

U.S. Department of Energy

Office of Science

Fiscal Year 2021

**Performance Evaluation Report of the
Jefferson Science Associates, LLC for
Management and Operations of Science and Technology
at the**

Thomas Jefferson National Accelerator Facility

For the period October 1, 2020 to September 30, 2021



Table of Contents

I. OVERALL SUMMARY RATING/FEE.....	3
Performance-Based Score and Adjectival Rating.....	3
Calculating Individual Goal Scores and Letter Grades	3
II. PERFORMANCE GOALS, OBJECTIVES, AND MEASURES/TARGETS	7
Goal 1.0 Provide for Efficient and Effective Mission Accomplishment.....	7
Goal 2.0 Provide for Efficient and Effective Design, Fabrication, Construction and Operations of Research Facilities.....	11
Goal 3.0 Provide Effective and Efficient Science and Technology Program Management.....	16
Goal 4.0 Provide Sound and Competent Leadership and Stewardship of the Laboratory	19
Goal 5.0 Sustain Excellence and Enhance Effectiveness of Integrated Safety, Health, and Environmental Protection.....	23
Goal 6.0 Deliver Efficient, Effective, and Responsive Business Systems and Resources that Enable the Successful Achievement of the Laboratory Mission(s)	26
Goal 7.0 Sustain Excellence in Operating, Maintaining, and Renewing the Facility and Infrastructure Portfolio to Meet Laboratory Needs.....	30
Goal 8.0 Sustain and Enhance the Effectiveness of Integrated Safeguards and Security Management (ISSM) and Emergency Management Systems	34

I. OVERALL SUMMARY RATING/FEE

Performance-Based Score and Adjectival Rating

The basis for the evaluation of Jefferson Science Associates, LLC (JSA or the Contractor) management and operations of the Thomas Jefferson National Accelerator Facility (TJNAF or the Laboratory) during FY 2021 centered on the Objectives found within the following Performance Goals:

Goal 1.0: Provide for Efficient and Effective Mission Accomplishment

Goal 2.0: Provide for Efficient and Effective Design, Fabrication, Construction and Operations of Research Facilities

Goal 3.0: Provide Effective and Efficient Science and Technology Program Management

Goal 4.0: Provide Sound and Competent Leadership and Stewardship of the Laboratory

Goal 5.0: Sustain Excellence and Enhance Effectiveness of Integrated Safety, Health, and Environmental Protection

Goal 6.0: Deliver Efficient, Effective, and Responsive Business Systems and Resources that Enable the Successful Achievement of the Laboratory Mission(s)

Goal 7.0: Sustain Excellence in Operating, Maintaining, and Renewing the Facility and Infrastructure Portfolio to Meet Laboratory Needs

Goal 8.0: Sustain and Enhance the Effectiveness of Integrated Safeguards and Security Management (ISSM) and Emergency Management Systems

Each Performance Goal was composed of two or more weighted Objectives and most Objectives had a set of performance measures, which assisted in determining the Contractor's overall performance in meeting that Objective. Each of the performance measures identified significant activities, requirements, and/or milestones important to the success of the corresponding Objective. The following describes the methodology utilized in determining the Contractor performance rating.

Calculating Individual Goal Scores and Letter Grades

Each Objective is assigned the earned numerical score by the evaluating office. The Goal rating is then computed by multiplying the numerical score by the weight of each Objective within a Goal. These values are then added together to develop an overall numerical score for each Goal. To determine the final Goal grade, the raw numerical score for each Goal will be rounded to the nearest tenth of a point using the standard rounding convention discussed below and then compared to Figure 1. A set of tables is provided at the end of each Performance Goal section of this document to assist in the calculation of Objective numerical scores to the Goal grade. No overall rollup grade shall be provided. The raw numerical score for S&T and M&O will be rounded to the nearest tenth of a point of purposes of determining fee. A standard rounding convention of x.44 and less rounds down to the nearest tenth (here, x.4), while x.45 and greater rounds up to the nearest tenth (here, x.5).

Score	0.0-0.7	0.8-1.0	1.1-1.7	1.8-2.0	2.1-2.4	2.5-2.7	2.8-3.0	3.1-3.4	3.5-3.7	3.8-4.0	4.1-4.3
Grade	F	D	C-	C	C+	B-	B	B+	A-	A	A+

Figure 1. FY 2021 Contractor Letter Grade Scale

The eight performance Goal grades shall be used to create a report card for the laboratory (see Figure 2, below).

Performance Goal	Grade
1.0 Mission Accomplishment	A
2.0 Design, Fabrication, Construction and Operations of Research Facilities	A-
3.0 S&T Program Management	A
4.0 Leadership/Stewardship	A-
5.0 ES&H and Environmental Management	B+
6.0 Business Systems	A-
7.0 Infrastructure	A-
8.0 Safeguards/Security	A-

Figure 2. Laboratory Report Card

Determining the Amount of Performance-Based Fee Earned:

The Office of Science (SC) uses the following process to determine the amount of performance-based fee earned by the Contractor. The S&T score from each evaluator shall be used to determine an initial numerical score for S&T (see Table A, below), and the rollup of the scores for each M&O Performance Goal shall be used to determine an initial numerical M&O score (see Table B, below).

S&T Performance Goal	Numerical Score	Weight	Total Score
1.0 Mission Accomplishment	4.0	30%	
2.0 Design, Fabrication, Construction and Operations of Research Facilities	3.5	45%	
3.0 S&T Program Management	3.8	25%	
Initial S&T Score			3.7

Table A. Fiscal Year Contractor Evaluation Initial S&T Score Calculation

For Goals 1.0 and 2.0, the weights are based on fiscal year costs for each program distributed between Goals 1.0 and 2.0; however, a minimum weight of 30% for Goal 1.0 is required regardless of program distribution. For Goal 3.0, the weight is set as a fixed percentage of 25% for all laboratories.

M&O Performance Goal	Numerical Score	Weight	Total Score
5.0 ES&H and Environmental Management	3.3	30%	
6.0 Business Systems	3.5	25%	
7.0 Infrastructure	3.6	25%	
8.0 Safeguards/Security	3.5	20%	
Initial M&O Score			3.5

Table B. Fiscal Year Contractor Evaluation Initial M&O Score Calculation

While tables within the performance evaluation report show scores rounded at the Goal level, in calculating the S&T and M&O scores all decimal places are carried over until the final calculation.

These initial scores will then be adjusted based on the numerical score for Performance Goal 4.0 (See Table C, below).

	Numerical Score	Weight	Total Score
Initial S&T Score	3.7	75%	
4.0 Leadership/Stewardship	3.5	25%	
Final S&T Score			3.7
Initial M&O Score	3.5	75%	
4.0 Leadership/Stewardship	3.5	25%	
Final M&O Score			3.5

Table C. Fiscal Year Final S&T and M&O Score Calculation

The percentage of the available performance-based fee that may be earned by the Contractor shall be determined based on the final score for S&T (See Table C) and then compared to Figure 3, below. The final score for M&O from Table C shall then be utilized to determine the final fee multiplier (see Figure 3) which will determine the final percentage of fee earned (see Table D). The actual amount of performance-based fee earned for FY 2021 is then calculated as shown in Table E.

Overall Weighted Score from Table C	Percent S&T Fee Earned	M&O Fee Multiplier
4.1 to 4.3	100%	100%
3.8 to 4.0	97%	100%
3.5 to 3.7	94%	100%
3.1 to 3.4	91%	100%
2.8 to 3.0	88%	95%
2.5 to 2.7	85%	90%
2.1 to 2.4	75%	85%
1.8 to 2.0	50%	75%
1.1 to 1.7	0%	60%
0.8 to 1.0	0%	0%
0.0 to 0.7	0%	0%

Figure 3. Performance Based Fee Earned Scale

Overall Fee Determination	
Percent S&T Fee Earned From Figure 3.	94%
M&O Fee Multiplier From Figure 3.	X 100%
Overall Earned Performance-Based Fee	94%

Table D. Final Percentage of Performance Based Fee Earned Determination

Earned Fee Calculation	
Available Fee	\$3,266,222
Overall Earned Performance - Based Fee (Table D)	X 94%
Earned Fee	\$3,070,248.60

Table E. Earned Fee Calculation

II. PERFORMANCE GOALS, OBJECTIVES, AND MEASURES/TARGETS

Goal 1.0 Provide for Efficient and Effective Mission Accomplishment

The science and technology programs at the Laboratory produce high-quality, original, and creative results that advance science and technology; demonstrate sustained scientific progress and impact; receive appropriate external recognition of accomplishments; and contribute to overall research and development goals of the Department and its customers.

The Department has assigned an overall grade of A for the Performance Goal. Comments are contained within the individual Objectives that follow:

Objective 1.1: Provide Science and Technology Results with Meaningful Impact on the Field

Nuclear Physics (NP)

TJNAF successfully completed the third full year of 12 GeV running in FY 2020 and a stream of scientific results from high priority experiments have been reported or published in high-profile journals with more results anticipated in the coming years. The 12 GeV science program has made a strong start and the user interest is high as evidenced by new proposals submitted to the Program Advisory Committee (PAC).

Notable science highlights from the TJNAF scientific staff include the second Lead Radius Experiment (PREX II) and very recently the Calcium Radius Experiment (CREX II) neutron skin measurements, deuteron electro-disintegration, color transparency, observation of beam spin asymmetries, first multidimensional, high precision measurements of semi-inclusive pion beam single spin asymmetries, near threshold J/psi production, direct photoproduction of the $a_2(1320)$ meson, short range correlations, and investigation of the pentaquark at the Large Hadron Collider beauty (LHCb) experiment.

The search for exotic mesons program that is being executed in the Continuous Electron Beam Accelerator Facility (CEBAF) Hall D is work in progress and no publications were reported to date. Hall D is a new experimental installation that accompanied the 12 GeV energy upgrade and the search for exotic mesons that result from excited gluons is one of the cornerstone science programs of the energy upgrade.

