

**U.S. Department of Energy**

**Office of Science**

**Fiscal Year 2022**

**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, 2021 to September 30, 2022**



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## 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 2022 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. For the purpose of determining 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).

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

**Figure 1. FY 2022 Contractor Letter Grade Scale**

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

<b>Performance Goal</b>	<b>Grade</b>
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	B+
5.0 ES&H and Environmental Management	B+
6.0 Business Systems	B+
7.0 Infrastructure	B+
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).

<b>S&amp;T Performance Goal</b>	<b>Numerical Score</b>	<b>Weight</b>	<b>Total Score</b>
1.0 Mission Accomplishment	3.7	30%	
2.0 Design, Fabrication, Construction and Operations of Research Facilities	3.6	45%	
3.0 S&T Program Management	3.7	25%	
<b>Initial S&amp;T Score</b>			<b>3.6</b>

**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	3.4	25%	
7.0 Infrastructure	3.4	25%	
8.0 Safeguards/Security	3.5	20%	
Initial M&O Score			3.4

**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	3.6	75%	
4.0 Leadership/Stewardship	3.3	25%	
Final S&T Score			3.6
Initial M&O Score	3.4	75%	
4.0 Leadership/Stewardship	3.3	25%	
Final M&O Score			3.4

**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 2022 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	\$3,345,296
Overall Earned Performance - Based Fee (Table D)	X 94%
Earned Fee	\$3,144,578.24

**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**

##### **Accelerator R&D and Production (ARDAP)**

TJNAF efforts under Accelerator Stewardship funding to advance high efficiency magnetron-based radio frequency (RF) power sources, superconducting radio frequency (SRF) metallographic research and development (R&D), and compact industrial accelerators is innovative and proceeding well. Principal Investigators (PIs) are encouraged to strengthen industrial participation where possible to ensure technology transfer to industry is successful.

##### **Nuclear Physics (NP)**

TJNAF is the world's leading hadron physics facility making impressive contributions to our understanding of nuclear force and nuclear structure. The TJNAF staff provide strong support for the experimental program and provide significant scientific leadership for the execution of the scientific program in general.

TJNAF has an outstanding record of scientific and technical accomplishments in the 12 GeV era. The science output from its experiments is impressive, and includes several publications from the 12 GeV running, with many more expected in the next several months. TJNAF continues to provide effective and efficient support to its PAC approved scientific program and high priority experiments like the Super Bigbite Spectrometer (SBS). TJNAF management and staff have significant leadership on the development and construction of the Electron-Ion Collider (EIC) and its baseline Detector. The partnership with Brookhaven National Laboratory (BNL) is highly effective and cooperative. The TJNAF theory group continues its exceptional contributions with the publication of significant science results. TJNAF staff are making seminal contributions to artificial Intelligence and machine learning (AI/ML) algorithms for experiments and for accelerator reliability.

The experimental research staff are active and productive in the experiments executed in all four Halls as evidenced by co-authorship on papers and public talks. The staff's research activities and leadership roles in the experiments and publications were not presented at the FY22 S&T review and therefore a panel assessment of the in-house medium energy research programs could not be made. Further, a late progress report that was received by NP did not contain sufficient information to aid in the assessment of the experimental staff.

The 12 GeV experimental program is strong and productive. The Program Advisory Committee (PAC) conducted the “Jeopardy” process and re-approved important experiments that are likely to have an impact on the field.

Accelerator scientists at TJNAF further advanced the predicting theory and models with experimental results on oxygen doping of accelerating SRF cavities with promising results that are less expensive and less complex in comparison with current nitrogen doping. The SRF group has a pending patent for oxygen alloying related to this work.

The theory group maintains its high-impact physics program and continues to work closely in support of the experimental program. Significant results have been obtained, many leveraged by the high-performance computing facility hosted by the laboratory. By forging alliances with local universities and other national theory groups, it maximizes its science impact and leads the effort in defining the science for the EIC.

The theory group has a multi-prong research effort. There are joint efforts between experiment and theory – hadron spectroscopy study includes lattice calculations, partial wave analysis (JPAC) and experiments, parton distributions (PDF, GPD) are tackled in lattice, global analysis (JAM) based on experimental cross sections such as DVCS mentioned above. The group is also successful in recruiting quality young researchers.

In the area of lattice quantum chromodynamics (QCD), in addition to world-leading research results, TJNAF is providing to the US lattice QCD community a set of mid-range High Performance Computing (HPC) resources tuned to specific tasks of importance to the NP community. TJNAF contributed about 2/3 of the US lattice QCD dedicated computing resources with only about 1/3 of the resources.

TJNAF scientists publish in leading peer-reviewed journals and make invited and contributed presentations at national and international meetings. TJNAF has a sustained publication and reporting output that is well-aligned with the NP program. According to the Laboratory, FY22 peer-reviewed publications in leading physics journals were distributed by research area as follows: Medium Energy – 37; Theory – 59; Accelerator Physics – 7; and Computational Science – 7. Invited talks were reported by research area as follows: Medium Energy – 49; Theory – 174; Accelerator Physics – 8; and Computational Science 3. There were 15 theses based on research activities at TJNAF during FY 2022. This year, TJNAF staff took lead roles in organizing and hosting 30 workshops and meetings.

### **Workforce Development for Teachers and Scientists (WDTS)**

The Laboratory executes WDTS sponsored programs in support of the SC/DOE STEM workforce mission in manners that meet expectations. The Laboratory is strongly encouraged to develop proactive outreach and engagement activities to recruit more applicants/participants.

Leveraging existing partnership with local/remote institutions, the lab is encouraged to actively engage faculty from underrepresented institutions and recruit them to the VFP program.

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 work to successfully support students under the continuing COVID-19 impact is appreciated.

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

#### **Nuclear Physics (NP)**

TJNAF staff made significant contributions to the nuclear data community, specifically related to nuclear data needs for medical applications. Staff were an important source of information for beam therapy for cancer treatment, particularly related to dose-to-patient and particle stopping power. This led to a medical applications session at the 2022 Workshop for Applied Nuclear Data Activities (WANDA) where TJNAF staff also presented on these needs. Staff also contributed nuclear data needs for medical applications as part of the Nuclear Science Advisory Committee (NSAC) charge on nuclear data.

The SRF science and technology group is continuing its leadership in in-situ cryomodule plasma processing with the goal of developing robust recipe for restoring performance that can be applied at other SC accelerator facilities. The SRF group has a strong track record of obtaining funding for R&D projects and continued to make major contributions during the past years. The future EIC and proposed Continuous Electron Beam Accelerator Facility (CEBAF) upgrades provide a strong basis for future SRF R&D at TJNAF. Plans should be well aligned with SRF efforts elsewhere to highlight contributions by the laboratory. Continued strong collaborations with other DOE labs and universities are encouraged. Collaborations with universities could help with attracting talent in SRF to the laboratory.

TJNAF led the SciDAC-4 lattice QCD project. Recent lattice QCD calculations done by the team determined for the first time the mass and decay rates for the isovector exotic  $\pi_1$  meson. The theory project provides important guidance for GlueX experiment's search for exotic states.

The TJNAF theory group led a successful lattice QCD proposal for SciDAC-5 award cycle and participates in a new SciDAC-5 project led by ANL.

The TJNAF Theory group leads the TMD Collaboration. This collaboration, involving TJNAF's JAM collaboration, developed a new framework of data analysis, performed the first simultaneous QCD global analysis of data and obtained the most precise determination of quark tensor charge.

TJNAF has done well in engaging young scientists in research opportunities. The following workforce development statistics were reported for junior scientists: Undergraduate Students – 57; Graduate Students – 212; Postdoctoral Associates – 65.

Staff at TJNAF have been appropriately recognized for their contributions through numerous awards. Two staff members were named as Fellows of the American Physical Society. Two staff scientists received DOE Early Career Research Awards, while another received both a DOE Early Career Research Award and an NSF Career Award. A student from Duke University conducting research at TJNAF received the Dissertation award from the Division of Nuclear Physics of the American Physical Society. An accelerator physicist was recognized by the American Physical Society as an Outstanding Referee. A nuclear theorist received the Jesse W. Beams Research Award, and an

accelerator physicist was named the U.S. Particle Accelerator School Prize Winner. Finally, a postdoctoral fellow received an NSF Postgraduate Fellowship.

**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.

Leveraging existing partnership with local/remote institutions, the Laboratory is encouraged to actively engage faculty from underrepresented institutions and recruit them to the VFP program.

