

# Appendix B

## Detailed Technical Performance Achieved

### NSTXU Project Scope Completion Verification

In addition to satisfying the project KPP's identified in the Project Execution Plan (PEP), both PPPL and DOE agreed to a format for verifying that all scope called out in the Work Breakdown Structure (WBS as shown in the PEP) has been delivered.

The methodology that was adopted required each of the Control Account Managers (CAMs) to review their WBS dictionaries and verify that their project scope had been delivered at the control account level or indicate what work remained to be delivered and when it would be completed. In addition, the CAMs verified that the WBS Dictionary was accurate, or indicated what changes would be necessary to reconcile the dictionary and the scope of work delivered.

The forms, called Project Closeout Acknowledgement (PCA) forms, were filled out by the CAMs and countersigned by their responsible line manager (RLM). Each PCA was then reviewed and approved by the NSTXU project manager.

Review of this documentation as of \_\_\_\_\_ indicated that the project scope has been delivered.

_____ Ron Strykowski, NSTXU Project Manager	_____ Date
_____ Mike Williams, Associate Director PPPL	_____ Date
_____ Stewart Prager, Laboratory Director PPPL	_____ Date

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9417-****-1000	<b>Title:</b> Center Stack Upgrade (CSU) analytical Support
<b>WBS:</b> 1.1.0	<b>Control Account Manager (CAM):</b> L. Dudek

**Scope Description;**

This WBS element includes development of a project integrated model and the associated analysis support of the overall NSTX Upgrade Project.


As a result of the NSTX Upgrade Project, the NSTX global models and analyses was updated. This WBS element included analytical support for global models and analysis not presently identified. The global model provides the basis for updating the analysis to qualify components and identify areas of the tokamak requiring further analysis. Identified plasma scenarios and power supply current limit analyses were run in the global model and current sets that required further analysis were identified. These analyses also serve to check the results of more detailed analyses.

**Is all work scope for this control account complete per the control account plan?**

Yes     No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**

Yes     No (Describe additions and/or exclusions below)

Acknowledgement	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	Larry Dudek	 Digitally signed by Lawrence E. Dudek DN: cn=Larry E. Dudek Date: 2015.04.13 16:16:15 -0400	
<b>Responsible Line Manager (RLM)</b>	Larry Dudek	 Digitally signed by Lawrence E. Dudek DN: cn=Larry E. Dudek Date: 2015.04.13 16:16:32 -0400	
<b>Project Manager</b>	Ron Strykowski	<b>Ron Strykowski</b> Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o=PPFL, email=strykow@pppl.gov, ou=US Date: 2015.04.14 07:33:43 -0400	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9417-****-1001	<b>Title:</b> {Center Stack Upgrade (CSU) PFCs
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<b>WBS:</b> 1.1.1	<b>Control Account Manager (CAM):</b> K.Tresemmer
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**Scope Description;**

The plasma facing components (PFCs) include all the systems and related elements that serve to protect the vacuum vessel from the charged particles and radiation flux from the plasma. These include the plasma facing tiles and mounting components, passive stabilizers, inner wall protection, divertor area strike plates, and local I&C. This element consists of the engineering design, analysis, procurement activities and component fabrication.

The NSTX Upgrade Project required new PFCs on the new Center Stack Casing (CSC) and the new Inboard divertor (IBD). This WBS element includes the design and analysis for both the CS and IBD PFCs, design modifications to the PFC tiles to accommodate surface diagnostics, including design of the tile mounting schemes and routing plans for diagnostic wires, generation of required documentation such as checked calculations, specifications and procedures, the procurement and installation of all PFC tiles and hardware on the CSC and IBD.

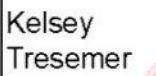


**Is all work scope for this control account complete per the control account plan?**

Yes     No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**

Yes     No (Describe additions and/or exclusions below)

Additional scope covering the upgrade and installation of the Row 1 Outboard Divertor Tiles was added in response to analyses which suggested that it was possible to run plasma scenarios where the strike point hit the side of the PF1C canister, a vacuum barrier. The subsequent design changes to both the Inboard and Outboard Row 1 tiles were needed to provide thermal shadowing of this affected zone. This work was completed along with the rest of the 1001 WBS scope.

