

NSTX Upgrade Project Acquisition Strategy

December 10, 2009

Change Log

Rev.	Date	Change Description	Pages
0	12/10/09	Initial Issue	

SUMMARY PROJECT INFORMATION

Project Title: NSTX Upgrade Project at PPPL

Total Project Cost (TPC) Range: \$76.8M to \$93.6M

CD-0 Mission Need Approved: February 23, 2009

CD-0 Approving Official: Dr. Patricia Dehmer,
Deputy Director of Science Program of the Office of Science

CD-0 Material Change: None

1.0 Desired Outcome, Requirements, and Major Applicable Conditions

1.1 Project Description

This is a hardware upgrade to an existing, operating fusion research device located at PPPL. The deliverable of this project is to design, build and install a new Centerstack for NSTX and install a second Neutral Beamline on NSTX.

The purpose of the NSTX Centerstack Upgrade is to expand the NSTX operational space and thereby the physics basis for the next-step ST facilities. The new centerstack will provide a toroidal magnetic field at the major radius of 1 Tesla compared to 0.55 Tesla in the original NSTX device, and will enable operation at plasma current up to 2 Mega-Amp compared to the 1 Mega-Amp rating of the original device.

A second TFTR neutral beamline will be decontaminated, reconditioned to the same status as the existing beamline on NSTX, and installed at Bay K of NSTX in such a way that its three beams are tangent to the radii: 130cm, 120 cm, and 109.4 cm. Beamline #1 and beamline #2 shall be configured so they can operate together or separately to support experiments.

1.2 Performance Parameters Required to Obtain Desired Outcome

Required performance parameters are covered in the General Requirements Document for the Centerstack Upgrade and in the General Requirements Document of installing a second Neutral Beam on NSTX.

1.3 Environmental, Regulatory, and Technology Development

No environmental, regulatory or technology development issues have been identified.

2.0 Cost and Schedule Range

2.1 Total Project Cost Range

The preliminary total project cost (TPC) range is \$76.8M - \$93.6M.

2.2 Funding Profile

Table 1. NSTX Upgrade Project Preliminary Funding Profile

TPC (\$K)								
<i>No Operations</i>								
Unconstrained Case	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	TOTAL
Base Estimate	\$5,146	\$11,469	\$12,731	\$28,894	\$11,765	\$249		\$70,254
Lower Contingency		\$358	\$694	\$2,436	\$1,344	\$1,762		\$6,593
Total Lower Bound	\$5,146	\$11,827	\$13,425	\$31,330	\$13,109	\$2,010		\$76,848
Upper Contingency		\$1,507	\$2,956	\$11,020	\$6,059	\$1,817		\$23,359
Total Upper Bound	\$5,146	\$12,977	\$15,687	\$39,914	\$17,824	\$2,066		\$93,613

<i>No Operations</i>								
Constrained Case	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	TOTAL
Base Estimate	\$5,146	\$10,693	\$7,654	\$9,418	\$27,423	\$13,468	\$18	\$73,820
Lower Contingency		\$345	\$310	\$705	\$2,170	\$1,494	\$1,757	\$6,781
Total Lower Bound	\$5,146	\$11,038	\$7,964	\$10,123	\$29,593	\$14,962	\$1,775	\$80,601
Upper Contingency		\$1,449	\$1,314	\$3,095	\$9,843	\$6,794	\$1,810	\$24,304
Total Upper Bound	\$5,146	\$12,142	\$8,968	\$12,513	\$37,265	\$20,262	\$1,828	\$98,124

2.3 Key Milestones (unconstrained case)

CDR	October 2009
Submit CD-1 Request	December 2009
Receive CD-1 Approval	January 2010
PDR	June 2010
Submit CD-2 Request	July 2010
Receive CD-2 Approval	August 2010
FDR	Mar 2011
Submit CD-3 Request	April 2011
Receive CD-3 Approval	May 2011
Begin Upgrade Outage	August 2011
Submit CD-4 Request	May 2014

3.0 Alternatives and Risk Analysis

3.1 Technical Alternatives Analysis

Alternatives that cover the range of available technical approaches are as follows:

Alternative 1: Do nothing

Alternative 2: Upgrade Centerstack and add second Neutral Beamline

Alternative 3: Upgrade Centerstack only

Alternative 4: Upgrade Centerstack and later add a Neutral Beamline

The advantages and disadvantages for each of these three alternatives are summarized below:

<u>Alternative</u>	<u>Advantage</u>	<u>Disadvantage</u>
#1	None	No new science
#2	New science (desired)	None
#3	Lower project cost	Minimal new science
#4	Project cost spread out	Increased total cost / No operations for 4 years

3.2 Location Alternative Analysis

There are no location alternatives available for consideration because this is an upgrade to an existing device.