Science Program Office	Letter Grade	Numerical Score	Objective Weight	Overall Score
Accelerator R&D and Production				
1.1 Efficient Strategic Planning and Stewardship	A-	3.5	50%	
Overall ARDAP Total				3.5
Nuclear Physics				
1.1 Efficient Strategic Planning and Stewardship	A-	3.7	50%	
1.2 Leadership	A-	3.7	50%	
Overall NP Total				3.7
Workforce Development for Teachers and Scientists				
1.1 Efficient Strategic Planning and Stewardship	B+	3.1	80.0%	
1.2 Leadership	B	3.0	20.0%	
Overall WDTS Total				3.1

**Table 1.1 Program Performance Goal 1.0 Score Development**

Program Office	Letter Grade	Numerical Score	Weight	Overall Weighted Score
Accelerator R&D and Production	A-	3.5	5.7%	
Nuclear Physics	A-	3.7	92.2%	
Workforce Development for Teachers and Scientists	B+	3.1	2.1%	
Performance Goal 1.0 Total				3.7

**Table 1.2 Program Performance Goal 1.0 Score Development**

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

**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, beginning assembly of the first batch of cryomodules.

**Notable Outcome:** Effectively manage and safely execute the assigned LCLS-II-HE project scope in accordance with DOE Order 413.3B. Performance will be assessed based on the work planned and accomplished during FY 2022.

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 began string assembly of the first article cryomodule, started the assembly on the second cryomodule, and maintained management and safety oversight of the related activities at the Laboratory.

**Nuclear Physics (NP)**

The MOLLER MIE has made excellent progress in design tasks during a year of constrained and uncertain funding only lately resolved with the receipt of Inflation Reduction Act funds. Planning and execution of MOLLER MIE has proceeded effectively, even under COVID restrictions. Design level is being qualitatively tracked and multiple design reviews are planned prior to the next Director’s review and independent review supporting long-lead procurements. The project is well positioned to complete final design in FY 2023.

The MOLLER collaboration and MIE effort has appropriately integrated in-kind contributions to the project detector both from the National Science Foundation and the Canadian Foundation for Innovation.

The Electron-Ion Collider (EIC) project has made excellent progress since attaining CD-1 in June 2021. The project has a sound foundation in place. This includes an established partnership and organization, defined scope, conceptual design, preliminary performance parameters, a cost and

schedule range that remains unchanged since CD-1, and appropriate planning documentation. The project is actively pursuing broader collaboration and partnership in the EIC. There is also a clear path forward on the project Detector 1.

The EIC project provided well-justified, clear, and timely responses to budget formulation requests in support of preparations of the FY 2024 budget formulation process. The project has proactively developed several funding profile exhibits that effectively demonstrate to NP impacts of out-year new funding caps to the total project cost and project completion date.

The EIC project, under the resource constrained funding environment of FY 2022 and with encouragement from the Federal Project Director, undertook an interim review in June 2022 that concentrated on scope, qualitative risk analyses, and updates to cost estimates. NP welcomed this opportunity to hear from the project team the progress that was made advancing technical scope planning and design despite funding below the technically possible profile. Presentations and follow up discussions with Level 2 managers gave insight into areas of technical risk and provided a frank view into areas of cost growth. The interim review positioned the project for more incisive internal reviews than would have occurred without this overarching review and will better prepare the project for a CD-2/3A, planned for FY 2024.

Following the interim review in June 2022, the project team undertook a set of technical choice and cost and schedule reviews for all project scope. The goal was to have Level 2 managers critically evaluate their scope in advance of CD-2.

The EIC project continues to regularly seek advice and input from other SC capital asset acquisition projects, potential collaboration partners in the National Laboratory system and across the international nuclear physics community, and from NP, as it continues refine its strategy for tailoring the project's critical decisions in recognition of funding realities, and the staggered maturity of its infrastructure, detector, and accelerator planning.

The EIC project made thoughtful and defensible decisions to revise its planning, and execute accordingly, to effectively utilize an unexpectedly greater proportion of base funding to line-item funding in FY22.

The EIC project recognizes the iterative and communal nature of risk planning. Although to comply with DOE Order 413.3 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 closely followed its plan for soliciting and evaluating detector collaboration proposals over a one-year span of time. The competition as conceived and executed by the project generated excitement in and galvanized the detector community, creating a forcing function that may lead to more in-kind contributions to the detector. The project plan included use of an ad-hoc Detector Proposal Advisory Panel composed of subject matter experts to complete the proposal evaluation and make a recommendation. This panel went above and beyond its charge, not only making a recommendation on the prioritized proposal for Detector 1, but also making recommendations useful for planning a second detector that is not within project scope.

The EIC project continued discussions with international entities but made little tangible progress in securing international in-kind commitments to support scope associated with the accelerator. The

project will need to have these commitments as firm as possible to so that there is sufficient confidence that the project is ready to baseline at CD-2 planned for FY 2024.

The Electron-Ion Collider project leadership seeks creative approaches to ever drive the project forward. Hiring actions at the end of FY 2021 that continued into the second quarter of FY 2022 jeopardized growing its operating budget beyond the means available during the continuing resolution and beyond. The project eventually relented, cutting back on hiring for the second half of FY 2022 and spending within its available funding during FY 2022. Without a finances director with authority over the entire project, a similar situation could reoccur.

**Notable Outcome:** Complete the Electron-Ion Collider (EIC) Detector 1 reference design selection process and harmonize its path forward with the EIC project plan.

The Department has determined that performance on this Notable Outcome met expectations. The EIC Detector 1 reference design selection process was completed in March 2022. Three detector collaboration proposals were submitted and an ad-hoc Detector Proposal Advisory Committee consisting of national and international subject matter experts was used to evaluate the proposals. The committee recommended the ECCE collaboration proposal as the EIC project detector. The EIC project team has harmonized this design within in the project plan.

### **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 has been a highly successful partner in providing assembly, delivery, and testing of cavities and cryomodules for the PPU project on schedule.

**Notable Outcome:** Effectively manage and execute the assigned PPU project scope in accordance with DOE Order 413.3B to safely deliver established project scope, meeting the performance baselines for schedule and cost. Performance will be assessed based on the work planned and accomplished during FY 2022.

The Department has determined that performance on this Notable Outcome met expectations. TJNAF has been a highly successful partner in delivering critical components for the PPU project on schedule and within cost, meeting or exceeding the technical performance criteria, with no equipment failures to date. Communication and collaboration have been strong and effective, with ORNL and TJNAF staff traveling to support fabrication, testing, and reviews to ensure successful subsystem delivery and integration. Notable is the application of shipping lessons-learned from the LCLS-II project, resulting in 100% of cryomodules arriving at ORNL damage-free.

### **Objective 2.3: Provide Efficient and Effective Operation of Facilities**

#### **Nuclear Physics (NP)**

TJNAF operations staff made notable improvements in the operational efficiency and reliability of the CEBAF user facility in FY 2022. The facility delivered 4,154 hours of beam of a scheduled 5,447 hours with a reliability of 76%. Delivered hours and reliability improvements are the result of management efforts to improve staffing levels and training impacted by COVID restrictions and the

continuing realization of the CEBAF Performance Plan (CPP). Achieving FY 2022 operation goals despite significant staff turn-over and the fluid nature of COVID restrictions is impressive.

The TJNAF Accelerator Division and Operations Group continue to make good progress on raising the CEBAF beam energy via replacement of old cryomodules with higher gradient newer models and improved operational procedures to plasma process cryomodules. They are working on a plan to process cryomodules in situ rather than a making a time consuming and resource intensive trip from the accelerator to the SRF lab and back again thus making more efficient use of resources during shutdowns. In support of this effort, TJNAF scientists and engineers made further progress in FY 2022 pursuing critical R&D using plasma processing technique aimed at restoring performance of degraded SRF cavities. Toward that goal, SRF group made considerable progress in improving a C-100 integrated cavity performance using plasma processing technique. Plasma processing is the main candidate in restoring CEBAF SRF cavity performance in the energy reach program at TJNAF.

Past issues with critical spares appear to be fully addressed. Issues related to device aging and system obsolescence demand further attention. The focus of operational challenge mitigation on the gradient margin, hardware reliability, and reproducibility is appropriate. Proposed system upgrades like replacing the klystrons with solid-state amplifiers are likely to significantly improve facility reliability and reduce unscheduled accelerator downs.

CEBAF operations is strengthening the conduct of operations including beamline hygiene and SRF safeguard discipline. The CEBAF team is encouraged to reach out to other institutes and laboratories to share experience and lessons learned with recently completed SRF facilities.

CEBAF operations have been supported by technical groups of both accelerator and engineering divisions appropriately with high priority. Challenges caused by the recent departure of some key supporting staff are being actively responded to. Accelerator staff retention and recruitment continue to be challenging.