Acknowledgement	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	Kelsey Tresemmer	 <small>Digitally signed by Kelsey Tresemmer DN: cn=Kelsey Tresemmer, o=PPPL, ou=Engineering, email=ktresem@pppl.gov, c=US Date: 2015.04.13 14:30:54 -0400</small>	
<b>Responsible Line Manager (RLM)</b>	Larry Dudek	 <small>Digitally signed by Lawrence E. Dudek Date: 2015.04.13 16:13:28 -0400</small>	
<b>Project Manager</b>	Ron Strykowski	 <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o= ou=PPPL, email=rstrykow@pppl.gov, c=US Date: 2015.04.14 07:34:31 -0400</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9417-****-1002	<b>Title:</b> Passive Plate Analysis and Upgrade Activity
<b>WBS:</b> 1.1.1	<b>Control Account Manager (CAM):</b> N.Atnafu

**Scope Description;**

The NSTX Upgrade required analysis of the passive plates for disruption and thermal loads. CDR level calculations were performed that addressed one of five disruptions. The remaining identified disruptions were completed during Preliminary & Final Design. Modest hardware upgrades are anticipated as part of this task. Additions of accelerometers or other diagnostics to benchmark calculations with actual performance in NSTX were provided. This analysis effort is included in this WBS element.

**Is all work scope for this control account complete per the control account plan?**

Yes     No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**

Yes     No (Describe additions and/or exclusions below)

Acknowledgement	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	Neway Atnafu	Neway Atnafu <small>Digitally signed by Neway Atnafu DN: cn=Neway Atnafu, o=Princeton Plasma Physics Lab, ou=PPPL, email=atnafu@pppl.gov, c=US Date: 2015.04.15 09:01:06 -0400'</small>	
<b>Responsible Line Manager (RLM)</b>	Larry Dudek	 <small>Digitally signed by Lawrence E. Dudek Date: 2015.04.17 09:35:01 -04'00'</small>	
<b>Project Manager</b>	Ron Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o, ou=PPPL, email=rstryk@pppl.gov, c=US Date: 2015.04.21 09:03:41 -0400'</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account: 9417-****-1200</b>	<b>Title: Vacuum Vessel &amp; Support Structure</b>
<b>WBS: 1.1.2</b>	<b>Control Account Manager (CAM): M. Smith</b>

**Scope Description;**

The vacuum vessel & support structure (VVSS) consists of the vacuum chamber, not including the PFCs, all ports and vacuum boundary closures and the torus support structure which provides the overall supporting mechanism for the torus components to the test cell floor. This WBS element includes the engineering design, analysis, procurement activities and component fabrication.

The NSTX Upgrade Project required that the existing VVSS be modified to accommodate the new center stack structure, including the umbrella structure and the new center stack support structure. This WBS element includes the analytical and CAD design of the support structures associated with the Magnet upgrade activities. The scope includes; the Vacuum Vessel & Structural Support, the Outer TF Structures, the Outer PF Coil Structures, the Umbrella Structural Reinforcement, the CS Support Pedestal and miscellaneous Vacuum Vessel Structural Supports. It also includes the procurement and fabrication of these structures, but does not include installation costs. Installations costs are included in WBS 1.8 CA 8200.

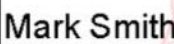


**Is all work scope for this control account complete per the control account plan?**

Yes     No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**

Yes     No (Describe additions and/or exclusions below)

Note: generally speaking, the description above is correct. However, structure / upgrades needed to the VV due to the 2nd neutral beam was not within the scope of CA 1200 but included in WBS 1.2 CA 2480. Also, structure / upgrades to the VV and/or diagnostic ports due to specific diagnostics was not within the scope of CA 1200 but included in WBS 1.4 CA 4500.

Acknowledgement	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	Mark Smith	 <small>Digitally signed by Mark Smith DN: cn=Mark Smith, o=PPPL, ou=am, email=msmith@pppl.gov, c=US Date: 2015.04.21 10:08:35 -0400</small>	
<b>Responsible Line Manager (RLM)</b>	Larry Dudek	 <small>Digitally signed by Lawrence E. Dudek Date: 2015.04.21 10:26:35 -04'00'</small>	
<b>Project Manager</b>	Ron Strykowski	 <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o=PPPL, email=rstrykow@pppl.gov, c=US Date: 2015.04.21 10:24:14 -0400</small>	



**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

**Control Account: 9417-\*\*\*\*-1300 & 1310**

**Title: Upgrade Project Design Support (Job 1300)**

**WBS: 1.1.3**

**Control Account Manager (CAM): S. Raftopoulos**

**Scope Description;**


This WBS element provided CAD design support and engineering supervision for the overall assembly associated with the CSA upgrade. It also included time for space allocation studies associated with the magnet upgrades. CAD design support for individual components is included in the specific component jobs.