TJNAF has advanced the proposed Solenoidal Large Intensity Detector (SoLID) experiment to a stage that allowed NP to conduct a science review in March 2021. This was a significant undertaking by the Laboratory and the collaboration. A pre-R&D plan is being effectively carried-out and is almost completed. TJNAF has acquired the CLEO-II magnet for SoLID which is being prepared for cold and low current testing.

The Theory Center maintained its expected level of productivity despite COVID-19 restrictions. The work of the group focusing on hadronic and nuclear structure and reactions is well supported by many postdocs and joint faculty and supports the local experimental program by motivating experiments, advising the PAC, developing tools to help interpret data, and guiding the program of the Laboratory.

In the area of Lattice quantum chromodynamics (QCD), in addition to world-leading research results, TJNAF has a very significant impact by providing to the United States Lattice QCD community a set of mid-range High Performance Computing (HPC) resources tuned to specific tasks of importance to the NP community such as graph contractions. TJNAF provides 68% of the United States QCD dedicated computing resources with only 33% of the resources.

TJNAF scientists submitted proposals to the DOE funding opportunities in artificial intelligence and machine learning (AI/ML). Two awards were received from the FY 2020 SC Laboratory funding opportunity in Data and AI/ML. One award in accelerator science features work on an on-line AI model to predict an impending superconducting radiofrequency (SRF) cavity fault by automatically detecting transient cavities instabilities. This work is impactful as it promises to increase availability of CEBAF. The other award is focused on developing a holistic detector control system through application of AI aimed at reducing time needed for expert monitoring and calibration of complex detectors. Again, a successful application of AI in this area would increase the time available for data taking for the broad array of complex detectors within the NP research portfolio.

TJNAF SRF scientists have developed a model for a less expensive and easier preparation method of oxygen doping for optimum SRF cavity performance in particle accelerators. This new process can lead to better performance and reduced costs for surface preparation of SRF cavities that would benefit future SC accelerator projects.

According to the Laboratory, FY 2021 peer-reviewed publications in leading physics journals are as follows: Medium Energy – 40 (Facility – 9); Theory – 59 (Facility – 9); Computational Science – 14; and Engineering – 2. Invited talks are reported as follows: Medium Energy – 61; Nuclear Structure/ Nuclear Astrophysics – 18; Theory - 151; Accelerator Physics – 27; Computational Science – 1; and Directorate – 4. Nineteen theses are reported as follows for the facility: Heavy Ions – 10, Heavy Ions – 7, Theory - 2.

The science productivity from hadron physics experiments conducted at CEBAF is excellent. The Laboratory reported two publications in the Journal Nature, 10 Physics Letter type publications and 23 publications on other peer reviewed journals such as Phys. Rev C and NIM.

Workforce Development for Teachers and Scientists (WDTS)

The Laboratory is commended for its responsiveness to achieving WDTS programmatic core requirements/deliverables, continuing the implementation of the recommendations of the 2019 Program Review, and collaborating on program initiatives to deliver consistent, high quality training experiences for students and faculty across the complex. In particular, the Laboratory's impressive work to increase its Community College Internships (CCI) cohort size, successful implementation of virtual internships, and development of community online resources for students and visiting faculty under the challenging circumstances due to the continuing COVID-19 pandemic is appreciated.

Objective 1.2: Provide Quality Leadership in Science and Technology that Advances Community Goals and DOE Mission Goals

Nuclear Physics (NP)

The TJNAF Experimental Nuclear Physics division clearly plays a seminal and productive role in delivering first class science. This is evident from their publications and invited talks. However, a

comprehensive assessment is not possible as the information on the individual contributions to collaboration results and leadership of analyses is not readily discernable and the division should work to clearly delineate the physics contributions of the scientific staff.

The scientific and technical staff at TJNAF are leading the conceptual development, design, and construction of new scientific instrumentation at CEBAF. The Super BigBite Spectrometer (SBS) is currently being installed in Hall A to determine the four elastic electromagnetic nucleon form factors, as well as making possible a flavor separation. The Measurement of Lepton-Lepton Electroweak Reactions (MOLLER) detector is now in the preliminary engineering and design stage and is planned to be installed in Hall A upon completion of the SBS science program. MOLLER aims to measure the parity-violating asymmetry in electron-electron scattering leading to the electroweak mixing angle, a fundamental parameter of the electroweak theory. The SoLID detector recently underwent a science review and will be used to study the 3-dimensional structure of the nucleon among other physics goals. These experiments will exploit the unique features of the CEBAF beams to realize the full science capabilities of the facility.

The TJNAF scientific and technical staff are leading the planning efforts for future facility capabilities including a Kaon Beam facility in Hall D, a transverse polarized target in Hall B, prospects for positron beams, CEBAF energy upgrade and establishing an intensity frontier that would be anchored by the proposed SoLID experiment.

The scientific staff at TJNAF have been actively engaged and taking leadership roles in strategic planning of the Electron-Ion Collider (EIC) experimental program, the accelerator systems, and the EIC detectors. This planning included significant contributions to the EIC Yellow report, which lays out the scientific goals, describes the specific detector requirements and presents the evolving detector concepts being explored to realize the EIC's experimental program. In this regard, the TJNAF and the Brookhaven National Laboratory (BNL) partnership has been effective in engaging the user community and soliciting first Expression of Interests (EoIs) and now detector collaboration proposals. The rapid engagement and organization in a relatively short time is commendable.

TJNAF is partnering with BNL to deliver the EIC project. The EIC project leadership has representation from both laboratories. The project has moved forward expeditiously and received CD-1, Approve Alternative Selection and Cost Range, in June 2021. The team has worked effectively and efficiently to complete the conceptual design and launch into preliminary design.

The staff of the SRF Science and Technology group are leading essential developments in in-situ cavity processing that are critical to the performance of CEBAF and other SC accelerator facilities based on SRF technology.

TJNAF staff expertise in SRF technologies is sought out for projects throughout the SC complex. TJNAF is constructing and delivering cryomodules for the Linac Coherent Light Source II High Energy (LCLS-II-HE) project at the Stanford Linear Accelerator Laboratory (SLAC) and the Proton Power Upgrade (PPU) at the Spallation Neutron Source (SNS) at the Oak Ridge National Laboratory (ORNL).

The members of the TJNAF theory group exhibit strong scientific leadership having published over the past year over 100 journal articles, delivering more than 140 invited virtual talks, and organizing over twenty national and international conferences and workshops.

Leadership roles held by staff members of the TJNAF theory group include deputy chair of the United States QCD Scientific Program Committee and Scientific Software Committee, chair of the Science Advisory Committee for the Institute for Nuclear Theory, co-spokesperson for the Transverse Momentum Distribution Topical Theory Collaboration, co-convenor for the EIC Yellow Report co-convenor, member of the Nuclear Science Advisory Committee (NSAC), and co-chair National Nuclear Physics Summer School.

TJNAF experts in AI/ML provided reviews on several nuclear data proposals involving AI/ML approaches. Their useful insight and feedback on the proposed methods and why or why not they were suitable for the work being proposed was valuable in making final funding decisions. As the nuclear data portfolio continues to build AI/ML into the nuclear data pipeline, the lessons learned from this first exercise provides useful input to the nuclear data community to help inform future submissions.

Staff at TJNAF are commended for sharing their technical capabilities and expertise with other NP facilities and service as reviewers.

TJNAF has always had a very strong educational and scientific literacy role. They reported training opportunities for junior scientists: Undergraduate Students – 37; Graduate Students – 110; and Postdoctoral Associates – 50 with 17 PhD theses submitted.

TJNAF staff has been recognized with 12 awards in 2021 including 3 American Physical Society (APS) Fellowships, an APS Distinguished Lectureship Award on the Application of Physics, and a Secretary of Energy’s Achievement Award. TJNAF staff received 6 U.S. patents as well as 7 Invention Disclosures.

TJNAF hosted and/or staff actively organized 163 national and international conferences, workshops, seminars, and meetings in FY 2021 including review participation as panel members or speakers on several review panels as well as DOE peer review panels. The staff participates on advisory committees to other facilities, in both the US and internationally, as well as to other federal government agencies.

Workforce Development for Teachers and Scientists (WDTS)

The Laboratory is commended for identifying, recruiting, and training research/technical staff that serve as mentors/advisors for WDTS program participants.

Science Program Office	Letter Grade	Numerical Score	Objective Weight	Overall Score
Nuclear Physics				
1.1 Efficient Strategic Planning and Stewardship	A	4.0	50%	
1.2 Leadership	A	4.0	50%	
Overall NP Total				4.0
Workforce Development for Teachers and Scientists				

1.1 Efficient Strategic Planning and Stewardship	B+	3.4	80%	
1.2 Leadership	B+	3.1	20%	
Overall WDTs Total				3.3

Table 1.1 Program Performance Goal 1.0 Score Development

Program Office	Letter Grade	Numerical Score	Weight	Overall Weighted Score
Nuclear Physics	A	4.0	98.4%	
Workforce Development for Teachers and Scientists	B+	3.3	1.6%	
Performance Goal 1.0 Total				4.0

Table 1.2 Program Performance Goal 1.0 Score Development

Score	0.0-0.7	0.8-1.0	1.1-1.7	1.8-2.0	2.1-2.4	2.5-2.7	2.8-3.0	3.1-3.4	3.5-3.7	3.8-4.0	4.1-4.3
Grade	F	D	C-	C	C+	B-	B	B+	A-	A	A+

Table 1.3 Goal 1.0 Final Letter Grade

Goal 2.0 Provide for Efficient and Effective Design, Fabrication, Construction and Operations of Research Facilities

The Laboratory provides effective and efficient strategic planning; fabrication, construction and/or operations of Laboratory research facilities; and are responsive to the user community.

The Department has assigned an overall grade of A- for the Performance Goal. Comments are contained within the individual Objectives that follow:

Objective 2.1: Provide Effective Facility Design(s) as Required to Support Laboratory Programs (i.e., activities leading up to CD-2)

Basic Energy Sciences (BES)

TJNAF has been an effective partner to the LCLS-II-HE project, providing design support and completing inspections of delivered cryomodule components. The Laboratory has proactively prepared for cryomodule assembly lines to begin production in FY 2022.

