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| **Exhibit 300: Non-Information Technology Capital Asset Plan and Business Case Summary**  **Part I: Summary Information and Justification** |

**Section A: Overview**

1. Date of Submission: 8/3/2011
2. Agency: Department of Energy
3. Program/Subprogram: National Spherical Torus Experiment (NSTX)
4. Project Name: NSTX Upgrade Project
   1. site Princeton Plasma Physics Laboratory (PPPL)
   2. type
5. Project ID: AT5505000
6. What kind of investment will this be in FY BY?

Planning

Full Acquisition

Operations and Maintenance

Mixed Life Cycle

1. What was the first budget year this investment was submitted to OMB, e.g., FY CD-0 was approved? FY 2009
2. Provide a brief summary and justification:

The most recent DOE O 413.3A approved Critical Decision is CD-2 that was approved on 12/20/2010 with a Total Project Cost (TPC) or preliminary cost estimate range of $94.3M and CD-4 of Sep 2015.

An improved understanding of the Spherical Torus (ST) magnetic confinement configuration is needed to establish the physics basis for next-step ST facilities, broaden the scientific understanding of plasma confinement for ITER, and maintain U.S. world leadership in ST research capabilities. In particular, operation at higher magnetic field with reduced plasma collisionality is needed to extend the plasma physics understanding of the ST toward next-step ST facilities and ITER. Controllable fully-non-inductive current-drive will also contribute to assessing the ST as a potentially cost-effective path to fusion energy. A proposed upgrade to the NSTX device consists of a new center stack as well as the addition of a second neutral beam injector (NBI).

A new center-stack will double the magnetic field and plasma current while increasing the plasma pulse length from the present ~ 1 second at 0.5 Tesla to 5 seconds at 1 Tesla providing the greatest performance among STs. A second more tangential NBI will double the NBI heating power for higher beta access at higher field with improved NBI current drive efficiency and the current profile control needed for achieving fully non-inductive operation. The upgraded NSTX capabilities will reduce the plasma collisionality by as much as an order of magnitude toward those expected for the next step STs and they will enable demonstration of fully non-inductive operation required for these next step STs. These upgrades would therefore provide the database needed to establish confidence in the design of such facilities. The enhanced research capability and flexibility enabled by the upgrades would also allow the ST to make unique contributions to the International Tokamak Physics Activity (ITPA) and ITER. For example, the ability to produce and investigate very high edge heat fluxes would aid in projecting and understanding divertor operation in ITER and future magnetic fusion devices.

1. Did the Acquisition Executive approve this request? Yes  No 
   1. If “yes,” what was approval date of this approval? 2/23/2009
   2. If at CD-0, what was the approval date of the mission need statement?
   3. If at CD-1, what was the approval date of the acquisition strategy?
   4. If post CD-2, what was the approval date of the latest project execution plan? 12/20/2010
2. Did the Federal Project Director (FPD) review this Exhibit? Yes  No
3. Contact information of the FPD?
   1. Name: Jeffrey Makiel
   2. Phone Number: (609) 243-3721
   3. E-mail: jmakiel@pppl.gov
   4. PMCDP Certification Level: 2
   5. Date Assigned to Project: 5/18/2009
   6. If not at appropriate PMCDP certification level, what is the anticipated date?: n/a

notes:

1. Contact information of the AE?
   1. Name: Edmund Synakowski
   2. Phone Number: 301-903-4941
   3. E-mail: ed.synakowski@science.doe.gov

