systems using the LLNS high performance computing capabilities and actual electrical grid hardware and software.

LLNS completed all deliverables for the site's emergency management program and exceeded expectations in the areas of notifications and accountability. Specifically, AtHoc was expanded to address notifications for timely important information and was successfully used in the annual exercise to supplement protective action notifications. Additionally, LLNS completed a pilot project using Tesa badge readers to automate its disaster personnel accountability process, enabling a faster and more effective process.

LLNS exceeded expectations in institutional maintenance by establishing a state-of-the-art computer maintenance management system that integrated LLNS maintenance management programs and is fully aligned and integrated with NNSA's crosscutting initiatives. LLNS is on track to implement a greatly improved maintenance balanced scorecard report with appropriate key performance indicators. While there are challenges in meeting site sustainability goals due to increased mission and staffing requirements, LLNS' Advanced Electric Metering System requires management attention due to the large number of broken meters and lack of data analysis.

LLNS received an excellent overall rating for Financial Performance, excelling in financial management, financial transparency, budget formulation and internal controls during FY 2019. LLNS received a rating of pass in all measures and special recognition for 11 commendable practices. Property Management was rated "Excellent" with all four physical inventories accomplished on time. One area of concern is the increase in high-value government property items being lost or stolen from employees' vehicles, at coffee shops, airports, etc. LLNS continues to promote property awareness for safeguarding LLNS-issued government property while offsite. LLNS Supply Chain Management (SCM) scored an "Outstanding" rating on the Objectives Matrix. LLNS' extensive use of strategic sourcing has yielded savings of \$31.5 million against a total invoice spend of \$683.9 million. The LLNS small business program exceeded the overall goal by 4% and LLNS strengthened the program using a targeted approach with the implementation of a more aggressive outreach program. The SCM program was recognized with over 20 individual, team and supplier awards at all levels. While LLNS staff made efforts to partner with NNSA to better align compensation practices with the enterprise, progress was slow.

LLNS' Office of the General Counsel has exercised sound judgment and effectively represented the Laboratory in challenging legal matters this year. The Office's effective

advocacy was demonstrated by the successful execution of a new contract with Alameda County for fire protection services and by the reduction of ongoing litigation involving the Laboratory.

Goal-6: Leadership

LLNS Amount of At-Risk Fee Allocation: \$6.04M

LLNS earned a rating of Very Good and 90% of the award fee allocated to this Goal. LLNS exceeded many of the Objectives and Key Outcomes and met the overall cost, schedule, and technical performance requirements with accomplishments that greatly outweigh issues. No significant issues in performance exist.

LLNS was actively engaged in the NNSA Strategic Vision process and provided appropriate and timely input. A detailed Laboratory Strategic Plan is in place that is well aligned with the NNSA Vision and reflects an appropriate direction for future success in a changing world. LLNS issued a FY2019 LLNS Investment Strategy for Science and Technology which outlines the near term priorities for the Laboratory-Directed Research and Development program investments.

LLNS demonstrated improvement to Site Governance through Integrated Health of the Program (IHOP) process collaboratively and transparently with LFO utilizing contractor assurance data. LLNS' Functional Management Reviews for performance improvement and leadership and participation in NNSA peer reviews at Sandia National Laboratory, Y-12, Pantex, and Los Alamos National Laboratory serve as good examples of parent company involvement and commitment.

LLNS Senior Management remained actively engaged in supporting the overall DOE/NNSA Mission through its participation and leadership on numerous Boards, Councils, and working groups. These include the Board of Directors for the DOE Exascale Computing Project, the NNSA Management Council, the Board of Directors of the American Associates of the Science and Technology in Society forum, the Council on Energy and Manufacturing Competitiveness Partnership, the U.S. Strategic Command Strategic Advisory Group, the NNSA Governance Executive Steering Committee, and others. LLNS management led the way for the Nuclear Security Enterprise to develop the strategy and tactics for High Performance Computing and Artificial Intelligence. Additionally, LLNS led a change in the focus for the ICF mission, shifting away from ignition and putting more deliberate efforts towards experiments necessary and relevant to the stockpile. LLNS management must continue to stay engaged on this issue to ensure the community does not return to an overemphasis on ignition and better communicate to stakeholders the benefits of ICF investments to the stockpile. LLNS Senior Leadership must directly engage in the management of Defense Programs mission work and participate in enterprise decision making rather than allowing this to occur at lower management levels.

LLNS developed five strategic initiatives in the area of Nuclear Threat Reduction and is leading a five-lab initiative on Advanced Data Analysis for Proliferation Detection. LLNS

provided coordination for numerous DOE functions, including leading DOE's EERE's HPC-4 Manufacturing Program, which includes several National Laboratories and DOE to create an integrated HPC-4 Energy Innovation.

LLNS' efforts in supporting the Nuclear Security Enterprise Recruitment Strategy Group were instrumental in the rapid progress and development of the Nuclear Security Enterprise Workforce Recruitment Strategy Plan. The LLNS work force continued to exhibit professional excellence as demonstrated by numerous awards and recognition by academic and industry groups of its scientists and engineers. The overall working environment is positive as shown by a recent Glassdoor Employees' Choice Award, recognizing the Laboratory as one of the Best Places to Work in 2019 and two Optima Awards from *Workforce Magazine*. Positive community relations were maintained through outreach and educational activities such as STEM Day, Discover Challenge Academy, and participation in local science fairs and charitable events. However, continued LLNS leadership engagement is needed to reinforce improved collaboration on compensation and benefits.