Notable Outcome: Effectively manage and execute the assigned LCLS-II-HE project scope in accordance with DOE Order 413.3B, in compliance with the technical performance specifications, and within the established DOE performance goals for cost and schedule. Performance will be assessed based on the work planned and accomplished during FY 2021, not on the cumulative performance of the project.

The Department has determined that performance on this Notable Outcome met expectations. TJNAF has been an effective partner to the LCLS-II-HE project. TJNAF provided design support to the

LCLS-II-HE project and awarded their share of the long lead procurements (CD-3A) on schedule. The lab conducted several inspections of delivered cryomodule components. TJNAF has proactively prepared for cryomodule assembly lines to begin production in FY 2022.

Notable Outcome: Effectively manage and execute the assigned PPU project scope in accordance with DOE Order 413.3B, in compliance with the technical performance specifications, and within the established DOE performance goals for cost and schedule. Performance will be assessed based on the work planned and accomplished during FY 2021, not on the cumulative performance of the project.

The Department has determined that performance on this Notable Outcome met expectations. TJNAF has performed well delivering all the planned cavities in FY 2021. TJNAF has qualified sufficient cavities for the first 2 cryomodules delivery, due to ORNL by April 2022 in time for the SNS outage. For the period, TJNAF's cost performance has been satisfactory despite the difficult pandemic conditions, although it has experienced some delay in cryomodule assembly that is expected to be recoverable.

Nuclear Physics (NP)

The MOLLER Major Items of Equipment (MIE) project has made excellent progress under the leadership of a highly experience project manager who was hired in FY 2020. TJNAF management held a timely Director's review that provided valuable input to the team as they prepare for their next independent project status review. Planning and execution of MOLLER MIE has proceeded effectively, even under COVID-19 restrictions.

The MOLLER collaboration realized in-kind contributions to the project detector both from the National Science Foundation and the Canadian Foundation for Innovation. These contributions reduced the total project cost to DOE. The MOLLER project management has appropriately and completely integrated the execution of that scope.

As the MOLLER MIE advances towards its next critical decision, it is important that the project manager actively tracks progress on preliminary design to ensure the design readiness is appropriate for baselining and the start of construction.

The EIC attained Critical-Decision-1 (CD-1) on June 29, 2021, following near universal praise for the preparedness of the project. The approval was preceded by simultaneous independent project and cost reviews. Reviewers from both the cost review and the project review noted the intuitive organization and advanced maturity of project documentation.

The EIC project carefully budgeted and segregated its finances so that it would not spend appropriated and allotted funds earmarked for planning, engineering, and design until after CD-1. However, the project ramped up hiring in advance of CD-1, anticipating a larger FY 2021 budget allocation than what was eventually realized. As a result, the EIC carried an unsustainable workforce into the end of the fiscal year. The project did spend within its available funds this year.

The EIC project recognizes the iterative and communal nature of risk planning. Although to comply with DOE Order 413.3B a project need only prepare a risk management plan before CD-1, the project has continued to refine its risk register and risk responses to make preparation of a meaningful quantitative risk analysis possible before CD-2.

The EIC project accepted the recommendation of the independent cost review to increase its contingency budget prior to CD-1 and made hard choices to keep the project affordable and within the recommended, and ultimately approved, cost range. One strategy employed involves cultivating in-kind support for the project. The project has embraced domestic universities and state economic development institutions with interest in supporting the project. The project has prioritized interactions with international entities that would provide in-kind components the project would incorporate in accelerator and detector systems. The significant push by the EIC leadership team to secure these in-kind contributions is valued by NP, since it advances engagement with domestic and international partners and at the same time reduces the total project cost for DOE.

The EIC project struggled with the recommendation of the independent cost review to double the budgeted schedule contingency since doing so would give the appearance of plans to delay the start of science. NP expects the project to incorporate an amount of schedule contingency reflective of the quantitative risk analysis prepared in advance of CD-2.

Notable Outcome: Achieve CD-1 Approval for the MOLLER MIE.

The Department has determined that performance on this Notable Outcome met expectations. MOLLER MIE requested and received CD-1 approval December 15, 2020. Progress on MOLLER has been impressively dependable throughout the pandemic.

Objective 2.2: Provide for the Effective and Efficient Construction of Facilities and/or Fabrication of Components (execution phase, post CD-2 to CD-4)

Basic Energy Sciences (BES)

TJNAF successfully completed assembly and delivery of the cryomodules for LCLS-II and provided support for cryoplant commissioning.

Although some delays were experienced, TJNAF has performed well with delivery and testing of cavities for PPU, with tests completed on approximately 70% of the bare cavities.

Notable Outcome: Effectively manage and execute the assigned LCLS-II project scope in accordance with DOE Order 413.3B, in compliance with the technical performance specifications, and within the established DOE performance goals for cost and schedule. Performance will be assessed based on the work planned and accomplished during FY 2021, not on the cumulative performance of the project.

The Department has determined that performance on this Notable Outcome met expectations. TJNAF met project requirements and expectations by completing assembly and delivery of the cryomodules for LCLS-II and has started closing out accounts related to cryomodule production. TJNAF will continue to support cryoplant #1 commissioning efforts and provide consultation support for commissioning the second cryoplant.

Objective 2.3: Provide Efficient and Effective Operation of Facilities**Nuclear Physics (NP)**

CEBAF was unavailable for operation until the fourth quarter of FY2021 due to a planned shutdown to install a new 2K cold box. After the successful installation and testing of the coldbox, operations of CEBAF began as planned in mid-August with 776 hours of beam delivered this fiscal year. The hours of beam delivery met expectations, but facility reliability was low at 70%. Such a low reliability at the start of a running period is not unusual. The TJNAF staff is congratulated on returning to operations as planned.

An appropriate emphasis is being placed on the CEBAF Performance Plan to increase both reliability and the energy reach of the accelerator. Work on the accelerator during the long shutdown for the 2K cold box installation focused on improving the accelerator gradient, including installation of two cryomodules. The facility has verified that the accelerator gradients needed to execute the science for the upcoming experiments are achievable. Executing the on-site work under COVID-19 restrictions was challenging and the staff is commended for timely completion of the work.

TJNAF has worked well with the user community to provide access and the ability to participate in experiments under COVID-19 restrictions. TJNAF coordinates well with the community to integrate user contributions that are funded internationally or by other agencies. These contributions are an important means to enhance the science program.

CEBAF has longstanding PAC procedures that maintain a lengthy list of approved experiments to provide the necessary flexibility in scheduling. The PAC is appropriately using the jeopardy process to retain only the most competitive experiments on the books while considering new proposals.

Scientists at TJNAF are pursuing important accelerator research and development using plasma processing on integrated SRF cavities in cryomodules where performance has degraded with time. The goal is to restore performance in situ without expensive and risky removal of an SRF cryomodule from the accelerator tunnel. As this research and development can have substantial positive impact on accelerator availability, it is important that TJNAF leadership ensure that sufficient resources are available to make appropriate progress.

Notable Outcome: Successfully complete the 2K cold box installation and resume CEBAF operations.

The Department has determined that performance on this Notable Outcome met expectations. The 2K cold box was installed with testing and commissioning completed in early July. CEBAF operations resumed in mid-August 2021.

Objective 2.4: Utilization of Facility(ies) to Provide Impactful S&T Results and Benefits to External User Communities**Nuclear Physics (NP)**

CEBAF is a world unique facility providing access to over 1600 users, 90% of which are external and a third international. The strong support for instrumentation at CEBAF by international users benefits

the science program, is appreciated, and a testament to the impactful science opportunities the facility offers.

The CEBAF facility is used effectively to provide impactful science and technology results. The science results from the 12 GeV program are beginning to be published in high-profile, peer reviewed journals. Recent results on neutron skins of both lead and calcium nuclei provide critical information needed to model neutron stars that is of utmost importance to communities outside the CEBAF user base. The very thin beam CEBAF can provide is essential to a search for Dark Matter candidates by the High Energy Physics community.

TJNAF has a very strong program of outreach in science education. Pre-college activities include the Jefferson Lab Science Activities for Teachers, Becoming Enthusiastic About Math and Science, Jefferson Lab High School Summer Honors Program, Jefferson Lab Mentorship Program, and the Virginia Summer Residential Governor’s Mentorship in Engineering. At the undergraduate level, activities include: The Science Undergraduate Laboratory Internship, Research Experiences for Undergraduate, and a Community College Internship Program. Programs to promote science literacy include Field Trips, Career Fairs, Classroom Visits, and Science Fair Judging, Cooperating Hampton Roads Organizations for Minorities in Engineering, partnering with the REECH (Reaching, Educating & Empowering Children) Foundation, to offer grade-level science and math collaborative activities, Virginia Regional Science Bowl, and maintaining a science education website that receives 200,000 visits per day. TJNAF has partnered with institutions to strengthen, nuclear and accelerator physics in physics departments, including minority serving institutions. TJNAF also provides graduate fellowships to support research at CEBAF and the EIC.

Science Program Office	Letter Grade	Numerical Score	Objective Weight	Overall Score
Basic Energy Sciences				
2.1 Support Laboratory Programs	A-	3.5	40%	
2.2 Construction of Facilities	A-	3.5	60%	
Overall BES Total				3.5
Nuclear Physics				
2.1 Support Laboratory Programs	A	4.0	10%	
2.3 Operation of Facilities	B+	3.4	75%	
2.4 S&T Results and Benefits to External User Communities	A-	3.6	15%	
Overall NP Total				3.5

Table 2.1 Program Performance Goal 2.0 Score Development

Program Office	Letter Grade	Numerical Score	Weight	Overall Weighted Score
Basic Energy Sciences	A-	3.5	6.3%	
Nuclear Physics	A-	3.5	93.7%	
Performance Goal 2.0 Total				3.5

Table 2.2 Program Performance Goal 2.0 Score Development

Score	0.0-0.7	0.8-1.0	1.1-1.7	1.8-2.0	2.1-2.4	2.5-2.7	2.8-3.0	3.1-3.4	3.5-3.7	3.8-4.0	4.1-4.3
Grade	F	D	C-	C	C+	B-	B	B+	A-	A	A+

Table 2.3 Goal 2.0 Final Letter Grade

Goal 3.0 Provide Effective and Efficient Science and Technology Program Management

The Laboratory provides effective program vision and leadership; strategic planning and development of initiatives; recruits and retains a quality scientific workforce; and provides outstanding research processes, which improve research productivity.