TJNAF makes appropriate use of a Program Advisory Committee (PAC), a best practice at scientific user facilities, to assess and recommend experiments for beam time. The PAC has established four recommendation categories for proposals: approved, conditionally approved, deferred, and rejected. The PAC meeting held in July 2022 considered 6 new proposals, one of the new proposals was approved, one was conditionally approved, and four were deferred. The recommended actions by the PAC are being responsibly acted on by TJNAF leadership to execute a high-quality science discovery program at CEBAF.

TJNAF has implemented a Jeopardy policy, where proposals that have been approved for four years or more but are not schedule must be reviewed by the PAC. For the PAC meeting held in July 2022, five proposals that fell within the Jeopardy policy passed this additional review step. NP welcomes the use of this Jeopardy policy as a means for the laboratory to assure that previously approved proposals remain scientifically compelling.

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

The Jefferson Lab Users Organization (JLUO) provides valuable assistance and encouragement to CEBAF users. It has over 1600 members from nearly 300 institutions in 36 countries. It provides help to users visiting the lab especially during the changing requirements due to COVID restrictions and does an especially good job in providing mentoring to younger scientists and advocating for and supporting DEI activities at TJNAF. JLUO continues to provide valuable on future directions for the CEBAF program.

The JLUO provides an important resident workforce in the form of students and postdocs. There are typically 225 young scientists at the laboratory, these days down to 125 or so due to COVID restrictions. Mentorship of these young scientists is included in TJNAF scientific staff 25% research effort.

The ever-changing conditions associated with COVID restrictions presented several challenges related to communication and user involvement. The laboratory has been effective in communicating with and supporting the user community, given the challenges the laboratory and user community faced during this period. The Jefferson Lab Weekly for Users newsletter and laboratory email communications have been effective in communicating frequently changing requirements. Laboratory support in allowing for remote co-shifts was appreciated and helped maintain a robust physics program and user engagement.

With some TJNAF staff working remotely, it remains important to ensure that users can determine their training requirements in advance of arriving at the laboratory, verify that they will be able to access the halls for shifts, and be able to arrange training in a timely fashion. The laboratory needs to facilitate in-person interactions, through making staff schedules more available or encouraging in-person participation in meetings when safe and feasible.

The accelerator group has made several important science and technology advances relevant for CEBAF, but also having broader SC/DOE and national impact. The laboratory and the SC complex have successfully benefited from several multi-laboratory technical partnerships including SRF support for LCLS-II, SNS, and FRIB.

The recent and near-term upgrades in the various halls are adding important new capabilities addressing high priority physics at CEBAF. The approval of new experiments and retention of experiments in jeopardy demonstrate a strong future 12 GeV science program. TJNAF has a significant international impact as evidenced by the diverse international users' group and the broad representation on CEBAF experiments.

Mentoring of early career scientists at TJNAF makes a significant contribution to the community. This is evidenced by the number of Early Career Awards to TJNAF scientists.

As a partner in the EIC, TJNAF is extremely active in pursuing in-kind international contributions, particularly to the accelerator portion of the EIC. This is a time-consuming task requiring significant effort. It is currently being undertaken by multiple people at TJNAF and BNL with prior commitments. While these personnel excel at this task, it is likely taking time from their primary

positions. The EIC project might benefit from a dedicated person to handle international agreements pertaining to the EIC.

The EIC project is applauded for its efforts in community building around the prioritized proposal for EIC Detector 1. When directed by the NP to incorporate members of collaboration proposals rated at lower priority by the Detector Proposal Advisory Committee, the prioritized collaboration, with significant and diplomatically executed encouragement from the project team, found meaningful and vital areas for their participation and contributions. This process of incorporating others to recast the collaboration took under six months, a surprising and impressive feat.

TJNAF has a rich history of education and public engagement that is greatly appreciated by NP. Education programs include pre-College programs for teachers, students, and a combination of the two focused on both middle and high school students. TJNAF’s programs for undergraduate students include federally supported programs such as the DOE Science Undergraduate Laboratory Internship (SULI), the NSF Research Experience for Undergraduates (REU) program, and the Community College Internship Program (CCIP), as well as TJNAF-initiated efforts including the Hampton University Graduate Studies (HUGS) program and the Virginia Physics Consortium (VPS), both of which aim to increase participation by underrepresented groups. On the science literacy front, staff at TJNAF participated as mentors for the Cooperating Hampton Roads Organizations for Minorities in Engineering (CHROME) program and supported teams as part of the Virginia Regional Science Bowl. TJNAF staff also hosted students on field trips, supported career and science fairs, and made classroom visits to broaden the STEM experience for Virginians. Lastly, TJNAF hosts a science education website that averaged more than 200,000 views per day.

Science Program Office	Letter Grade	Numerical Score	Objective Weight	Overall Score
Basic Energy Sciences				
2.1 Support Laboratory Programs	A-	3.5	50%	
2.2 Construction of Facilities	A-	3.5	50%	
Overall BES Total				3.5
Nuclear Physics				
2.1 Support Laboratory Programs	A-	3.7	10%	
2.3 Operation of Facilities	A-	3.6	75%	
2.4 S&T Results and Benefits to External User Communities	A-	3.6	15%	
Overall NP Total				3.6

**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	8.2%	
Nuclear Physics	A-	3.6	91.8%	
Performance Goal 2.0 Total				3.6

**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)**

TJNAF has a well-defined strategic planning process to inform annual planning and maintain core capabilities. The Laboratory’s mission is well aligned with NP’s mission, and Laboratory leadership effectively communicates the strategic vision with stakeholders. TJNAF is an effective partner in the EIC project, with TJNAF staff filling critical project leadership positions and the Laboratory poised to deliver technical scope. TJNAF is also contributing to the recruitment of international collaborators for the purpose of realizing in-kind contributions to the EIC accelerator and detector. The MOLLER MIE project is being effectively managed, and communication between the project and NP is excellent.

TJNAF’s approach to strategic planning was presented at their July 2022 Science and Technology Review. The Laboratory has a well-structured planning process, connecting the Laboratory’s vision and mission with the Laboratory’s annual plan, departmental plans, and agenda (including LDRD). The Laboratory maintains scientific strategies in nuclear physics, accelerator science and technology, its partnership on the EIC project, and computational science and technology. The Laboratory’s vision and mission are well aligned with the NP mission.

Recent and envisioned future accelerator facility upgrades put the Laboratory in an excellent position to support an exciting research program, to be a strong partner in the realization of the EIC, as well as to support other DOE accelerator laboratories.

Maintaining critical core capability in SRF with extensive technical experience is of high importance for the Laboratory and NP. SRF staffing, especially trying to replace senior SRF scientists having years of expertise, will need a more aggressive hiring approach. In-house training of junior staff and promotion of mid-career scientists are commendable efforts. Maintaining technical SRF experience when transitioning from the ramp down of the SRF DOE projects to the ramp up of the EIC will be critical.

The Laboratory is encouraged to continue working with the user community to develop a science case for CEBAF upgrades in advance of the next Long Range Plan exercise.

TJNAF theory group led a successful lattice QCD proposal for SciDAC-5 awards and participates in a new SciDAC-5 project led by Argonne National Laboratory (ANL).

TJNAF management has been successful in securing partnerships with major construction projects in the US as well as helping the staff members win award funding. Together with the newly planned CEBAF upgrade concept, such programs can play important roles in attracting key expertise and retaining core staff.

In support of the EIC project, BNL and TJNAF have fruitfully invested in their partnership, with a 75 percent stake held by the host laboratory, BNL, and a 25 percent stake held by TJNAF based on the estimated cost of the scope each would deliver for the project. Informal agreements between the two laboratories have led to the adoption of shared project management practices that will benefit the project. The two laboratories need to continue these efforts to arrive at a shared and unified governance and management structure that will facilitate the efficient control of systems, procurements, and changes.

Leadership for the EIC project has kept the affordability of the project at the forefront of their minds. One strategy employed involves cultivating in-kind support for the project. This has included soliciting contributions from the New York State Empire State Development (ESD), international collaborators, and other federal agencies (e.g., National Science Foundation). The project envisions in-kind contributions to the accelerator and detector at the levels of ~\$50M and ~\$90M, respectively, and \$100M from ESD for conventional construction. Progress made in early discussions with potential collaborations on the accelerator and detector scope are encouraging. The protracted negotiations with ESD on the conventional construction scope have led the project to reconsider the execution of architectural/engineering design scope as DOE-funded scope to avoid prolonged details on conventional scope.