**Section B: Summary of Spending**

1. Provide the total estimated life-cycle cost for this investment by completing the following table.

| **Table 1: SUMMARY OF SPENDING FOR PROJECT PHASES**  **(REPORTED IN MILLIONS)**  (Estimates for BY+1 and beyond are planning purposes only and do not represent budget decisions) | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **FY PY-1**  **and**  **earlier** | **FY PY** | **FY CY** | **FY BY** | **FY BY+1** | **FY BY+2** | **FY BY+3** | **FY BY+4**  **and**  **beyond** | **Total** |
| Planning | $10.800 |  |  |  |  |  |  |  | $10.800 |
| Acquisition | $2.700 | $10.500 | $14.600 | $25.300 | $27.500 | $2.900 | $0.000 |  | $83.500 |
| Subtotal Planning & Acquisition | $13.500 | $10.500 | $14.600 | $25.300 | $27.500 | $2.900 | $0.000 |  | 94.300 |
| Operations & Maintenance |  |  |  |  |  |  |  |  |  |
| TOTAL | $13.500 | $10.500 | $14.600 | $25.300 | $27.500 | $2.900 | $0.000 |  | $94.300 |
| **Government FTE Costs should not be included in the amounts provided above.** | | | | | | | | | |
| Government FTE Costs | $0.400 | $0.200 | $0.200 | $0.200 | $0.200 | $0.200 |  |  | $1.400 |
| No. of FTE represented by Costs | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |  |  | 7 |

notes:

1. How many number of years are covered in the column “PY-1 and earlier”?: 2
2. How many number of years are covered in the column “BY+1 and beyond”?: 0
3. Will this project require the agency to hire additional FTEs? Yes  No 
   1. If “yes,” how many and in what fiscal year?

n/a

1. If the summary of spending has changed from the FY CY President’s budget request, briefly explain those changes:

n/a

**Section C: Acquisition/Contract Strategy**

1. Complete the table for all (including all non-Federal) contracts and/or task orders currently in place or planned for this investment.

| **Table I.C.1 CONTRACTS TABLE** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Field** | **Contract 1** | **Contract 2** | **Contract 3** | **Contract 4** | **Contract 5** |
| **Contract Status (awarded, pre-award post-solicitation, or pre-award pre-solicitation)** | Award |  |  |  |  |
| **Contracting Agency ID** | 8900 |  |  |  |  |
| **PIID** | DE-AC02-09CH11466 |  |  |  |  |
| **Contract or Task Order Number** | DE-AC02 09CH11466 |  |  |  |  |
| **Solicitation ID** | DE-AC02 09CH11466 |  |  |  |  |
| **Alternative Financing Option (ESPC, UESC, EUL, or N/A)** | N/A |  |  |  |  |
| **EVM Required (Y/N)** | Y |  |  |  |  |
| **Ultimate Contract Value ($)** |  |  |  |  |  |
| **Type of Contract/Task Order (Pricing)** | Cost plus award fee |  |  |  |  |
| **PBSA Contract (Y/N)** |  |  |  |  |  |
| **Start Date of Contract/Task Order** | 1/28/2009 |  |  |  |  |
| **Stop Date of Contract/Task Order** |  |  |  |  |  |
| **Extent Competed** | Full and open |  |  |  |  |
| **CO Name, Phone, E-mail** | Raymond Kimble  (609) 243-3707  rkimble@pppl.gov |  |  |  |  |

1. Provide short description of each contract/acquisition in table.

Contract 1: Managing and Operating contract

1. If earned value is not required or will not be a contract requirement for any of the contracts or task orders above, explain why:

Earned value will be used.

1. Is there an acquisition plan which reflects the requirements of FAR Subpart 7.1 and has been approved in accordance with agency requirements? Yes  No
2. If “yes,” was it approved in accordance with agency requirement? Yes  No 
   1. If “yes,” what is the date? 4/5/2010
      1. Is it current? Yes  No
   2. Does it meet the requirements of EOs 13423 and 13514? Yes  No
   3. If “no,” will an acquisition plan be developed? Yes  No 
      1. If “no,” briefly explain why:

n/a

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| **Part III: Non-IT Capital Investments** |

**Section A: Alternatives Analysis**

1. Was an alternatives analysis for this project? Yes  No 
   1. If “yes,” provide the date the analysis was completed?  4/15/2010
   2. How many alternatives were considered? 4
   3. Did the analysis evaluate the costs and benefits of each alternative? Yes  No
   4. Briefly summarize the rationale for the selected alternative.