**Is all work scope for this control account complete per the control account plan?**

**Yes**       **No (Describe when the work will be completed)**

**Does the WBS dictionary accurately represent the work completed?**

**Yes**       **No (Describe additions and/or exclusions below)**

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	S. Raftopoulos	Steve Raftopoulos <small>Digitally signed by Steve Raftopoulos DN: cn=Steve Raftopoulos, o=Princeton Plasma Physics Laboratory, +e=raftop@pppl.gov, ou=Engineering, c=US Date: 2015.04.13 16:53:46 -0400</small>	
<b>Responsible Line Manager (RLM)</b>	L. Dudek	 <small>Digitally signed by Lawrence E. Dudek Date: 2015.04.14 08:25:22 -0400</small>	
<b>Project Manager</b>	R. Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o=PPPL, email=ron.strykowski@pppl.gov, ou=US Date: 2015.04.14 08:51:20 -0400</small>	

**NSTX Upgrade Project**  
**Project Closeout Acknowledgement**  
**CD-4**

<b>Control Account:</b> 9417-****-1301	<b>Title:</b> Outer Toroidal Field Coil Repairs (Job 1301)
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<b>WBS:</b> 1.1.3.2	<b>Control Account Manager (CAM):</b> S. Raftopoulos
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**Scope Description;**

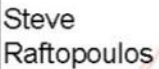


The outer Toroidal Field coils subsystem consists of the coil sections that make up the 12 TF outer legs. This WBS element included the design, analysis, prototypes (as required), procurement activities and fabrication. This WBS element included the fabrication of (2) new Outer TF coils to replace the existing leaking OTF#7 and OTF#11 that were removed during the Neutral Beam port upgrade. These coils will then be used as a spare for future operations in NSTX. The scope included the procurement of conductor, insulation material, aluminum castings and supports necessary to fabricate a new OTF coils. Coil fabrication was performed by an outside vendor. This scope does not include costs associated with installation. Installations costs are included in WBS 1.8

Is all work scope for this control account complete per the control account plan?

Yes     No (Describe when the work will be completed)

Does the WBS dictionary accurately represent the work completed?

Yes     No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	S. Raftopoulos	 <small>Digitally signed by Steve Raftopoulos  DN: cn=Steve Raftopoulos, o=PPPL, ou=PPPL, email=raftop@pppl.gov, c=US  Date: 2015.04.13 16:54:07 -0400</small>	
<b>Responsible Line Manager (RLM)</b>	L. Dudek	 <small>Digitally signed by Lawrence E. Dudek  Date: 2015.04.14 08:25:09 -0400</small>	
<b>Project Manager</b>	R. Strykowski	 <small>Digitally signed by Ron Strykowski  DN: cn=Ron Strykowski, o=PPPL, ou=PPPL, email=rstrykow@pppl.gov, c=US  Date: 2015.04.14 08:52:08 -0400</small>	


**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9417-****-1302	<b>Title:</b> Center Stack Assembly (Job 1302)
<b>WBS:</b> 1.1.3.3.4	<b>Control Account Manager (CAM):</b> S. Raftopoulos

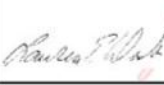
**Scope Description;**  
 The Center Stack Assembly effort involved the activities associated with the assembly of the Center Stack and included design modifications and upgrade of the coil assembly stand; procedures for assembling the Center Stack and for installation; assembly of the Center Stack components including the OH/TF coil supports, mounting of the OH Solenoid surface diagnostics and thermal blanket, inconel casing and inner PF coils and setup and tear down of the Center Stack assembly area.