The EIC project has put in place an Advisory Board with international and domestic partners joining. The Board provides strategic direction and address issues affecting scope and/or resource allocation for the EIC project sited at BNL and at partner institutions. The EIC Advisory Board advises on areas such as organization, scope, schedule, collaboration, and international engagement. The formation of the Advisory Board is appreciated by NP as it provides an avenue for partner engagement that will likely foster in-kind contributions to both facility construction and experimental operations.

### **Workforce Development for Teachers and Scientists (WDTS)**

The Laboratory seeks student participants for placement in hands-on learning and authentic research experience opportunities, helping ensure that DOE has a sustained pipeline of STEM workers. The Laboratory is encouraged to develop and execute outreach activities aimed at providing equitable access and recruiting a more diverse, inclusive applicant and participant pool to WDTS sponsored programs.

The Laboratory is strongly encouraged to consider developing outreach proposals and activities in response to WDTS annual call for DOE lab-led outreach programs to recruit more students and faculty to benefit from the science and engineering expertise and user facilities at TJNAF.

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

#### **Nuclear Physics (NP)**

The emphasis on formal project management by TJNAF is laudable. The Project Management Qualification program is an excellent investment to enable the Laboratory to continue leading projects in the future. The partnership with BNL on the EIC, and employing some of the successful BNL management tools, is also noted and strongly encouraged.

Management of MOLLER MIE has been well executed during a year of constrained and uncertain funding, recently resolved with the appropriations in the Inflation Reduction Act, as the project works toward a proposed CD-3A for magnet materials and CD-2/3, Approve Project Baseline and Start Construction. The in-kind contributions from NSF and the Canadian Foundation for Innovation have been effectively integrated. Project management is practicing earned value management prior to baselining. Personnel concerns and hiring needs have been shared by the MOLLER project director with Laboratory management but have not yet resolved. In the new environment of full funding, management will need to give attention to hiring and training as a possible schedule driver.

TJNAF is appropriately managing the scheduling of experiments. While the large backlog can in some cases make it difficult to predict when measurements can be run, a significant backlog is beneficial in cases where a large fraction of the experiments proposed for a given hall cannot be run in the short term, or when trying to schedule efficient multi-hall operations.

TJNAF is executing the CEBAF Performance Plan (CPP) with the goal of improving the number of CEBAF running hours and facility reliability with new cryomodules, updates to the superconducting infrastructure, and efforts to streamline maintenance and operations procedures. Good execution of the CPP is already reaping benefits with more beam time and improved reliability at delivering beam to users. TJNAF management is to be commended for their proactive actions. However, given the uncertainties associated with inflation, supply chain, and staff retention issues as well as risks associated with remaining critical spares and key obsolescence issues, more rigorous project management is needed both on the CPP and on non-CPP upgrades covering accelerator improvements and capital equipment. An actively managed risk register is necessary for proper management.

The TJNAF Engineering Division is to be commended for proactively managing helium availability under challenging market conditions and global uncertainties. The annual helium loss reduction by

about 50% from 2018 to 2020 is significant. Plans are being developed along with back-up power for catastrophic conditions. The team is encouraged to further develop efficiency improvement plans to reduce the utility costs and to explore storage possibilities.

EIC has a strong, experienced, and dedicated project team. The EIC is a complex project due to its scale, technical innovations, and in-kind contributions. The project team has the right mix of individuals to appropriately address this complexity. The project recently lost its Project Manager to retirement but launched a successful search and recently onboarded a new Project Manager. Project leadership continues to take an aggressive position regarding schedule, with the goal of maintaining affordability. The project team makes appropriate use of its PAC and has recently undertaken an examination of past lessons from similarly complex projects to best position the EIC for success.

As the new electronic work planning system (ePAS) is implemented, it should include an appropriate set of metrics to address performance and progress on safety across the laboratory.

TJNAF increased its total annual investment in its Laboratory Directed Research and Development (LDRD) program in FY22 to \$2M, supporting multiple activities that are well aligned with the NP mission, including new investments in artificial intelligence and graphic analytics applied to improving CEBAF availability, development of new detector technologies for nuclear physics experiments including those planned at the future EIC, and validating a technology aimed at increasing the electron beam energy at CEBAF. The strategic investments by TJNAF through the LDRD program are sound and will help the Laboratory keep the CEBAF accelerator and scientific instruments at the cutting edge.

**Notable Outcome:** Conduct an independent review of the End Station Refrigerator 2 (ESR-2) project, to assess and mitigate risks to expected cost and schedule performance.

The Department has determined that performance on this Notable Outcome met expectations. TJNAF completed a Director's Review of the ESR-2 project on November 12, 2021, using panelists independent of the project team and with staff from NP observing the review. Recommendations from the review have been acted on and the project has appropriately mitigated risks to both cost and schedule performance.

### **Workforce Development for Teachers and Scientists (WDTS)**

Laboratory staff leading the execution of WDTS sponsored programs are responsive to programmatic direction and their willingness to share with other laboratories on their practices.

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

#### **Nuclear Physics (NP)**

Monthly meetings with the CEBAF operations staff are well done with not only discussion of operational experience and challenges but also detailed updates on the progress of the CEBAF Performance Plan and its impacts on providing reliable beam delivery to user experiments. Staff demonstrate commendable forward thinking in planning activities in advance of scheduled shutdowns with complex constraints from limited staff, time, and technical resources.

MOLLER MIE project management has communicated their planning and emergent personnel challenges well with NP and has appropriately planned and tracked internal design reviews. Increased communication with the Federal Project Director and coordinating uniform project information flow, including earned value management reporting, will be important in the new environment of full funding and the planned baselining process.

Bi-weekly zoom meetings between TJNAF leadership and NP are useful and informative. These are helpful in anticipating challenges and providing input for the NP and TJNAF.

TJNAF is well-represented in its communications to the broader community and the public with several NP website highlights and multiple press releases. This level of communication is important in keeping TJNAF in the minds of various stakeholders.

NP provided monthly reporting guidance to the EIC project following attainment of CD-1. The first report provided by the project team covered September 2021 and the project has consistently provided reports each month. While continuous improvement on meeting monthly reporting expectations was realized early in FY22, progress seems to come to a standstill by the middle of FY22. As a result, NP does not have the clarity it needs on the workforce supporting EIC, funds obligated and expended, and design activities remaining, and other efforts required before the next critical decision. NP will continue working with the project team to communicate report expectations.

**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-	3.7	30%	
3.2 Project/Program/Facilities Management	A-	3.7	40%	
3.3 Effective Communications and Responsiveness	A-	3.6	30%	
Overall NP Total				3.7
Workforce Development for Teachers and Scientists				
3.1 Efficient Strategic Planning and Stewardship	B	2.8	20%	
3.2 Project/Program/Facilities Management	B+	3.1	50%	
3.3 Effective Communications and Responsiveness	B+	3.1	30%	
Overall WDTS Total				3.0

**Table 3.1 Program Performance Goal 3.0 Score Development**

Program Office	Letter Grade	Numerical Score	Weight	Overall Weighted Score
Nuclear Physics	A-	3.7	99.8%	
Workforce Development for Teachers and Scientists	B	3.0	0.2%	
Performance Goal 3.0 Total				3.7

**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 B+ for the Performance Goal. Comments are contained within the individual Objectives that follow:

#### **Objective 4.1: Leadership and Stewardship of the Laboratory**

JSA has shown strong leadership and skillful stewardship in developing a vision for the future of nuclear physics, both at TJNAF and in the field generally. It continues to position itself to contribute at a greater level to SC missions as part of diversifying the S&T portfolio of the laboratory. It has shown strong leadership and stewardship in working together with BNL in preparing the EIC for the next DOE gateway, CD-2/3a. JSA 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 as regards the EIC detectors. Regarding partnerships, JSA has made significant inroads 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. The Laboratory continues to prioritize work planning and safety protocols for on-site work.

Laboratory’s leadership was evident in the acquisition of a Recruitment Coordinator to help identify and attract candidates to fill key staff positions. The timely search and selection of key members of the Laboratory leadership team this year including the Deputy Director for Science, the Chief Operating Officer, the Associate Director for Physics, and the Research and Technology Partnerships Office manager were all vitally important to the future of the Laboratory. The Department

recognizes Laboratory leadership's support and engagement in regular diversity, equity, and inclusion (DEI) activities and initiatives. The accumulated investment by the Laboratory in this area is aligned with the Department's DEI goals going forward. The Laboratory planned and executed a highly successful orientation visit by the Secretary of Energy along with hosting Congressional and local leaders.