The Department has assigned an overall grade of A for the Performance Goal. Comments are contained within the individual Objectives that follow:

Objective 3.1: Provide Effective and Efficient Strategic Planning and Stewardship of Scientific Capabilities and Program Vision

Nuclear Physics (NP)

The 12 GeV science program at CEBAF is well underway and aligned with the priorities of the NSAC Long Range Plan. TJNAF management is appropriately exploring opportunities to expand the science capabilities at CEBAF in the EIC era in preparation the next NSAC Long Range Plan exercise.

TJNAF management and staff have demonstrated effectiveness and efficiency navigating the prevailing circumstances imposed by COVID-19 restrictions and implemented a protocol for a safe onsite work environment. Their proactive planning has allowed scientific progress to advance which is appreciated by NP and by users, particularly postdocs and graduate students.

The stewardship of scientific capabilities is reviewed by TJNAF and plans for enhancements to experiments within available resources are presented to NP. Future opportunities include a Kaon Beam facility in Hall D, a transverse polarized target in Hall B, prospects for positron beams, CEBAF energy upgrade and establishing an intensity frontier anchored by the SoLID experiment.

TJNAF has a broader vision for the Laboratory in priority areas for SC and NP. In quantum computing, TJNAF has partnered with BNL's Co-design Center for Quantum Advantage (C2QA). The contribution and impact should become evident in the coming years. In the area of advanced computing, TJNAF has re-organized to provide a focus on artificial intelligence and streaming readout. It co-hosted the AI4NP winter school and has published the AI for NP workshop.

On technology development, TJNAF partnerships with other SC projects continues to make appropriate progress. TJNAF scope on LCLS-II is completed with the last cryomodule shipped in November 2020. The LCLS-II-HE has CD-1/3a approval and SNS PPU CD-3 approval. Both projects entail construction and delivery of cryomodules produced by TJNAF. These activities help maintain a core competency at TJNAF which benefits CEBAF and other NP user facilities, as well as SC construction projects.

The EIC project evaluated options for tailoring the project's critical decisions in recognition of the staggered maturity of its infrastructure, accelerator, and detector planning. It has opted to pursue a long lead procurement in conjunction with setting its performance baseline (CD-2/3A). NP supports this strategic decision and expects the project to weight the scope of the long lead procurements with the planned progress in design and available funding.

Management maintains and updates a 5-year run plan that is used effectively to coordinate equipment upgrades and initiatives and allows users to plan for when their experiments may run. The plan prioritizes high impact experiments that make best use of available conditions including beam properties, and hall/instrument availability. NP recognizes it was a difficult choice to run at a reduced energy in Fall 2021 to prioritize work on cryomodules to improve energy reach.

In response to a recommendation from a one-day site visit, TJNAF accelerator staff provided an updated strategic plan for accelerator research and development. The plan provides a multi-year vision for activities that supported NP as well as other SC laboratories. The research and development on superconducting radiofrequency equipment associated with state-of-the-art particle accelerators is a core competency of TJNAF. The strategic plan was not clear on the plans to maintain core competency in cryogenics.

TJNAF has been challenged to retain highly qualified staff in accelerator science. The strategic plan for accelerator research and development and maintaining high availability for the CEBAF accelerator can only be realized by having well-developed and communicated workforce development and succession plans.

Workforce Development for Teachers and Scientists (WDTS)

The Laboratory is commended for continuing outreach activities aimed at providing equitable access and recruiting a more diverse, inclusive applicant and participant pool to WDTS sponsored programs.

Objective 3.2: Provide Effective and Efficient Science and Technology Project/Program/Facilities Management

Nuclear Physics (NP)

Management of MOLLER MIE has performed well as the project works toward CD-2/3, Approve Project Baseline and Start of Construction. The in-kind contributions obtained from the National Science Foundation and the Canadian Foundation for Innovation have been appropriately and effectively integrated into management and reporting. Impressively, technical progress has been maintained throughout COVID-19 restrictions and management is being proactive about personnel and funding concerns on the horizon.

Management has appropriately developed and prioritized a CEBAF Performance Plan to address reliability and accelerator gradient issues within funding constraints. The plan is well integrated with the run schedule and science program.

Newly funded Laboratory Directed Research and Development (LDRD) projects at TJNAF covered areas of accelerator science and quantum computing. The LDRD program is being managed effectively to improve the competitiveness of the facility. Those projects funded this year look to expand the scope of available beams at CEBAF and broaden the Laboratory's portfolio in cross-cutting areas that align well with NP priorities.

Workforce Development for Teachers and Scientists (WDTS)

Laboratory staff leading the execution of WDTS sponsored programs are commended for their responsiveness to programmatic direction and willingness to implement new program policies/procedures that advance complex-wide workforce development outcome.

Objective 3.3: Provide Efficient and Effective Communications and Responsiveness to Headquarters Needs

Nuclear Physics (NP)

Last year it was stated that communications with Laboratory management was improving at the Associate Director and the Division Director level. There have been issues in the past.

The EIC project team has forthrightly shared with NP its opportunities and challenges. This includes progress on research and development activities, interactions with potential international collaborators, progress on receiving economic development funds, and other emerging issues. There are regular meetings of the Integrated Project Team and a weekly meeting with project leadership, BNL and TJNAF leadership, NP staff, Site Office staff, and other project personnel. EIC project leadership provides timely, clear, and well-justified responses to budget planning and execution exercises.

Regular meetings with CEBAF operations leadership are useful and appreciated. The biweekly meetings between NP and the TJNAF leadership team are beneficial and appreciated.

The leadership of the MOLLER project has typically effectively communicated the challenges and opportunities facing the project. While NP appreciated the in-kind contributions to MOLLER, the program was disappointed in the drafts of public communications regarding the relative impact of the in-kind scope relative to the scope of work funded through the MOLLER MIE. The MOLLER project manager worked productively with NP staff in addressing the issue to NP's satisfaction.

Workforce Development for Teachers and Scientists (WDTS)

Laboratory staff leading the execution of WDTS sponsored programs are commended for their responsiveness to headquarters inquiries and requests.

Science Program Office	Letter Grade	Numerical Score	Objective Weight	Overall Score
Nuclear Physics				
3.1 Efficient Strategic Planning and Stewardship	A	4.0	30%	
3.2 Project/Program/Facilities Management	A	3.8	40%	
3.3 Effective Communications and Responsiveness	A-	3.6	30%	
Overall NP Total				3.8
Workforce Development for Teachers and Scientists				
3.1 Efficient Strategic Planning and Stewardship	B+	3.1	20%	
3.2 Project/Program/Facilities Management	B+	3.1	50%	
3.3 Effective Communications and Responsiveness	B+	3.1	30%	
Overall WDTs Total				3.1

Table 3.1 Program Performance Goal 3.0 Score Development

Program Office	Letter Grade	Numerical Score	Weight	Overall Weighted Score
Nuclear Physics	A	3.8	99.8%	
Workforce Development for Teachers and Scientists	B+	3.1	0.2%	
Performance Goal 3.0 Total				3.8

Table 3.2 Program Performance Goal 3.0 Score Development

Score	0.0-0.7	0.8-1.0	1.1-1.7	1.8-2.0	2.1-2.4	2.5-2.7	2.8-3.0	3.1-3.4	3.5-3.7	3.8-4.0	4.1-4.3
Grade	F	D	C-	C	C+	B-	B	B+	A-	A	A+

Table 3.3 Goal 3.0 Final Letter Grade

Goal 4.0 Provide Sound and Competent Leadership and Stewardship of the Laboratory

This Goal evaluates the Contractor’s Leadership capabilities in leading the direction of the overall Laboratory, the responsiveness of the Contractor to issues and opportunities for continuous improvement, and corporate office involvement/commitment to the overall success of the Laboratory.

The Department has assigned an overall grade of A- for the Performance Goal. Comments are contained within the individual Objectives that follow:

Objective 4.1: Leadership and Stewardship of the Laboratory

The Laboratory's senior management team has shown strong leadership and skillful stewardship in developing a vision for the future of nuclear physics and for TJNAF as well. As for diversifying the S&T portfolio of the Laboratory, realizing CD-1 for EIC as a future scientific user facility was a key step to exploring and defining the inner workings of the nucleon. TJNAF continues to be proactive in exploring and developing partnerships key to the success of the EIC and the future of the Laboratory and has demonstrated effective stewardship of a highly active international EIC User Group which is playing an important role in charting the future of the EIC project, especially regarding the EIC detectors. Regarding partnerships, TJNAF should continue engagement with the State of Virginia on the value of the important science and technology being developed at the Laboratory and the value of the Laboratory to the region and the State.

Despite the pandemic, the Laboratory management team interacted proactively and effectively with senior DOE managers and local officials.

- The Laboratory hosted a DOE Office of the Secretary visit in October 2020.
- In November, the Laboratory Director held a virtual meeting with the Mayor, City Manager, and other senior officials of the City of Newport News to update them on the developing role of the Laboratory in the EIC project, prospective Science Laboratories Infrastructure (SLI) projects, the potential for expanding the Laboratory mission into high performance computing, and the status of the Applied Research Center (ARC) transfer.
- The Laboratory's leadership continued productive discussions on developing a High-Performance Data Facility and potential high-performance computing opportunities at TJNAF.

The Laboratory demonstrated a strong partnership with the BNL leadership on the continued success of the EIC project. The Laboratory contributed significantly to the approval of CD-1 for the EIC project following a successful Independent Project Review by the Office of Project Assessment in SC. Strong collaboration was evident among the two laboratories after CD-1 which resulted in significant portions of project work scope being assigned to TJNAF as efforts continued towards establishment of a project baseline.