**Is all work scope for this control account complete per the control account plan?**  
 Yes     No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**  
 Yes     No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	S.Raftopoulos	Steve Raftopoulos <small>Digitally signed by Steve Raftopoulos            DN: cn=Steve Raftopoulos, o=Princeton Plasma Physics Laboratory, ou=Engineering, email=raftopo@pppl.gov, c=US            Date: 2015.04.13 16:54:28 -0400</small>	
<b>Responsible Line Manager (RLM)</b>	L.Dudek	 <small>Digitally signed by Lawrence E. Dudek            Date: 2015.04.14 08:24:52 -0400</small>	
<b>Project Manager</b>	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski            DN: cn=Ron Strykowski, o=PPPL, email=rstryko@pppl.gov, c=US            Date: 2015.04.14 09:52:46 -0400</small>	



NSTX Upgrade Project Project Closeout Acknowledgement CD-4			
Control Account: 9417-****-1303		Title: TF Joint Stand & Performance Test (Job 1303)	
WBS:1.1.3.3.1		Control Account Manager (CAM): S. Raftopoulos	
<p>Scope Description;</p> <p>For the NSTX Upgrade Project a test stand to measure the required performance parameters on the new NSTX TF joint design was designed and fabricated. Test parameter measurements and cyclic lifetime tests of the new TF joint materials were performed and testing data was compiled. Results were used for the design of centerstack components.</p>			
<p>Is all work scope for this control account complete per the control account plan?</p> <p><input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No (Describe when the work will be completed)</p>			
<p>Does the WBS dictionary accurately represent the work completed?</p> <p><input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No (Describe additions and/or exclusions below)</p>			
Acknowledgements	Name	Signature	Date
Control Account Manager (CAM)	S.Raftopoulos	Steve Raftopoulos <small>Digitally signed by Steve Raftopoulos DN: cn=Steve Raftopoulos, o=PPPL, ou=PPPL, email=sraftop@pppl.gov, c=US Date: 2015.04.13 16:54:51-0400'</small>	
Responsible Line Manager (RLM)	L.Dudek	 <small>Digitally signed by Lawrence E. Dudek Date: 2015.04.14 08:24:39 -04'00'</small>	
Project Manager	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o=PPPL, ou=PPPL, email=rstryk@pppl.gov, c=US Date: 2015.04.14 09:00:12 -0400'</small>	


**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9417-****-1304	<b>Title:</b> Inner Toroidal Field Bundle (Job 1304)
<b>WBS:</b> 1.1.3.3.1	<b>Control Account Manager (CAM):</b> S. Raftopoulos

**Scope Description;**  
 For the NSTX Upgrade Project a new TF Inner Leg was fabricated. This WBS element includes the design of the TF Bundle, the TF flex bus and flex bus supports and included all analytical and CAD design efforts for these components. It also included the procurement of the TF conductor [80 lengths] and procurement of the TF flex bus and supports. It does not include the procurement/fabrication of the OH, which is included as part of the OH procurement in WBS 1.1.3.3.2.

**Is all work scope for this control account complete per the control account plan?**  
 Yes     No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**  
 Yes     No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	S.Raftopoulos	Steve Raftopoulos <small>Digitally signed by Steve Raftopoulos            DN: cn=Steve Raftopoulos, o=Princeton Plasma Physics Laboratory, ou=Engineering, email=raftop@pppl.gov, c=US            Date: 2015.04.13 16:55:11 -0400</small>	
<b>Responsible Line Manager (RLM)</b>	L.Dudek	 <small>Digitally signed by Lawrence E. Dudek            Date: 2015.04.14 08:24:14 -0400</small>	
<b>Project Manager</b>	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski            DN: cn=Ron Strykowski, o=PPPL, email=rstryk@pppl.gov, c=US            Date: 2015.04.14 09:00:59 -0400</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9417-****-1305	<b>Title:</b> Ohmic Heating Solenoid (Job 1305)
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<b>WBS:</b> 1.1.3.3.2	<b>Control Account Manager (CAM):</b> S. Raftopoulos
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**Scope Description;**


For the NSTX Upgrade a new OH Solenoid was fabricated. This WBS element included the design & fabrication of a new OH solenoid and associated components including a Belleville washer spring assembly and support structures for the NSTX upgrades. It also included all analytical & CAD design efforts. Includes advance procurement of the copper conductor and co-wound [glass/Kapton] insulation. Also includes the procurement of the Micro-therm insulation, conductive paint. Includes the in-house fabrication for the combined OH and TF bundle assembly.

Is all work scope for this control account complete per the control account plan?