#### **Objective 4.2: Management and Operation of the Laboratory**

JSA has implemented a robust cost accounting system (CAS); it 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 HQ is comprehensive and timely. Continued diligent stewardship will be important to ensure the CEBAF Performance Plan is effective in significantly improving the reliability and performance of the CEBAF machine. JSA's efforts in support of integrating the TJNAF financial system into the SC financial system are commended.

The Laboratory's management of the COVID-19 Workplace Safety and Re-entry Plan was responsive to changes in DOE policy and the Center for Disease Control guidance and supported by exceptional case management from the Occupational Medicine group. A considerable amount of work was expended by Human Resources and line supervision to fill and on-board over 160 positions during the performance period, including the development and implementation of a hybrid work program. This was coupled with an expansion of employee benefit programs to help recruit and retain staff in a very competitive labor market and at the same time realizing an annual benefits renewal rate of minus 1.8%. The transitions of the Chief Operating Officer and Deputy Director for Science and Technology positions included time for proper overlap of in-coming and out-going leaders which facilitated very smooth transitions in both cases.

#### **Objective 4.3: Leadership of External Engagements and Partnerships**

The Strategic Partnerships Program (SPP) has been complementary of the Laboratory's mission and vision, including significant long-term relationships with local educational institutions. Due to unfavorable outcomes from SPP activities at peer Laboratories, care must be taken to adequately define and monitor the terms and commitments with collaboration partners to protect the interests of the United States.

The Laboratory's patience and tact have been necessary and evident in navigating the on-going Applied Research Center (ARC) acquisition process. Close coordination with the Federal Project Director and SC Headquarters is necessary to address on-going funding constraints and position the CEBAF Renovation and Expansion (CRE) project for success.

TJNAF continues to provide leadership and insightful stewardship in establishing a vision for developing technology transfer (TT) activities and meaningful partnerships in support of DOE missions. Of note are recent changes in the Contractor corporate structure to strengthen Contractor capabilities to achieve DOE goals.

TJNAF made an important structural investment by establishing a new Research and Technology Partnership Office (RTPO), which positions the Laboratory for expanded TT/commercialization success. The Office of Technology Transitions (OTT) encourages the Laboratory to define a clear commercialization strategy and success metrics for the new office.

OTT commends TJNAF for the formation of its new RTPO and has appreciated early collaborations with its Director and staff in support of the RTPO mission – to transfer knowledge and technological innovations from the Laboratory to the greater scientific and business community to promote national economic competitiveness.

TJNAF is to be commended for having provided complete and timely responses of the highest quality to the DOE Annual Technology Transitions data call and the associated quality assurance and quality control process, the highest quality submissions, and updates of success stories to the Laboratory Partnership Service (LPS), and consistent support to other OTT communications activities and products. TJNAF notably exceeded expectations for its support of OTT’s TT data and metrics collection, management, analysis, evaluation, and reporting activities. TJNAF is encouraged to utilize the LPS for updating its existing and publishing all future technology transitions and commercialization success stories to support DOE meeting statutory reporting requirements.

**Objective 4.4: Contractor Value-added**

JSA has been very supportive of SC and NP’s vision for the future of U.S. nuclear physics 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 goals in DEI.

Upon filling JSA Board of Director’s vacancies, a new set of JSA committees were established and committee activities resumed under a more strategically aligned framework, complementary of the Laboratory’s Contractor Assurance System (CAS) implementation. A continuation of strong funding from Southeastern Universities Research Association (SURA) was evident to support Laboratory programs, including added emphasis in promoting educational opportunities and recognition for under-represented persons in science and nuclear physics.

**Notable Outcome:** Select and appoint members to fill the open JSA Board positions by the end of FY 2022.

The Department has determined that performance on this Notable Outcome met expectations. The selection and appointment of a new President and Chief Executive Officer (CEO) of SURA filled a critical gap as the Chair of the JSA Board of Directors. This had added significance with SURA becoming the sole corporate governance entity. The selection and appointment of members to the remaining open Board positions were completed by mid-year.

	Letter Grade	Numerical Score	Objective Weight	Overall Score
4.1 Leadership and Stewardship of the Laboratory	B+	3.3	30%	
4.2 Management and Operation of the Laboratory	B+	3.3	30%	
4.3 External Engagements and Partnerships	A-	3.5	10%	
4.4 Contractor Value-added	B+	3.3	30%	
Performance Goal 4.0 Total				3.3

**Table 4.1 Program Performance Goal 4.0 Score Development**



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

**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**

The Department recognized many instances where accelerator division leaders and supervisors publicly reminded staff and on-call personnel that they are not expected or encouraged to work for extended hours or in a sleep deprived state. These interactions are vital to setting and maintaining a robust safety culture.

The announcement of a new Occupational Medicine Director filled an important vacancy. The collective Occupational Medicine staff provided exceptional employee COVID case management and advice to Supervisors throughout the year.

With the departure of key personnel within the Laboratory’s safety division, field observations indicate the performance of some programs have declined. It is of great interest to the Department that some of those programs, including fall protection and prevention, be reinvigorated to adequately educate workers and supervisors to plan and safely execute work in the field.

The Department is appreciative of the active agenda and discourse among members of the Laboratory’s Safety Configuration Management Board (SCMB), which is needed for objective appraisal of conditions and solutions impacting accelerator operations and safety. As a single-program laboratory operating a world-class accelerator, it is the Department’s expectations that TJNAF remain at the forefront of accelerator safety, leading by example.

The Laboratory has maintained transparency with the Site Office during formal event investigations and proceedings, allowing efficient and effective oversight. The Laboratory has an established safety observation program, which has been utilized lab wide. The program continues to be refined for optimal adaptation, and participation is a universal expectation.

**Notable Outcome:** Hazardous energy control program improvements and corrective actions, including those from DOE’s 2021 Notice of Violation (NOV), will be systematically managed to address activity-based risks, and be supported by objective evidence of closure and subsequent implementation effectiveness.

The Department has determined that performance on this Notable Outcome met expectations. The rollout of the new ePAS work control system completed the Phase 1 testing and moved into the Phase 2 implementation within the Laboratory Departments. Progress continued to be made on the closure of the hazardous energy control corrective actions in the Department's corrective action tracking system, but awareness of the target closure dates has not always been well managed, risking the loss of confidence with the external stakeholders that compelled the creation of those entries.

Assessment of the Laboratory's hazardous energy control program concluded that many compliance elements had been incorporated in the Laboratory's policies and procedures, but it also noted some originally identified elements remain to be integrated.

### **Objective 5.2: Provide an Efficient and Effective Environmental Management System**

The Laboratory applied for and successfully received permit renewals from the Virginia Department of Environmental Quality (DEQ) and Hampton Road Satiation District (HRSD). The Laboratory received a Notice of Violation (NOV) from HRSD for not calibrating water meters within the permit's 5-year cycle. Corrective actions stemming from this event should help reduce the likelihood of recurrence. The Laboratory received HRSD's Gold Award for perfect compliance during the previous fiscal year.

The ES&H group continued to be proactive to keep environmental regulators well informed of planned program changes, helping maintain overall confidence in the Laboratory's program. The timeliness of environmental permit submittals improved throughout the fiscal year. Early and effective communication between Laboratory divisions will be necessary for proposed projects to satisfy environmental requirements, especially those involving external partners and participants.

The Laboratory's Environmental Management System (EMS) program met ISO 14001 conformance standards this fiscal year. The ES&H group continued to coordinate meetings with the EMS/Sustainability committee (Green team). The Laboratory's EMS committee planned and executed an Earth Day clean up event in the third quarter. The Laboratory took a proactive approach to sustainability, including submittal of data for required for the Vulnerability Assessment and Resilience Plan (VARP) and sustainability reporting, although submission of these reports and plans has not always allowed adequate time for review by the Department.

A Notable Event was investigated in August 2021 after recognition that waste generated from cryomodule refurbishment had not been properly characterized for radiological content, nor properly disposed as mixed waste. The Site Office is not aware of any procedures being issued to prevent recurrence of this waste management vulnerability.

The Laboratory was recognized by the Virginia Department of Environmental Quality (DEQ) as an Exemplary Environmental Enterprise (E3) facility. The Laboratory submitted the Emergency Planning and Community Right to Know Act (EPCRA) report in a timely manner.

	Letter Grade	Numerical Score	Objective Weight	Overall Score
5.1 Integrated ES&H	B+	3.4	80%	
5.2 Environmental Management System	B+	3.1	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 B+ 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**

JSA successfully utilized the Laboratory’s financial management system tools and controls to maintain an integrated set of business systems supporting the Laboratory mission and to support business processes that ensured costs and commitments did not exceed available funding in FY 2022.