3.3 Total Lifecycle Costs

This project is an upgrade to an existing facility and it will extend the life of the facility and hence extend the present maintenance and repair costs. This upgrade will not substantially increase the cost of decommissioning the facility

3.4 Recommended Alternative

Alternate 1 was deemed unacceptable due to the lack of new science.

Alternate 2 is recommended as the preferred alternate because it is the most efficient use of capital funds, provides the desired science and maximizes the operational time for the existing NSTX facility.

Alternate 3 was deemed unacceptable because it minimizes the new science attainable.

Alternate 4 was deemed unacceptable because it requires four years of downtime for the NSTX facility.

Other Acquisition Alternatives Considerations

Various alternatives have been considered with respect to this project. One was to evaluate whether to build the new Centerstack at PPPL or to award a contract to a

vendor to perform the fabrication. The other was to evaluate whether to decontaminate existing components of Neutral Beam #4 or to fabricate new ones.

It has been determined that the Centerstack should be fabricated at PPPL due to the fact that PPPL has the experience, having built the present Centerstack, and any issues with the fabrication process for this unique design could be handled most effectively in a setting where the engineers and designers who developed the design are available for immediate consultation if problems arise.

The decontamination of the neutral beam is being pursued to determine which components can be returned to a condition that is acceptable for use on NSTX, thereby saving the cost of fabricating new components.

3.5 Risk Analysis

An essential part of the project planning will be to ensure the risks associated with the project have been identified, analyzed, and determined to either be avoidable or manageable. Risk identification and analyses will be continued throughout the planning process. Each of the identified risks will be monitored at each critical decisions and review point to ensure that they have been satisfactorily addressed, eliminated, or managed. The risk assessment process was started before CD-0. Risk analysis process and conclusions were reviewed and revised during the preparation for CD-1.

A formal risk management plan will be included in the Project Execution Plan and it will include how the Risk Registry will be used and strategies for mitigating risks. Risks will be monitored and managed throughout the project.

4.0 Business and Acquisition Approach

4.1 Contract Alternatives

Various alternatives have been considered with respect to this project. Due to the fact that a substantial amount of the work has been performed before at PPPL, it is recommended that the design and fabrication of non-off-the-shelf components be performed by experienced PPPL staff. Figure 4.1 shows a comparison of procured, subcontracts, and PPPL labor necessary to execute the project.

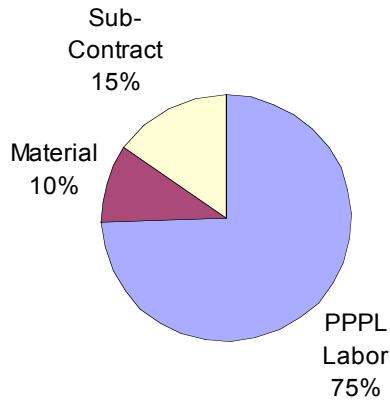


Figure 4.1 Project cost breakdown

4.2 Major Contracts Contemplated

PPPL will award contracts for the copper required to build the coils and center bundle, the Plasma Facing Components, cabling, and cable installations outside the Test Cell. Competitive selections will be based on demonstrated technical abilities, qualifications, capabilities and resource availability to meet the schedule requirements, as appropriate. Firm fixed price contracts are expected.

Existing Basic Ordering Agreements (BOAs) may be used to cover some of the standard trade work performed outside of the NSTX Test Cell.