The Laboratory senior management team established a cross functional group to plan and manage a significant maintenance and equipment upgrade workload during the Scheduled Accelerator Down (SAD). This work included refurbishment of cryomodules, installation and startup of a new 2K cold box in the Central Helium Liquifier (CHL) plant, installation of a new fire suppression system in the accelerator tunnel, equipment cooling upgrades and other preventive and corrective maintenance actions. The SAD workload was completed on schedule with limited on-site staff using COVID-19 safety controls, and the successful completion supported accelerator startup and initiation of experimental operations at year's end.

Objective 4.2: Management and Operation of the Laboratory

The Laboratory began FY 2021 operating with limited on-site staff in Medical Condition (MEDCON) Level 5, Limited Operations. The Laboratory effectively managed their operations through a challenging time of evolving pandemic driven requirements and controls. The health and safety controls were effectively documented in the Laboratory's COVID-19 Workplace Safety Plan, which

was updated multiple times in FY 2021 as Government-wide control strategies and virus risks changed. The Laboratory very effectively transitioned in June to MEDCON 4, Operations with Maximum Telework, and increased the number of staff working on-site to accelerate progress on completion of the SAD and critical projects supporting other SC laboratories.

JSA has implemented a robust Contractor Assurance System (CAS). The Laboratory completed a thorough independent peer review of CAS implementation during this performance period. The Laboratory demonstrated sound management systems and processes that the peer review team concluded were well integrated into a JSA performance assurance system and were supporting a learning organization culture with healthy and safe reporting of off-normal events by the staff. An example of the effective implementation of CAS processes across multiple Laboratory divisions (procurement, financial, legal, property management, DC power, accelerator, performance assurance) over recent years was the TJNAF response to discovery of counterfeit power supply transistor parts. The Laboratory promptly made notifications to the Department, investigated the impacts of the counterfeit parts, identified affected equipment, replaced the parts where necessary, and recovered information and records to support a DOE Inspector General (IG) investigation into the supplier.

The Laboratory presented their Laboratory Management Budget Briefing to the Nuclear Physics Program Office in February which provided a proposed spending plan to optimize the TJNAF mission within the fiscal constraints of the agency. The Laboratory understands the cost of doing business and prioritizes the management and allocation of costs in an optimal way. A culture of accountability and responsibility exists throughout the organization and communication with SC Headquarters is comprehensive and timely. Continued diligent stewardship will be important to ensure relatively recent electrical safety issues do not occur in the future, and that the CEBAF Performance Plan is effective in significantly improving the reliability and performance of the CEBAF machine.

Notable Outcome: The Laboratory must keep senior SC leadership informed of key events (e.g., VIP/protocol visits, news releases, media requests) through timely population of the Science News Dashboard with all the relevant information on such activities and/or through other appropriate mechanisms.

The Department has determined that performance on this Notable Outcome met expectations. The Laboratory provided good updates to the DOE Office of Science News Dashboard daily to keep SC leadership and Public Affairs informed of upcoming VIP/protocol visits to TJNAF, planned news releases, and pending media requests.

Objective 4.3: Leadership of External Engagements and Partnerships

The Laboratory has provided leadership and insightful stewardship in establishing a vision for developing technology transfer activities and meaningful partnerships in support of DOE missions. Of note are a TJNAF hosted workshop to explore opportunities for synergy between SC and the National Institute of Health (NIH); an EIC overview presentation to small business owners during the annual Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Principal Investigator (PI) Exchange meeting hosted virtually by NP; and a recent change in the Contractor corporate structure to strengthen capabilities to achieve DOE goals.

The Laboratory continued to seek and implement new external engagements, strengthened, and expanded existing partnerships, and increased the profile of the Laboratory's technology – both internally and externally – to the larger community despite the impacts of COVID-19. The Laboratory's Technology Transfer team performed well this year. The team processed six new Cooperative Research and Development Agreements (CRADAs) and one International CRADA (ICRADA) and one new Strategic Partnership Project (SPP). There were six active SPP agreements, 26 active CRADAs, and one active ICRADA for FY 2021. These actions represent a strong effort by the Laboratory management.

TJNAF is to be commended for its constructive engagement with the Office of Technology Transitions (OTT) Leadership around new Administration priorities and its adaptability in advancing the Technology Transfer/commercialization mission under COVID-19 enforced circumstances. TJNAF is appreciated for its contributions and its successful transition during the pandemic to virtual formats for its many programs.

TJNAF staff members are active and effective participants in OTT organized efforts including events and products. TJNAF has been a meaningful contributor to the Energy I-Corps program as well as the community of practice, and the Laboratory has taken initiative to promote the OTT mission.

TJNAF is to be commended for having provided responses of high quality to the FY 2020 annual technology transitions data call and the associated quality assurance and quality control process, high quality submissions and updates of success stories to the Laboratory Partnership Service, and support to other OTT communications activities and products.

TJNAF complied with the Lab Partnering Service's (LPS's) first lead connections report to help OTT understand the outcomes of LPS inquiries. The TJNAF team engages with the LPS team and provides thoughtful feedback on LPS. TJNAF was an active member of the LPS climate site working group in formulating a climate change taxonomy and posting related content.

TJNAF is to be commended for having collaborated with other laboratories in the groundbreaking initiative to engage a Partnership Intermediary for the development innovative solutions to advance commercialization of technologies resulting from basic science research. TJNAF is encouraged to continue to find ways to track interim milestones that could be precursors to greater commercialization successes consistent with the PEMP Objective.

Objective 4.4: Contractor Value-added

JSA continued to provide governance support to ensure that the governance structure and their functions supported the Laboratory and DOE which enabled the Laboratory to capitalize on opportunities to address current and future challenges. The JSA Board chair provided the annual CAS assurance declaration noting attention areas warranting the Board's continued vigilance. JSA promptly informed SC senior leadership of the resignation of the Chief Executive Officer (CEO) and took immediate steps to appoint an interim CEO as well as to initiate plans for selection of a permanent replacement.

JSA has been very supportive of SC in all regards and its messaging on the importance of the SC mission has been very important. It has also facilitated important in-roads outside of regular channels to advance SC diversity, equity, and inclusion (DEI) goals.

Notable Outcome: The Laboratory and Contractor leadership must ensure that all communication with interested stakeholders on DOE/SC program priorities/objectives are communicated in advance to DOE and aligned with DOE/SC goals, strategies, and guidance.

The Department has determined that performance on this Notable Outcome met expectations. JSA leadership demonstrated regular engagement with the Laboratory leadership to ensure alignment with SC on communications with stakeholders about DOE program priorities and objectives.

	Letter Grade	Numerical Score	Objective Weight	Overall Score
4.1 Leadership and Stewardship of the Laboratory	A-	3.5	32%	
4.2 Management and Operation of the Laboratory	A-	3.5	32%	
4.3 External Engagements and Partnerships	B+	3.4	5%	
4.4 Contractor Value-added	B+	3.4	31%	
Performance Goal 4.0 Total				3.5

Table 4.1 Program Performance Goal 4.0 Score Development

Score	0.0-0.7	0.8-1.0	1.1-1.7	1.8-2.0	2.1-2.4	2.5-2.7	2.8-3.0	3.1-3.4	3.5-3.7	3.8-4.0	4.1-4.3
Grade	F	D	C-	C	C+	B-	B	B+	A-	A	A+

Table 4.2 Goal 4.0 Final Letter Grade

Goal 5.0 Sustain Excellence and Enhance Effectiveness of Integrated Safety, Health, and Environmental Protection

This Goal evaluates the Contractor’s overall success in deploying, implementing, and improving integrated ES&H systems that efficiently and effectively support the mission(s) of the Laboratory.

The Department has assigned an overall grade of B+ for the Performance Goal. Comments are contained within the individual Objectives that follow:

Objective 5.1: Provide an Efficient and Effective Worker Health and Safety Program

In response to the Department’s Final Notice of Violation letter issued in April 2021, the Laboratory worked closely with the Department in identifying an appropriate list of corrective actions to be entered into the DOE Non-Compliance Tracking System (NTS). The Laboratory is managing many important electrical safety program improvement initiatives, and regular updates are evident in NTS. Considerable progress is being made in expanding the electrical safety training and qualifications program, including practical demonstrations of proficiency that were absent from the prior program.

The identification of a worker being exposed to unguarded, uncontrolled electrical conductors inside of a klystron transformer cabinet was the direct result of observations and actions taken by the Laboratory's newly assigned electrical field inspectors. Aside from the intervention aspect, positive

interactions between inspectors and electrical workers in the field affirm the human capital investments made by the Laboratory in strengthening its electrical safety program.

Challenges remain in implementing the updates to the hazardous energy control program, including promoting awareness of requirements across Divisions and approval of subcontractor work plans. It is imperative that sufficient resources be applied to monitor field performance of hazardous energy control program requirements, while also responding to hazardous energy control events and conditions in a timely manner.

The Laboratory has continued to update its COVID-19 safety program as changes in the Center for Disease Control (CDC) recommendations and DOE requirements evolved. These changes were accompanied by mass e-mail communications, weekly newsletters articles, and updates to the site's COVID-19 web resource portal. Timely alerts were issued for presumptive positive cases and impacted work departments. The Laboratory's on-site vaccinations represented a considerable amount of work and coordination. Filling the Site Occupational Medical Director vacancy will be an important step to shape the policies for an eventual return to routine operations.

Throughout the SAD, work activity coordination was very evident to efficiently plan work and meet the site's COVID-19 policies on personal protective equipment use and social distancing. This is noteworthy given the multiple work crews working on the same system or in the same area. An impressive amount of work was completed by a limited number of on-site staff during the pandemic. The Department especially notes the periodic reminders by Management to caution line-Supervisors and work crews to not over-commit resources at the risk of compromising safety. The Laboratory's decision to derate the overhead crane in Hall A was well reasoned and decisive. This was a difficult decision given the impact to the detector installation schedule. Exemplary coordination between Physics and other Divisions was instrumental in proceeding through the SAD without a material handling mishap.