The finance management team exceeded DOE reporting requirements, while continuing to manage the complexities of remote working, by submitting financial reports on time or in advance of their scheduled due dates. Several examples of such include:

- FY 2021 Financials (facilitate reconciliation between JSA contract costs and DOE financial records)
- 533M reports (monthly)
- FY 2021 Institutional Cost Report (ICR)
- FY 2021 Payment Integrity Lookback Analysis for Prior Years’ Improper Payments
- FY 2021 Leases Data Call reporting
- FY 2021 Heritage Assets, Stewardship Land, and Deferred Maintenance reporting
- FY 2021 LDRD Financial Report and Certification
- Property Management Report (Construction Work-In-Progress (CWIP) and Assets)
- FY 2021 Payment Integrity
- FY 2021 Incurred Cost Electronically (ICE) Schedules to the Consolidated Service Center (CSC)
- DOE Statement of Federal Financial Accounting Standards (SFFAS) 54 Implementation Data Call

TJNAF continued to sustain 97+% for on-time timesheet completion, exceeding the 90% goal throughout FY 2022. This ensured accurate, real-time access to labor data for project managers, supervisors, and leadership, which helped inform management decisions and safe work allocation. This performance is also expected to form a strong basis for timekeeping cost audits by the DOE Office of the Inspector General (OIG).

The Laboratory actively pursued the Commonwealth's settlement agreement documentation in response to their \$1.129M Sales and Use Tax appeal. As of June 30, they have received multiple partial refund checks totaling \$690,982.89. They are continuing to work with the Virginia Commissioner's Office to obtain the remaining appeal value already negotiated with the Commonwealth, plus interest.

This year JSA explored and defined the steps to becoming an integrated contractor with the assistance of a highly experienced consultant who was formerly a CFO at another financially integrated DOE laboratory. DOE approved the Laboratory's proposal to begin the transition to become an integrated contractor by FY 2024. By the end of the performance period JSA had selected a consulting firm for project management and leadership to assist the cross-functional project team to become a financially integrated contractor.

The Laboratory continued to work with the OIG to support investigations and information requests. In February, the Laboratory provided an overview and walk-through demonstration of the Deltek Costpoint and Lenel On Guard Business systems for the OIG to facilitate understanding of the systems and the scope of the data contained therein. They also began diligently working to prepare the FY 2021 Incurred Cost Proposal Submission in accordance with an implementation plan to support the OIG's new audit strategy. The submission was reviewed by Internal Audit, JSA leadership, the Consolidated Service Center (CSC), and submitted to the OIG in advance of the August 15 due date. The quality and timeliness of the TJNAF submission set the standard for all the SC laboratories.

In accordance with the contract, TJNAF developed the Provisional Billing Rate proposal for DOE approval prior to FY 2023 implementation. The Laboratory met with the CSC staff and the Contracting Officer (CO) in September 2022 to review the proposal and obtain CO approval.

The Laboratory submitted its Risk Profile and Interim Internal Control Status (IICS) inputs, which are part of the annual A-123 DOE Internal Control Evaluation process, on time and as applicable in DOE's AMERICA System.

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

#### Acquisition Management:

The FY 2022 Procurement Balanced Score Card (BSC) total score was 92% out of a possible 100 points, which utilized 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 2,267 procurement actions valued at \$37.8M, 2,881 e-commerce transactions valued at \$1.3M through August and completed 32 transactions using DOE Integrated Contractor Purchasing Team (ICPT) agreements for computer products valued at \$450K. In addition, the Laboratory achieved strategic source savings of \$3M (through the third quarter). For the fifth consecutive year, the Laboratory earned DOE's Gold Green Buy Award for sustainable acquisitions by purchasing 9 Priority Products in 6 categories. This is the fifth time the Laboratory was recognized for achieving "Gold" level, which resulted in the GreenBuy Prime Award for FY 2021 for demonstrating excellence in Sustainable Acquisition (awarded in 2022 for calendar year 2021 performance).

As it relates to the Department's Small Business program, the Laboratory exceeded four of their six mandated small business subcontracting goals (Women-owned Small Business, Disadvantaged, Veteran-Owned and HUBZone) and came close to meeting their other two mandated small business goals (Small Business and Service-Disabled), which was truly excellent. A total of \$17.9M of small business procurements in FY 2022 led to the accomplishment or near accomplishment of these 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. 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 formal pre-Procurement Evaluation and Reengineering Team (PERT) Review was conducted in July by an outside vendor. In August, the Department notified the Laboratory that a formal DOE PERT review of the Laboratory's procurement system is scheduled on July 31-August 4, 2023. This review is conducted every three years unless officially deferred by the CO under his formal Risk Assessment Tool Analysis. Note that the last DOE PERT Review was conducted on October 13, 2017, and 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 their progress made to address the Department's concerns from the previous review, the Department issued a formal determination on December 9, 2021, to delay the PERT in FY 2021 for an additional three-year period (a total of six years from the last DOE PERT Review).

#### Property Management:

In the area of personal property, 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 (i.e., during the first half of FY 2022) and during transition to normal operations.

The FIMS validation, observed on site by DOE MA-50, was successfully completed.

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

Human Resources (HR) staff continued aggressive recruiting efforts resulting in 168 filled positions, such as:

- Deputy Director for Science
- Several Staff Scientists and Engineers
- Chief Operating Officer
- Deputy Chief Financial Officer (new position)
- Associate Director for Experimental Physics
- Cryogenics Deputy Department Head
- Payroll & Finance Accountant
- STARS Accountant (new position)
- CEBAF Operability Leader
- Cyber Security Manager (new position)
- Electrical Engineering Manager
- Computational Sciences and Technology (CST) Project Manager (new position)
- Research and Technology Partnership Manager (new position)

The Laboratory formally introduced a comprehensive Remote Work Policy in April. Employee demand was high with 64% currently approved for some level of remote work. To ensure a smooth and effective transition, HR developed and designed multiple learning avenues to introduce the Remote Work Policy, to include an eLearning module, providing a policy overview as well as an in-person/virtual offering for supervisors who will be leading hybrid teams.

JSA's benefits portfolio was expanded to include a Paid Parental Leave program that provides eligible employees with six weeks of paid time off to care for and bond with their newborn or adopted child. The newly added leave provision fosters inclusion and retention and supports a manageable work-life balance during the life-changing event of becoming a parent.

Recognizing the importance of staff being emotionally prepared to transition back into the workplace, the Laboratory partnered with the Optima Employee Assistance Program (EAP) to offer three lunch-and-learn sessions spanning topics on Mental Health Awareness in the Workplace and Returning to the Office: Working in a Hybrid Setting.

The DEI Council hosted multiple inclusion activities in FY 2022, both on-site and virtually, including a "Get Connected" event open for all staff to meet and greet at the Laboratory after working off-site for the past couple of years. Virtual sessions included an Asian Pacific American Heritage Month speaker's forum, and several special Safe Zone educational offerings. In celebration of National Disability Employment History Month, the Director of Diversity Initiatives and Assistant Professor at Old Dominion University discussed "visible equity" and how to achieve it for employees with disabilities. In recognition of LGBTQ+ Pride Month, a Professor of History at Norfolk State University and the Secretary and Board Member of Hampton Roads Pride spoke to staff, sharing their stories and experiences and providing suggestions on how to continue to become allies to LGBTQ+ colleagues.

Standards of Conduct and Ethics annual training was updated to bring awareness to a wide range of standard and emerging ethical issues in the workplace, including outside business activities and virtual work; DEI; and research integrity.

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

The degree of cooperation and coordination with the OIG investigation into the suspect electronic counterfeit parts discovery remained exemplary and reflected positively on the processes within multiple Laboratory departments.

The Laboratory was an active participant in several different quality assurance related forums, contributing its experience to peer institutions, and gleaning important lessons learned for local awareness and process improvement.

The Department recognizes the continued objectivity and commitment being applied by the Performance Assurance auditors leading the Laboratory's varied program area assessments. The Performance Assurance program showed steady improvements again this year and is paying visible dividends for Laboratory management in their safety culture improvement efforts.

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

Several critical Strategic Partnership Projects/Cooperative Research and Development Agreements (SPPs/CRADAs) were entered this fiscal year and successfully administered. In FY 2022, 22 Invention Disclosures 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 Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) proposals and 45 support letters were sent for actual proposals that were submitted to DOE and 6 proposals received funding of approximately \$1.95M. 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 97% in FY 2022. 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). The Laboratory continued the process of engaging the Associate Laboratory Directors when authors did not use the approval process, which leads to an increased understanding of, and compliance with, the standard process.