4.3 Special Acquisition Procedures

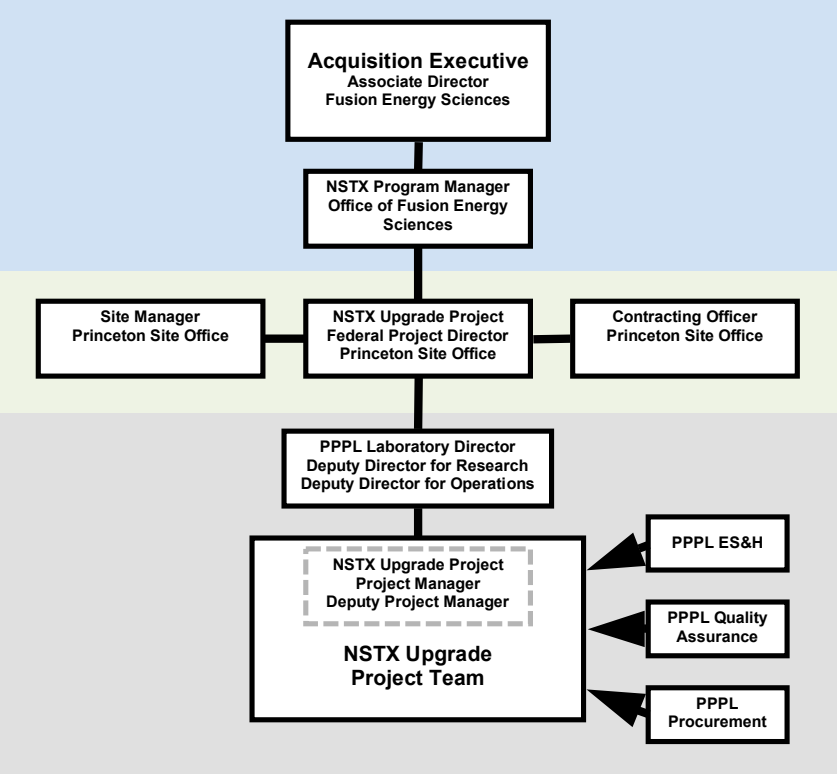
No special acquisition procedures will be used.

4.4 Performance Incentives / Small Business Approach

Solicitation will be made with consideration for small business, veteran owned small business, service disabled veteran-owned small business, HUB Zone small business, and small disadvantaged business and women-owned small business concerns. Awards will be based on the best value determined from an evaluation of the technical criteria such as technical qualifications, past performance and experience, as well as cost considerations.

5.0 Management Structure

5.1 Project Organization



Integrated Project Team Members

- The NSTX Upgrade Project Federal Project Director
- The OFES NSTX Upgrade Project Program Manager
- The PPPL Associate Laboratory Director for Engineering and Infrastructure
- The NSTX Project Director
- The NSTX Program Director
- The NSTX Upgrade Project Laboratory Project Manager
- The PPPL Procurement Manager
- The NSTX Upgrade Project Quality Assurance Manager
- The NSTX Upgrade Project ES&H Manager
- The NSTX Upgrade Project Control Manager
- The NSTX Control Manager
- The NSTX Centerstack Upgrade Engineering Manager
- The NSTX Second Neutral Beam Engineering Manager

The membership of the Integrated Project Team will change as the project evolves into construction and system startup.

5.2 Approach to Performance Evaluation and Validation

DOE O 413.3A, *Program and Project Management for the Acquisition of Capital Assets*, will be used as the primary management tool and guideline to execute the project.

PPPL is implementing a certifiable EVMS that is compliant with ANSI/EIA-748-A-1998. This EVMS will be certified prior to CD-3, and will be implement and used to monitor and evaluate project progress and performance for the duration of the project.

A Primavera database, including estimated costs and resources, will be utilized to manage this project. Throughout the phases of this project, the Primavera database will be updated and refined to reflect the sequence of activities required to be accomplished within specific milestone completion dates and planned costs. The database will be updated monthly to document progress with respect to the performance durations and cost. The DOE site office will coordinate the preparation and submittal of any status reports required by DOE Headquarters.

Change Control

The Project Execution Plan specifies a change control process which has been used before at PPPL. This process identifies the change control authorities of DOE and PPPL that will be utilized to manage any required changes to cost, scope, or schedule.

Project Reporting

Monthly reporting will be accomplished through the DOE Project Assessment and Reporting System (PARS). Quarterly reports will be provided to SC-OFES.

Project Meetings

PPPL will conduct regularly scheduled meetings and reviews to discuss project technical scope, schedule and cost status, and any emerging issues that may have an adverse impact on technical scope, schedule, or cost. Participants will include integrated project team representatives as deemed appropriate.

SIGNATURES

This report accurately represents the best thinking and efforts of the NSYX Upgrade Project and the IPT to understand the full range of project risks and alternatives available to accomplish the project mission.

All reasonable risks and mitigations to executing the acquisition strategy have been included at this time, and the IPT believes the recommended acquisition strategy is in the best interest of DOE.

If new information or facts arise that could have a significant impact on the project’s cost, schedule, or performance, the NSTX Upgrades Project Manager will make the IPT aware of this in a timely manner.

This acquisition strategy may be revised when it makes good business sense to do so. Any changes must be justified and documented. Material changes to the acquisition strategy, such as changes in recommended alternative(s), risk profile, contract or competition approach, or major milestones, must be adequately documented and approved at the same approval level as the original document.

APPROVALS

Submitted for Approval:

Associate Director for Fusion Energy Sciences date

Recommended for Approval:

DOE Contracting Officer date

Approval:

Approving Officer date