As a result of the investigation into an accelerator safety envelope violation, it was identified that multiple unauthorized entries occurred into a posted high radiation area. Laboratory leadership needs to stay engaged on these events to ensure a hierarchy of controls approach is applied in corrective action implementation. It is vital that the Laboratory demonstrate accelerator safety excellence. This includes taking comprehensive steps to address causal elements and acquire confidence that work practices are consistent with policies, especially where Divisional interfaces exist.

Notable Outcome: Hazardous energy control program improvements and corrective actions will be systematically managed to address activity-based risks and be supported by objective evidence of closure and subsequent implementation effectiveness. This includes management of any outcomes linked to the DOE Office of Enforcement's 2019 safety compliance investigation.

The Department has determined that performance on this Notable Outcome met expectations. The Laboratory continued to manage many important electrical safety program improvement initiatives, and regular updates were evident in NTS. Considerable progress was made in expanding the electrical safety training and qualifications program, including practical demonstrations of proficiency that were absent from the prior program.

Objective 5.2: Provide an Efficient and Effective Environmental Management System

The Laboratory was again recognized by the Hampton Roads Sanitation District (HRSD) for exemplary performance by receiving the Pre-Treatment Gold Award for 2020.

Through persistent discussions with HRSD, the Laboratory was successful in resolving an initial non-approval decision on its update to the cooling tower treatment chemicals. Continued dialog with the regulator and Facilities Management is warranted, as acceptance of bromide containing products is not indefinite and may be revoked when the Sustainable Water Initiative for Tomorrow (SWIFT) wastewater treatment plant goes on-line.

The Environmental Management System (EMS) met the conformance standards set in ISO 14001. The Virginia Environmental Excellence Program (VEEP) Gold Award recognition was reaffirmed by the Department of Environmental Quality (DEQ) for the Laboratory’s environmental program excellence. The Environment, Safety and Health (ES&H) group continued active dialog with the regulators and shared planned program changes to help maintain overall confidence in the Laboratory’s program. The Laboratory maintained compliance with all regulatory permits during this performance period. Permit applications, Annual Environmental Reports, permit compliance reports and deliverables were submitted complete with only minor errors identified in Site Office reviews. EMS regulatory deliverables could benefit from more detailed quality assurance reviews and be submitted to DOE with additional lead time to support final review before Regulator deadlines. Continuous improvement efforts are appropriate to thoroughly document procedures so they can be easily followed by the regulatory entities. With a progressive increase in the number of activated cryomodules being refurbished by the SRF group, tracking procedures and waste characterization have not kept pace to ensure proper disposition of radiological material. This resulted in a mixed waste incident that was identified this year and may have been unidentified in previous years.

	Letter Grade	Numerical Score	Objective Weight	Overall Score
5.1 Integrated ES&H	B+	3.3	80%	
5.2 Environmental Management System	B+	3.3	20%	
Performance Goal 5.0 Total				3.3

Table 5.1 Program Performance Goal 5.0 Score Development

Score	0.0-0.7	0.8-1.0	1.1-1.7	1.8-2.0	2.1-2.4	2.5-2.7	2.8-3.0	3.1-3.4	3.5-3.7	3.8-4.0	4.1-4.3
Grade	F	D	C-	C	C+	B-	B	B+	A-	A	A+

Table 5.2 Goal 5.0 Final Letter Grade

Goal 6.0 Deliver Efficient, Effective, and Responsive Business Systems and Resources that Enable the Successful Achievement of the Laboratory Mission(s)

This Goal evaluates the Contractor's overall success in deploying, implementing, and improving integrated business systems that efficiently and effectively support the mission(s) of the Laboratory.

The Department has assigned an overall grade of A- for the Performance Goal. Comments are contained within the individual Objectives that follow:

Objective 6.1: Provide an Efficient, Effective, and Responsive Financial Management System

While continuing to work remotely, the Laboratory successfully utilized financial management system tools and controls to maintain an integrated set of business systems supporting the scientific mission. In addition, these tools supported business processes that ensured costs and commitments did not exceed available funding in FY 2021.

The Laboratory's financial team completed the FY 2020 financial audit with KPMG. The Laboratory submitted documentation verifying compliance with the requirements for preparation of statements that assured the Laboratory's financial information was properly recorded.

The Laboratory met DOE timeframes and made several enhancements to its financial controls. All financial deliverables were submitted accurately and on time. The Laboratory's financial team conducted timely close-outs of FY 2020 accounting records and improved the Total Time Reporting controls, leading to an increase in on-time completion from 49 percent at the start of FY 2020 to a sustained 98 percent through the performance period. Additionally, these enhancements better accommodate employees working in different states. The Laboratory continued multi-state hiring in compliance with state-specific payroll tax requirements and enhanced the payroll staff to support continued compliance with the requirements.

The Laboratory's financial team implemented two unique training sessions for its employees. The finance department created and provided purchase order accrual training for technical staff, who provide input to monthly accruals, which ensures accurate and consistent accruals in the Laboratory's financial reports. All employees were required to take training on completing timesheets.

As required by the revised DOE Order 550.1, the Laboratory implemented a new process ahead of schedule to request and obtain DOE approval for foreign virtual conference participation. JSA received approval to participate in 11 foreign virtual conferences.

The Laboratory continued to pursue the Commonwealth's settlement agreement documentation requests in response to its \$1.383M Sales and Use Tax appeal. The Commonwealth of Virginia agreed in May with the Laboratory's basis for the appeal. This result represented the successful culmination of a year's long process with tax payment refunds expected from Virginia.

Finally, approximately 320 employees received Medical Loss Ratio rebates. These rebates were from refunds that the Laboratory's medical insurance provider sent based upon exceeding specific thresholds within the Affordable Care Act.

Objective 6.2: Provide an Efficient, Effective, and Responsive Acquisition Management System and**Acquisition Management:**

The FY 2021 Procurement Balanced Score Card (BSC) total score is 92% out of a possible 100 points, which utilizes the Department's core performance measures as the basis of the assessment. The targets under the various BSC performance metrics are based on national (and/or negotiated) targets issued by the Department's Office of Procurement Assistance Management. A score of 92% was a challenge given the large influx of dollars and requirements related to the various projects. The Laboratory executed 6,698 procurement actions valued at \$55M, 4,056 e-commerce transactions valued at \$1.9M, and achieved strategic source savings of \$2.291M. For the fourth consecutive year, the Laboratory earned DOE's Gold GreenBuy Award for sustainable acquisitions by purchasing 12 Priority Products in 5 categories. This is the fourth time the Laboratory was recognized for achieving "Gold" level, which resulted in the GreenBuy Prime Award for FY 2020 for demonstrating excellence in Sustainable Acquisition (awarded in 2021 for calendar year 2020 performance). During the national pandemic, the Laboratory continued to successfully provide remote access operations and categorized on-site subcontractors as essential or non-essential with updated safety plans to successfully maintain critical on-site operations and reduce Laboratory staff exposure risk per federal COVID-19 Guidance. In addition, the Procurement Department continued to provide strong procurement support to the various federal projects assigned to the Laboratory.

As it relates to support to the Department's Small Business program, the Laboratory exceeded all their mandated small business subcontracting goals (Small Business, Women-owned Small Business, Disadvantaged, Veteran-Owned, Service Disabled and HUBZone), which was truly outstanding. A total of \$43.9M of small business procurements in FY 2021 led to the accomplishment of all the goals. The Laboratory continued to support a formal Small Business Mentor Protégé Agreement with Momo's Cafe (a small, disadvantaged women-owned business) to assist the Protégé in identifying, developing, and promoting capabilities, experience and technical expertise that will help foster growth and business development for its future catering services. In particular, Momo's Cafe seeks to increase capability and capacity of its full-service restaurant and vending machine operations to provide greater food services capabilities to the Mentor's future catering requirements. Note that the Laboratory's other Small Business Mentor Protégé Agreement with Innovative Solution Unlimited, LLC (Insolves – a HUBZone small business) dropped out of the program.

A Procurement Evaluation and Reengineering Team (PERT) conducted the periodic review of the Laboratory's procurement system and issued a final report in October 2017. One of the PERT team's major concerns at that time was that the Procurement organization was significantly understaffed, and this was viewed as a major vulnerability. Based on the progress made to address concerns from the previous review, the Department issued a formal determination in December 2020 to delay the PERT in FY 2021 for an additional three-year period.

Property Management:

The Laboratory successfully managed government-owned personal property in accordance with applicable statutes and regulations. Specifically, the property office effectively supported the Laboratory while meeting COVID-19 requirements by implementing innovative work practices (e.g., staggered work schedules) and continued to achieve 100% of deliveries, on average, within one day. This is a significant achievement because the property office's throughput never decreased, while

their operational complexity significantly increased, due to adhering to pandemic safety protocols within the office and in the field.

The personal property validation was successfully completed using innovative techniques that were necessary to efficiently work within pandemic controls. The property validation is a difficult task under normal conditions; it was greatly complicated by social distancing controls and the fact that most employees were not on-site to assist in locating property issued to them.

Objective 6.3: Provide an Efficient, Effective, and Responsive Human Resources Management System and Diversity Program

The Laboratory continued to manage an efficient, effective, and responsive Human Resource (HR) Management System that meets the needs of the Laboratory's mission amid the challenges of operating during the COVID-19 pandemic. The HR strategies remained well-aligned with the Laboratory's science and technology strategy as highlighted in the Annual Laboratory Plan.

During this performance period, the Laboratory's HR team made 65 critical staffing hires. HR and Compensation continued to address significant market lags in core competency skills to remain competitive and deliver on mission objectives. It conducted 63 market adjustments to target select engineering and scientist job classifications.

The Laboratory was awarded second place in the 2021 Eddy Award at the Pension and Investments Conference for Pre-Retirement Planning, adapting from an in-person annual retiree-planning workshop to an all-inclusive three-day virtual event.

The Laboratory's HR team introduced more comprehensive DEI related analytics, including turnover and exit interview analysis and quarterly recruiting conversion metrics, to provide real-time data to measure progress towards goals, identify trends or concerns, and support decision making and planning efforts.