Science Program Office	Letter Grade	Numerical Score	Objective Weight	Overall Score
6.1 Financial Management Systems	B+	3.4	20%	
6.2 Acquisition and Property Management Systems	B+	3.3	20%	
6.3 Human Resources	A	3.8	20%	
6.4 Contractor Assurance Systems	B+	3.4	25%	
6.5 Technology Transfer	B+	3.3	15%	
Performance Goal 6.0 Total				3.4

**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 B+ 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:

**Facilities Operations and Maintenance:**

The Laboratory's Facility Maintenance and Logistics (FM&L) division supported accelerator operations to maintain an uptime of greater than 98%. General Plant Project (GPP) funding allowed for the construction of increased cooling capacities in the accelerator's LINAC service buildings. This increased the reliability of the electronics that support CEBAF operations.

**Facility Safety:**

The Laboratory assisted DOE to complete a Baseline Need Assessment when responding to credible site emergencies, covering information, trained personnel, physical fire safety, and emergency medical features.



The Laboratory successfully completed a Triennial Fire Hazard Analysis (FHA) for the tunnel, experimental halls, and Test Lab (Bldg. 58) using a third-party assessment, with zero findings and zero recommendations.

The Laboratory completed an FHA for the Applied Research Center (ARC) renovation with recommendations incorporated into the final design.

The Laboratory completed Phase II of the installation of panic door hardware on 50 doors.

The Laboratory installed permanent breaker locking devices in eight LINAC switchboards to facilitate safely securing breakers when performing Lockout/Tagout.

The Laboratory installed VeriSafe Absence of Voltage Testers on the switchboards at the LERF, allowing the absence of voltage checks to be performed without going into the cabinet.

#### Coordination Efforts:

The Laboratory coordinated with Dominion Energy to perform an operational test on the load side breaker transformer at their Warwick substation involving shifting all loads to the transformer which provides power to the accelerator. At completion, all loads were switched back with no Accelerator Operations impact.

The Laboratory worked with Dominion Energy to understand the November 18, 2021, slight power voltage deviation. Evidence of a bird was found on the overhead line near an insulator connection on their 230kV line that runs from the Chickahominy Substation to their substation near Providence Forge/New Kent.

The Laboratory assisted in executing 9 crane operations in the Halls and for major equipment repair. This included three major equipment moves to support Engineering and Cryogenics.

The Laboratory coordinated with the Virginia Department of Energy on electric utility rates and Dominion's clean energy mix related to meeting DOE sustainability goals.

#### Corrective Maintenance:

The Laboratory completed the repair design on the Hall A crane and two repair contracts have been awarded for the crane rails and lateral supports. Field measurements have been taken to allow fabrication of needed components for the physical repair during the FY 2023 Scheduled Accelerator Down.

The Laboratory converted TAC to Honeywell controls for Compressor, Control and Uninterruptable Power Supply rooms.

The Laboratory completed breaker maintenance on 33 accelerator support buildings. A 2,000 Amp outside breaker was found inoperative, which was subsequently repaired and reinstalled.

#### Preventive Maintenance:

The Laboratory completed the replacement of two accelerator site building roofs beyond useful life.

The Laboratory performed thermal scan analysis of all panel boards in 22 Accelerator Site and Campus buildings to ensure reliability of the electrical systems.

The Laboratory performed preventive maintenance on the 33 MVA substation switchgear. It also cleaned and lubricated the 15kv switch and tested its breakers and installed new enhanced reporting meters.

The Laboratory performed preventive maintenance tasks for accelerator service buildings' air handlers (cooling units), including replacing belts and air filters; cleaning coils, condensate drain pans, and traps/lines; lubricating bearings; and checking overall operation.

#### Sustainability:

The Laboratory participated in Emergency Capacity Demand Response and Energy Efficiency Rewards receiving over \$420,000 in receipts. Funding from campus participation was reinvested in energy savings projects.

The Laboratory's FM&L division collaborated with Environmental Safety and Health (ES&H) to organize and participate in an Earth Day campus clean-up event where staff volunteered up to two hours of their time to improve site conditions. Additionally, FM&L interfaced with each division to understand the impact of climate hazards on critical assets to complete the first-ever, DOE required Vulnerability Assessment and Resiliency Plan (VARP).

The Laboratory awarded contracts for key sustainability initiatives, which include advanced metering for all utilities in DOE owned buildings, Electric Vehicle Supply Equipment (EVSE), energy and water evaluations in 21 buildings, and an on-site renewables and battery storage study.

The Laboratory developed energy projections for site operations and capital improvement projects allowing development of a roadmap for Carbon Pollution Free Electricity (CFE) at TJNAF.

The Laboratory developed water efficiency projects for site operations and capital improvement projects. Projections are being utilized to develop a site water balance for the DOE Water Management Plan due August 2023.

#### Service:

The Laboratory awarded a new grounds subcontract combining the accelerator and campus subcontracts into one subcontract, thereby reducing management overhead.

#### **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 met expectations throughout FY 2022 to plan for and acquire the facilities and infrastructure required to support the continuation and growth of the Laboratory's mission and programs.

#### GeV Project:

In early FY 2022 the Office of Nuclear Physics (NP) notified the Federal Project Director (FPD) of the need to submit a final closeout report for the 12 GeV project, which had completed Critical Decision 4 Project Completion in 2017. JSA worked diligently throughout most of FY 2022 to complete the required report. The final report was signed by JSA, the FPD, NP and was reviewed by the DOE Office of Science's Office of Performance Assessment prior to it being uploaded into the DOE Project Accountability Reporting System (PARS) in September, thus completing this required deliverable and officially closing the project.

#### Central Helium Liquifier (CHL) 2K Cold Box Replacement:

As of the end of FY 2022 the project team completed procurements of buy-down items utilizing remaining funds in support of cryogenic operations. A baseline change request authorized the use of remaining contingency to procure buy down items and changed the project completion date from June 30, 2021 to August 31, 2022. The project close-out report was received from the Contractor on September 29, 2022 and is in final DOE review.

#### End Station Refrigerator (ESR) 2:

As of the end of the fourth quarter of FY 2022 the project had completed all recommendations that were a result of a Director's Review held in November of 2021, including the necessary revision of the Project Execution Plan and the associated base line change request to change the completion date from March 2023 to September 2024. In addition, the project is 84.9% complete with a Schedule Performance Index (SPI) at 1.01 and the Cost Performance Index (CPI) at 0.83. Cost variance was largely driven by \$130K of redesign work that was identified at the Director's Review in November 2021 but was not included in the BCRs completed in the second quarter of FY 2022. It remains critical that the project continue to place emphasis on the safe and successful completion of this project by September 2024 to meet the MOLLER Major of Item of Equipment project's critical schedule need date of April 2025. The project is forecasting initiation of installation activities in May 2024, which will be followed by commissioning.

#### Cryogenic Test Facility Upgrade:

As of the end of FY 2022 the project progressed to 40.6% complete with an SPI at 0.76 and a CPI at 1.62. On September 22, 2022, JSA reported that the Distribution Box system design-build bids had been received and that two bids came in below the \$2M budget estimate. JSA is finalizing Design-Build bid evaluations with expected award in the first quarter of FY 2024. For the Heat Exchanger portion of the project, earlier in FY 2022 the project team cancelled the outstanding procurement because the vendor was unable to meet the technical requirements in the contract. In September 2022, the project team reported that the need for replacement of the heat exchanger may not be necessary once the new distribution box system is installed, which would likely involve a change to the project that must take into consideration the Key Performance Parameters (KPP) documented in the Project Execution Plan (PEP) and the overall mission need associated with this project. In addition, the project continues to project a preliminary estimate of an ~18 month slip to the completion date of the project from the third quarter FY 2023 DOE milestone which will require the submission of a baseline change request (BCR) to obtain approval by DOE for the new completion date. It will be critical for the project team to expedite its decision process, recommend an

approach for completion of this project, and submit any required BCR documentation before the end of CY 2022.

#### Site Mechanical Systems Upgrades:

This project for which DOE provided \$576K in Science Laboratory Infrastructure (SLI) funds entails installing 46 new Pressure Independent Control (PIC) valves throughout the chilled water system to replace existing Pressure Dependent Control (PDC) valves to lower energy/electrical consumption and to upgrade existing domestic water systems to lower water consumption. As of the end of FY 2022, the overall project is at 60% complete and has completed installation of all 46 PIC valves. However, the controls testing and balancing and commissioning of the valve replacement activity is yet to be completed because of an unexpected leak that developed in a main chilled water supply line that is under repair. The project intends to use any remaining contingency toward installation of plumbing fixtures with water saving devices in select facilities across the TJNAF campus. The project remains on schedule to meet the completion date of December 29, 2022. It is important to note that earlier in FY 2022 this project decided that it would develop and submit a PMP as opposed to a PEP the latter of which typically involves tailoring principles of DOE Order 413.3B into how the project will be managed. It is critical for the project to complete the required DOE approved Project Management Plan (PMP) for this project which is long overdue.