The selected alternative was 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.

* 1. If “no,” what is the anticipated date this analysis will be completed? n/a
  2. If no analysis is planned, provide brief explanation.

n/a

**Section B: Risk Management**

1. Does the investment have a Risk Management Plan (RMP)? Yes  No 
   1. If “yes,” what is the date of the plan? 4/7/2010
   2. Has the RMP significantly changed since last submission to OMB? Yes  No
   3. If “yes,” describe any significant changes:

n/a

* 1. Does the RMP include a list of risks, i.e., risk registry? Yes  No
  2. Does the RMP include the probability of occurrence for each risk? Yes  No
  3. Does the RMP include the impact of each risk? Yes  No
  4. Does the RMP include a mitigation strategy for each risk? Yes  No
  5. Does the RMP include activity managing risk throughout the lifecycle? Yes  No

1. If a RMP has not been developed, provide a brief explanation.

n/a

**Section C: Performance Information**

1. Complete the table. Enter the agency strategic goals supported by the investment and the corresponding performance measures. The performance goals must be clearly measurable and quantifiable.

| **PerformaTable III.C.1: PERFORMANCE INFORMATION TABLE** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Fiscal**  **Year** | **Strategic Goal(s) Supported** | **Performance Measure** | **Actual/Baseline** | **Performance Goal Planned**  **(Target)** | **Performance Goal Results**  **(Actual)** |
| 2011 | \* GOAL 5.3: INFRASTRUCTURE – Build, modernize and maintain facilities and infrastructure to achieve mission goals and ensure a safe and secure workplace. | Complete project on schedule | Sep 2015/Sep 2015 | Project completion: September 2015 | On schedule |
| 2011 | \* GOAL 3.2: FOUNDATIONS OF SCIENCE  - Deliver the scientific facilities, train the next generation of scientists and engineers, and provide the laboratory capabilities and infrastructure required for U. S. Scientific primacy. | Complete project on schedule | Sep 2015/Sep 2015 | Project completion: September 2015 | On schedule |
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1. Explanations

\* 2006 Department of Energy Strategic Plan

**Section D: Earned Value Management**

1. Is the EVMS certified in accordance with DOE Order 413.3A? Yes  No
2. Provide the EVM data for the investment.
   1. Budget at Completion (BAC) ($M) 77.3
   2. Planned Value (PV) or Budgeted Cost for Work Scheduled (BCWS) ($M) 20.5
   3. Earned Value (EV) or Budgeted Cost for Work Performed (BCWP) ($M) 19.9
   4. Actual Cost (AC) or Actual Cost of Work Performed (ACWP) ($M) 18.9
   5. Cost Variance (CV) ($M) = EV - AC 1.0
   6. Cost Variance (CV) (%) = CV/EV x 100 5.3%
   7. Cost Performance Index (CPI) = EV/AC 1.06
   8. Schedule Variance (SV) ($M) = EV - PV -0.6
   9. Schedule Variance (SV) (%) = SV/PV x 100 -2.8%
   10. Schedule Performance Index (SPI) = EV/PV 0.97
   11. Estimate at Completion (EAC) ($M) = BAC/CPI 80.4
   12. Variance at Completion (VAC) ($M) = BAC - EAC -3.1
   13. Variance at Completion (VAC) (%) = VAC/BAC x 100 -4%
   14. Percent Complete (%) = EV/BAC x 100 25.7%
   15. Percent Spent (%) = AC/BAC x 100 24.4%
   16. Estimated Completion Date 9/30/2014

* 1. Data “as of” date: 6/30/2011

1. Explanations

Certification of EVMS is planned to occur prior to CD-3 approval.

1. Has the initial performance baseline (CD-2) been changed in the past FY? Yes  No 
   1. If “yes,” when was it approved by the Acquisition Executive? n/a
   2. If “yes,” state reason (cost/scope/schedule):