Objective 6.4: Provide Efficient, Effective, and Responsive Contractor Assurance Systems, including Internal Audit and Quality

Contractor Assurance and Quality:

The objectivity of the Laboratory's assessment program is evidenced by the mixture of overall performance determinations, as would be expected for any organization seeking continuous improvement. The leadership role assumed by the Performance Assurance Office is evident and the basic tenets of CAS are being executed transparently. There has been an impressive workload undertaken by the Performance Assurance lead investigators in managing concurrent mishap investigations.

Of note, the Laboratory's investigation into the counterfeit electronic parts discovery was outstanding. Line workers and Supervision were put under considerable duress in trying to recover from the parts failure, while simultaneously trying to understand what went wrong. The subsequent responses to requests for support to the DOE IG investigation was impressive. Responses required input from many different Divisions, and the information was both comprehensive and timely. This is emblematic of a fully functional CAS program that has underlying processes and procedures that had been well implemented in multiple functional areas over several years.

The pandemic compelled traditional assessments to be conducted remotely. The accelerator safety envelope violation and corresponding unauthorized entries into a high radiation area may serve as a reminder that assessing performance remotely has inherent limitations. Evaluation of hybrid assessments may be warranted until public health conditions allow resumption of a more normal work posture that affords all team members the opportunity to directly evaluate performance in the field.

Internal Audit and Oversight:

Internal Audit continued to perform its duties remotely during FY 2021. All deliverables were submitted early or on time. The Annual Report of Internal Audit Activities summarized audits performed, audit results, corrective actions, and finding resolutions, for audits performed in FY 2020. The report documented that there were no unresolved questioned costs for audits performed in FY 2020. All audits on the FY 2021 Audit Plan were performed and reports issued by September 30, 2021.

As required by DOE Federal Managers Financial Integrity Act (FMFIA), Internal Audit tested 238 out of 398 (59.8%) of the internal controls over processes, sub-processes, and risks. The results of the Financial Management Assessment were reported in AMERICA timely. Internal controls continue to receive scrutiny by the Department's Chief Financial Officer (CFO), especially information technology controls.

Additionally, the Laboratory's Internal Auditor served as the lead assessor on an external quality Assessment of the DOE's Kansas City National Security Campus internal audit activity.

Objective 6.5: Demonstrate Effective Transfer of Knowledge and Technology and the Commercialization of Intellectual Assets

Several critical SPPs and CRADAs were entered into this fiscal year and successfully administered. In FY 2021, 19 patents were awarded which relate directly to the Laboratory's core competencies. The Laboratory continued to participate in the Department's Technology Transfer Working Group (TTWG) as it relates to the transfer of technology and commercialization of intellectual assets of the Laboratory.

In addition, there were numerous small business companies that requested letters of support for their SBIR/STTR proposals, and 33 support letters were sent for actual proposals that were submitted to DOE and 21 proposals received funding of approximately \$11.5M. This clearly demonstrated the Laboratory's continued commitment to the Department's Small Business and Technology Transfer Programs. Overall, the Laboratory continued to have an effective technology transfer program as evidenced by the significant number of intellectual assets generated during this period.

Significant focus and effort towards meeting public access requirements was demonstrated, and the Laboratory achieved accepted manuscript submission rates of 98% in FY 2021. The Laboratory's strong commitment to public access, including its focus on comprehensiveness and staff outreach are to be commended. The Laboratory has a long-standing, effective Scientific and Technical Information (STI) management process, and accepted manuscripts have been efficiently incorporated into the routine submission of STI to the Office of Scientific and Technical Information (OSTI).

	Letter Grade	Numerical Score	Objective Weight	Overall Score
6.1 Financial Management Systems	A-	3.5	20%	
6.2 Acquisition and Property Management Systems	A-	3.6	20%	
6.3 Human Resources	A-	3.5	20%	
6.4 Contractor Assurance Systems	A-	3.5	25%	
6.5 Technology Transfer	B+	3.3	15%	
Performance Goal 6.0 Total				3.5

Table 6.1 Program Performance Goal 6.0 Score Development

Score	0.0-0.7	0.8-1.0	1.1-1.7	1.8-2.0	2.1-2.4	2.5-2.7	2.8-3.0	3.1-3.4	3.5-3.7	3.8-4.0	4.1-4.3
Grade	F	D	C-	C	C+	B-	B	B+	A-	A	A+

Table 6.2 Goal 6.0 Final Letter Grade

Goal 7.0 Sustain Excellence in Operating, Maintaining, and Renewing the Facility and Infrastructure Portfolio to Meet Laboratory Needs

This Goal evaluates the overall effectiveness and performance of the Contractor in planning for, delivering, and operations of Laboratory facilities and equipment needed to ensure required capabilities are present to meet today's and tomorrow's mission(s) and complex challenges.

The Department has assigned an overall grade of A- for the Performance Goal. Comments are contained within the individual Objectives that follow:

Objective 7.1: Manage Facilities and Infrastructure in an Efficient and Effective Manner that Optimizes Usage, Minimizes Life Cycle Costs, and Ensures Site Capability to Meet Mission Needs

The Laboratory efficiently and effectively managed facilities and infrastructure as evidenced by the following highlights of performance:

- Performed overhaul of Low Conductivity Water (LCW) Pump motors 1 and 3 from the north access building as a result of conducting proactive vibration analysis which indicated bearing wear.
- Preempted fan failure by identifying bearing noise in the Hall D Cooling Tower and performing corrective measures.
- Replaced three exhaust fans found inoperable on the roof of the north access building.
- Replaced certain of the Test Lab's scrubber fan elements to increase structural integrity on Chemical Lab Fume Hood Scrubbers and improve SRF chem room operations.

- Replaced the Test Lab's obsolete Windows 8 server, providing alarm monitoring of fume hoods in the Chem Lab, and Monitoring and Control Servers for the Accelerator mechanical and CEBAF Center data systems.
- Improved Hall C operations with replacement of the main LCW Cooling Pump, repairing a gauge-piping leak, replacing leaking filter housing, and replacement and calibration of pressure and pH sensors in the Hall C Beam Dump.
- Improved the reliability of cooling water supply for upcoming accelerator operations with the repair of leaking isolation valves and replacement of Victaulic coupling gaskets in the secondary heat exchanger in the Facilities Service building, which supports LCW cooling in Halls A, B, and C.
- Enhanced the Laboratory's electrical distribution systems during the performance of required electrical preventive maintenance (PM) with installation of "VeriSafe Units" on the west end of the North LINAC. This allows for verification of zero voltage on a switchboard without removing covers, donning required Personal Protective Equipment (PPE) or using meters. Also, permanently attached "Fixed Circuit Breaker Lockout" devices to the breaker, to allow locks to be applied directly to the breakers versus using temporary devices, a measure that exceeds current code requirements.
- Coordinated Dominion Energy's preventive maintenance work on the 22 megavolt amperes (MVA) substation that supports the campus side of the Laboratory and is a redundant power source to the accelerator site. Maintenance, including upgrades, to the 33 MVA and 40 MVA substations that support Accelerator Operations was also performed. The upgrades included having installed "Remote" Resetting of the Ground Fault Relay which allows for much faster resetting of the Dominion side of the power when interruptions occur; upgraded controls for Automatic Voltage Regulators, which guard against voltage irregularities between the three phases of the distribution; and upgraded metering controls for better reporting power interruptions.
- Quickly responded to the accelerator site losing power after a lightning strike in July. Dominion Energy, using their newly installed resetting capability, restored it in only 12 seconds after the loss. Facilities personnel then closed the 40 MVA breaker within 20 minutes of the loss, minimizing equipment damage and interruption to accelerator site operations.
- Procured three mission-critical spare transformers to better support rapid failure responses and installed two enhanced switchboards in the North LINAC to support the load for the Laboratory's C-75 cryomodule gradient upgrades.
- Continued focus on improving energy reduction through replacement of 1000 W HID lighting fixtures with 250 W LED fixtures in radiation areas in the experimental Halls. When completed, 51 fixtures will have been replaced with an energy reduction of 40.2 kilowatt (kW).
- Initiated construction of a General Plant Project (GPP) to address LINAC cooling issues with increasing chilled water capacity, improving airflow, reducing infiltration of unconditioned air, and increasing air conditioning capacity.

- Completed construction to replace the outdated and unreliable Hall A air conditioning (A/C) system. This project delivered higher reliability on the Hall A/C systems, which is critical to support the cooling requirements for the upcoming SBS experiment.
- Completed proactive assessments of cranes as a result of having observed and identified several structural problems with the Hall A 20-ton radial crane. This led to the proactive response involving a more detailed evaluation that led to repair recommendations that are under design and will be implemented in FY 2022. No issues were found with the Hall B crane. The Hall C crane trolley beam showed areas that appeared to be flexing more than expected and stiffener plates were installed to strengthen the areas of concern. As well, the Test Lab Crane's three rail splices were found to have significant gaps that exceed allowable standards, and therefore, is also being evaluated for the repair.
- Completed fire protection system work in the tunnel, including replacement of detection systems in the experimental Halls. The completion of this effort eliminated a serious risk to CEBAF in that the original sprinkler pipes had been subject to significant corrosion due to poor original design for the tunnel environment and had reached a point where they were unlikely to operate properly in the event of a fire in the tunnel.

Objective 7.2: Provide Planning for and Acquire the Facilities and Infrastructure Required to Support the Continuation and Growth of Laboratory Missions and Programs

The Laboratory performed exceptionally well this year across a broad range and heavy workload of projects as highlighted below:

Central Helium Liquefier (CHL) 2K Cold Box Replacement:

The project is essentially complete at 99.4% complete with the Cost Performance Index (CPI) at 1.04 and the Schedule Performance Index (SPI) at 1.00. The new CHL cold box, cold box platform, and I-beam trolley installation was completed. Mechanical and electrical installation was completed in April 2021. Cold box commissioning was completed on July 5 and the Federal Project Director (FPD) verification walkdown was conducted in August. Buyback items have been identified for funding using remaining contingency and final project closeout is anticipated in the first quarter of FY 2022.