#### Linear Accelerator (LINAC) Cooling Upgrade:

The scope of this \$1.5M project was to increase chilled water capacity, improve air flow, reduce infiltration of unconditioned air, and increase air conditioning to provide 75 tons of additional cooling capacity in each Linear Accelerator (LINAC). Final commissioning was completed April 21, 2022, and the project was completed on May 27, 2022. This completes phase 2 of the LINAC cooling upgrade effort.

#### Cooling Tower Water Reuse:

This project will help the Laboratory meet the sustainability goal of 33% reduction of potable water. The 60% conceptual design submittal review was completed, and comments were submitted to the A/E for updates. A Utility Energy Savings Contract (UESC) is required to fully execute this project as being planned. However, the utility company for the UESC has not been identified at this time.

#### Central Utility Plant (CUP) Upgrade:

This project replaces three chillers in the TJNAF Test Lab basement with an additional 800-ton chiller to the CUP. A fourth 800-ton chiller is also planned to be added to the CUP, which will provide redundancy during equipment issues and facilitate maintenance. As of the end of FY 2022, the project has completed the conceptual design.

#### High Performance Data Facility (HPDF):

As of the end of FY 2022 this project team remains fully prepared to respond to an anticipated release of an RFP from the DOE Office of Science's Office of Advanced Scientific Computing Research (ASCR), which is expected to lead to a project siting decision. Among its many preparations including having written a proposal for the HPDF project, and built a foundational project team, was the development of an Analysis of Alternatives (AoA) for a facility being referred to by JSA as the

Jefferson Lab Data Center (JLDC). This AoA was reviewed by the FPD early in FY 2022. The FPD provided recommendations to the project team that the AoA on the JLDC could not be considered complete because it needed to address/consider HPDF project user needs and data gaps that could result from a larger ongoing ASCR effort known as the Architectural Blueprint Initiative as well as the design and supporting requirements of the advanced computing systems that is planned to be housed inside the JLDC. The project team also received confirmation that the Virginia Governor's budget for FY 2023 included \$3M for the data center and a separate \$350K for coordination between State Universities and the Laboratory on the TJNAF data center concept and utilization. Should TJNAF be selected as the site where this project will be performed it will be critical to work with the FPD and the Federal Program Manager to finalize the formulation of the project structure to include addressing whether the JLDC can be a separate dependency to the HPDF project or whether it must be an inherent element of the project.

#### Thomas Jefferson Infrastructure Improvement (TJII):

This project received CD-0 in December 2020 with a cost range of \$77-\$98M. The AE firm contract completed an initial task order for a stormwater condition assessment and is working to complete an AoA, which is currently underway. Once the AoA is completed it will need to undergo a DOE Peer Review as part of preparation for CD-1 approval currently forecast for the fourth quarter of FY 2023. Of major concern at this point in the project planning is the possibility that the additional high bay space need may not be available in time to meet mission needs associated with the MOLLER project and the Electron Ion Collider project at the TJNAF. It will be critical for the project to continue to explore feasible alternatives that could mitigate this concern and continue to work closely with the FPD and the Science Laboratory Infrastructure (SLI) Federal Program Manager (FPM) as the project moves toward obtaining approval of CD-1.

**Notable Outcome:** Support completion of the acquisition of the Applied Research Center (ARC) and complete the ARC Renovation final design for the CEBAF Renovation and Expansion (CRE) project by the end of the 2nd Quarter of FY 2022. Achieve CD-2/3A approval for the CRE project by the end of the 3rd Quarter of FY 2022 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. As of the end of FY 2022, JSA continues to work all necessary activities in support of completing the ARC building acquisition, which continues to be delayed pending completion of the Department of Justice (DOJ) review of the preliminary title package initiated in November 2020 and the final DOE approved ARC acquisition package. The final design for the ARC renovation was completed by TJNAF as of the end of the second quarter of FY 2022. TJNAF worked diligently with the Federal Project Director and the SLI FPM to progress toward a CD-2/3 review and approval cycle. However, the continued delay in completion of the DOJ review of the preliminary title package and the follow-on activity to obtain DOE approval of the ARC building acquisition package has impacted the project's ability to achieve CD-2/3A approval by the end of the third quarter of FY 2022. A revised schedule for obtaining approval of CD-2/3 will be established once the ARC building acquisition has been completed.

	Letter Grade	Numerical Score	Objective Weight	Overall Score
7.1 Usage and Life Cycle Cost	B+	3.4	40%	
7.2 Planning and Acquisition	B+	3.4	60%	
Performance Goal 7.0 Total				3.4

**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**

During the first half of the fiscal year, the Laboratory conservatively operated with minimal staffing on-site while ensuring emergency management capabilities were ready and effective. Throughout the year, drills and exercises successfully identified areas for improvement. The Laboratory is commended for the decision to conduct a Notable Event investigation when the outcome of a tornado drill, accountability exercise, and active shooter communication drill each identified some type of weakness in the emergency notifications system. Quarterly accountability drills were smoothly conducted with timely and complete results. The Laboratory received positive feedback and no findings were issued from a DOE-lead review of the emergency management program.

**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 assessment reports.

Efficiency was gained in the metric that measured hosts with high or critical vulnerabilities at 1.52% percent. To put this in context, this goal was previously 4% of what can be scanned, and this year based upon direction, was reduced to 3%. 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 VPN (virtual private network) servers and various networking equipment upgraded to supported systems with increased bandwidth and capabilities. These are higher capacity models that can better support remote work and the increases in staffing. In addition, new routers installed in Scientific Computing and the Core support higher density 100gbit connectivity. Two new ESnet routers were deployed as the first phase of the Laboratory's ESnet6 upgrade. These routers will support greater bandwidths for WAN connectivity and the Laboratory's increasing usage of the Open Science Grid and remote computing resources by the experimental program. The Laboratory's new Rubrik drive-based system upgrade is an example of good proactive strategizing, particularly considering the magnitude of negative impact that ransomware is having in the industry, as it eliminates the use of tapes and provides protections from ransomware incidents. These are examples of critical strategic planning by the Computational Sciences and Technology Division. The successful completion of these technical challenges, while balancing the heavy administrative requirements on the program, with such limited resources is noted.

There is evidence of solid contributions to the Laboratory mission. This includes the Laboratory working with the Energy and Science Network (ESnet), and other providers to enhance performance with Laboratory network traffic. The performance of this network connection directly impacted the performance of the TJNAF computation jobs being executed at supercomputing sites and on the Open Science Grid (OSG). The Laboratory was also instrumental in assessing risk for the use of CILogon/COmanage, for managing a virtual organization for the EIC project, and federating authentication to scientific computing resources with BNL. Collaborative capability is enhancing well in support of the EIC project, and the balance to maintain successful interactions with security protection is commendable.

The Department recognizes the amount of effort and time dedicated to responding to the increasing volume and complexity of external data requests. One example is the substantial amount of effort focused toward the highly visible log4j vulnerability. Identification, research, and the repeated application of software patches among the various systems, all within the added complexity of the condensed December period is noted. The responses to all the repeated log4j data calls from the Department, during that active time frame, were well worded with timely submissions.

There is evidence that the overall cyber posture is adequate, based on the current architecture and privilege separation, and there are no negative impacts existing 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 Department's Safeguards and Security Survey Team conducted a comprehensive quadrennial review of the Laboratory's security program, covering compliance with policies and performance. Satisfactory determinations were assessed across all security program areas. The team also acknowledged some noteworthy practices, including sessions to refresh Sponsors on their responsibilities for hosting foreign and domestic visitors.

Considerable effort was applied to the bidding and selection of a new security guard subcontract, which included benchmarking in the planning stages. The new contract provides coverage to meet DOE security requirements that had arisen since the former contract had been established, and the

contractor selected has a recognized Department presence and corporate reach-back capacity not previously available.

The Laboratory’s security staff successfully coordinated with outside responders in preparation for the Secretary of Energy’s site visit.

	Letter Grade	Numerical Score	Objective Weight	Overall Score
8.1 Emergency Management	B+	3.4	25%	
8.2 Cyber-Security	A-	3.5	50%	
8.3 Physical Security	A-	3.5	25%	
Performance Goal 8.0 Total				3.5

**Table 8.1 Program Performance Goal 8.0 Score Development**

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

**Table 8.2 Goal 8.0 Final Letter Grade**