End Station Refrigerator (ESR) 2:

The project is half complete, but it continued to experience slow progress primarily on the main compressor, cold piping, control systems, and building support activities. The project team conducted a deliberate evaluation of the project's progress earlier in FY 2021 and updated the forecast for completion of remaining activities based on the cost and schedule impacts the project had been experiencing, which resulted in an updated schedule forecast completion date for the project. The Estimate at Completion (EAC) estimate trend improved over the last three months of the performance period based on improved management oversight and efficiencies in design and fabrication activities. Attention to this project remains critical to improve overall project performance and to avoid impacts to the MOLLER project need date for ESR2 of December 2024. The project began planning for a Lab-sponsored independent review in first quarter of FY 2022 to further evaluate opportunities for improvement.

Cryogenic Test Facility Upgrade:

The project progress is 14.3% with a CPI of 1.53 and SPI of 0.58. The Shield Refrigerator Cold Box (CB1N) acquisition strategy changed from purchasing a new system to refurbishing the existing system due to availability, cost, and schedule. The cost savings and schedule delays with the CB1N procurement are driving variances in both the CPI and SPI performance metrics. The procurement of the CB1N expander pod refurbishment was awarded in April with an expected delivery in September but has been delayed to first quarter of FY 2022. The late award of the CB1N refurbishment led to late design of interfaces and distribution box system, which added to the schedule delay. Metrics are expected to improve since the award of the CB1N expander pod refurbishment and continued progress on the CB1N interface, the Distribution Box, and the 2K Recovery Heat Exchanger system designs. The existing cold box is functional, and delay of the refurbishment is not expected to negatively affect the remaining project schedule or plant performance, with the final project completion remaining on schedule.

Cryogenics Engineering Building 89 Renovation:

This project was completed in early FY 2021. The Laboratory's Procurement and Facilities Management organizations completed efforts to resolve the subcontractor's request for additional time and money due to the lab-imposed, 52-day COVID shutdown on the project in 2020. The Cryogenics team is currently using the building and overall employee feedback was very positive.

High Performance Data Facility (HPDF):

The HPDF, an Advanced Scientific Computing Research (ASCR) project, received CD-0 approval in December 2020 with a cost of range of \$300-500M. The Laboratory completed procurement activities to select and hire an Architect and Engineering (A-E) firm to begin work on the project's analysis of alternatives (AoA) and preliminary conceptual design. The project team has been actively engaged with the FPD to enhance communication with the ASCR Program Office and progress the fundamental project planning that is needed at this stage of the project. It is critical for the project team to determine how it will evaluate the facility's user needs and then clearly identify the project requirements that are fundamental to completing the AoA and preliminary conceptual design. This coupled with staffing up the project are crucial next steps for this project to move to the next critical decision, CD-1/3A.

Thomas Jefferson Infrastructure Improvement (TJII):

The TJII project received CD-0 approval in December 2020 with a cost range of \$77-98M. JSA hired a Project Director (PD) and completed procurement actions to select an A-E firm that will complete the AoA and the conceptual design. The newly hired PD has drafted AoA criteria to be agreed upon between the FPD and SC Program Manager. The PD also did an excellent job of preparing a list of CD-1 requirements using the most recent SC project management decision matrix, which will be necessary for planning the activities needed to obtain approval of the next critical decision, CD-1, *Approval of the Analysis of Alternatives, and the Total Project Cost Range*.

Notable Outcome: Complete the acquisition of the Applied Research Center and the preliminary design for the CEBAF Renovation and Expansion (CRE) project by the end of the 2nd Quarter of FY 2021 in compliance with the technical performance specifications and within the established DOE performance goals for cost and schedule.

The Department has determined that performance on this Notable Outcome met expectations. The project team continued to support the acquisition of the Applied Research Center (ARC) building with submittal of the preliminary title package to the Department of Justice (DOJ) for review in November 2020. In parallel with the ongoing DOJ review, the project team also provided inputs to support the Real Estate Contracting Officer’s submission of the draft acquisition package for review and approval to DOE’s Office of Management and Administration. The Laboratory completed the preliminary design for the CRE project in March 2021. The CRE project team issued the Notice to Proceed with the final design for the ARC building and received the 60% design for its renovation in June. The final design for the ARC building remained on schedule to complete on or before January 2022.

	Letter Grade	Numerical Score	Objective Weight	Overall Score
7.1 Usage and Life Cycle Cost	A-	3.6	40%	
7.2 Planning and Acquisition	A-	3.6	60%	
Performance Goal 7.0 Total				3.6

Table 7.1 Program Performance Goal 7.0 Score Development

Score	0.0-0.7	0.8-1.0	1.1-1.7	1.8-2.0	2.1-2.4	2.5-2.7	2.8-3.0	3.1-3.4	3.5-3.7	3.8-4.0	4.1-4.3
Grade	F	D	C-	C	C+	B-	B	B+	A-	A	A+

Table 7.2 Goal 7.0 Final Letter Grade

Goal 8.0 Sustain and Enhance the Effectiveness of Integrated Safeguards and Security Management (ISSM) and Emergency Management Systems

This Goal evaluates the Contractor’s overall success in safeguarding and securing Laboratory assets that supports the mission(s) of the Laboratory in an efficient and effective manner and provides an effective emergency management program.

The Department has assigned an overall grade of A- for the Performance Goal. Comments are contained within the individual Objectives that follow:

Objective 8.1: Provide an Efficient and Effective Emergency Management System

The Laboratory conservatively operated with minimal on-site staffing while ensuring emergency management capabilities were ready and effective. The Laboratory continued to execute its Worker Pandemic Protection and Response Plan, resulting in efficiently managing changing pandemic conditions that drove decreasing then increasing pandemic controls over the course of the year. The emergency manager worked with the DOE Continuity of Operations Program (COOP) office and the Laboratory leadership in successfully accomplishing an in-person tabletop exercise that should yield significant improvements in a few areas. Quarterly accountability drills were smoothly conducted with timely and complete results.

Objective 8.2: Provide an Efficient and Effective Cyber Security System for the Protection of Classified and Unclassified Information

During this fiscal year, the Department validated statistics through a mixture of walkthrough inspections, results from exercises, and inspection reports.

Efficiency was gained in the metric that measured the mean time to remediate critical intrusion events and the raw score is at an impressive 9.52 hours. Most importantly, there were no root-level compromises or use of the Laboratory to platform to external systems. Despite a very busy year, services were upgraded such as the central fileserver, Voice Over Internet Protocol (VOIP) servers, firewalls, routers, and switches. In addition, the Varonis software was deployed to help secure sensitive files, monitor user behavior, and prevent data leaks across Office 365 (O 365). These are examples of critical strategic planning by the cyber security group. The successful completion of these technical challenges, while balancing the heavy administrative requirements on the program, with such limited resources is noted. Collaborative capability is enhancing well in support of the EIC project, and the balance to maintain successful interactions with security protection is commendable.

There is evidence of solid contributions from the Computational Science and Technology division to the Laboratory mission. This includes instituting a federation of O 365 tenants with several other laboratories and with SC. This is allowing Laboratory O 365 accounts to be used, to access the O 365 resources owned at the other locations, which is great for collaboration. Another example is the running of open science grid jobs for the GlueX and CLAS12 experiments. Previously, these open science grid jobs were submitted to other sites and are now both accepted and run locally. It is noted that this capability is also available for EIC project efforts. In addition, the delivery of more than 14 million Computer Processing Units (CPU) hours from the computer farm to experimental physics is impressive. The installation of a network router for Hall A allows that group to now take advantage of the provided 40Gbit/sec uplink speed.

The Department recognizes the amount of effort and time dedicated to responding to the increasing volume and complexity of external data requests. There is evidence that the overall cyber posture is adequate, based on the current architecture, and privilege separation, and no negative impacts exist toward the production of science at the Laboratory.

Objective 8.3: Provide an Efficient and Effective Physical Security Program for the Protection of Special Nuclear Materials, Classified Matter, Classified Information, Sensitive Information, and Property

The Laboratory continues to demonstrate leadership amongst its peers by hosting the SC Physical Security Working Group. This effort is greatly appreciated by the Department and the broader SC laboratory community. Meeting agendas have stimulated significant discussion among attendees which has promoted awareness of emerging technologies and allowed SC to better understand common challenges faced by the laboratory community.

The updated security program training content is of high quality, and the interactive format helps affirm comprehension of training objectives. The new training content is timely and aligns with the Department's emerging security requirements. This is in addition to more personal training classes provided to promote awareness of security requirements for those that sponsor visitors to the Laboratory.

The Department recognizes the energy and effort that has gone into adjusting funds to support security program needs in the current budget environment. Additionally, the Laboratory’s efforts in preparing for the security force contract recompetes next year are evident.

The Laboratory’s collaboration to align the contract requirements with the nuclear material accounting deliverables was greatly appreciated, and now accurately reflects the actions and responsibilities compelled by the Directives.

By recently hosting a visit by the regional FBI leadership and coordinating an active shooter exercise with the City of Newport News Police Department, the Laboratory has helped maintain strong relationships with outside responders. These relationships are instrumental in communicating site security risks and improving coordination and site familiarization in the event of an emergency.

	Letter Grade	Numerical Score	Objective Weight	Overall Score
8.1 Emergency Management	B+	3.4	30%	
8.2 Cyber-Security	A-	3.5	40%	
8.3 Special Nuclear Materials, Classified Property	A-	3.6	30%	
Performance Goal 8.0 Total				3.5

Table 8.1 Program Performance Goal 8.0 Score Development

Score	0.0-0.7	0.8-1.0	1.1-1.7	1.8-2.0	2.1-2.4	2.5-2.7	2.8-3.0	3.1-3.4	3.5-3.7	3.8-4.0	4.1-4.3
Grade	F	D	C-	C	C+	B-	B	B+	A-	A	A+

Table 8.2 Goal 8.0 Final Letter Grade