Yes     No (Describe when the work will be completed)

Does the WBS dictionary accurately represent the work completed?

Yes     No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	S.Raftopoulos	Steve Raftopoulos <small>Digitally signed by Steve Raftopoulos DN: cn=Steve Raftopoulos, o=Princeton Plasma Physics Laboratory, ou=Engineering, email=craftop@pppl.gov, c=US Date: 2015.04.13 16:58:26 -0400</small>	
<b>Responsible Line Manager (RLM)</b>	L.Dudek	 <small>Digitally signed by Lawrence E. Dudek Date: 2015.04.14 08:24:00 -0400</small>	
<b>Project Manager</b>	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o, ou=PPPL, email=rstryk@pppl.gov, c=US Date: 2015.04.14 09:01:22 -0400</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9417-****-1306	<b>Title:</b> Inner Poloidal Field Coils (Job 1306)
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<b>WBS:</b> 1.1.3.3.3	<b>Control Account Manager (CAM):</b> S. Raftopoulos
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**Scope Description;**

The inner poloidal/shaping coils subsystem consists of the new coils that will make up the poloidal field coils 1A, 1B and 1C. This WBS element includes the design, analysis, procurement activities and fabrication.

For the NSTX Upgrade three new sets of inner poloidal field coils were fabricated and installed. This WBS element includes the design and procurement of the Inner poloidal field coils and supports which includes all analytical and CAD design efforts for these components. It includes the early procurement of the PF conductor and co-wound [Glass/Kapton] insulation.

**Is all work scope for this control account complete per the control account plan?**

Yes     No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**

Yes     No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	S.Raftopoulos	Steve Raftopoulos <small>Digitally signed by Steve Raftopoulos DN: cn=Steve Raftopoulos, o=Princeton Fusion Plasma Laboratory, ou=Digital-IT&amp;G, email=st@pppl.gov, c=US Date: 2015.04.13 16:55:53 -0400'</small>	
<b>Responsible Line Manager (RLM)</b>	L.Dudek	<i>Lawrence E. Dudek</i> <small>Digitally signed by Lawrence E. Dudek Date: 2015.04.14 08:22:12 -0400'</small>	
<b>Project Manager</b>	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o= pppl, email=rstryk@pppl.gov, c=US Date: 2015.04.14 09:02:04 -0400'</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9417-****-1307	<b>Title:</b> CS Casing (Job 1307)
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<b>WBS:</b> 1.1.3.3.4	<b>Control Account Manager (CAM):</b> S. Raftopoulos
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**Scope Description;**

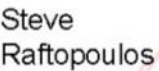


This WBS element includes the design and fabrication of the Center Stack casing and ceramic break assembly for the upgraded Center Stack as well as the assembly of the new Center Stack. The Center Stack Casing effort includes analysis and CAD design for the casing components; the procurement of the Inconel tubing, forgings, bellows and organ pipes; the fabrication of Center Stack support legs; the procurement/fabrication of a new ceramic break assembly; the in-house assembly of the casing components; and mounting of the PF1A and PF1B structure/coils to the casing.

**Is all work scope for this control account complete per the control account plan?**

Yes     No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**

Yes     No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	S.Raftopoulos	 <small>Digitally signed by Steve Raftopoulos DN: cn=Steve Raftopoulos, o=Princeton Plasma Physics Laboratory, ou=Engineering, email=raftos@pppl.gov, c=US Date: 2015.04.13 16:06:18 -0400</small>	
<b>Responsible Line Manager (RLM)</b>	L.Dudek	 <small>Digitally signed by Lawrence E. Dudek Date: 2015.04.14 08:21:54 -0400</small>	
<b>Project Manager</b>	R.Strykowski	 <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o=PPPL, email=rstryk@pppl.gov, c=US Date: 2015.04.14 09:02:36 -0400</small>	



**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

**Control Account: 9418-\*\*\*\*-2300**

**Title: Electron Cyclotron Heating (Job 2300)**

**WBS: 1.2.3**

**Control Account Manager (CAM): T. Stevenson**

**Scope Description;**




**This scope of the WBS element for the NSTX Upgrade covers the ECH and other antenna systems, and miscellaneous diagnostics and components attached to the vessel which will be affected by the increases in EM and thermal loading. Disruption loads on the ECH waveguide were evaluated for the Center Stack Upgrade Fields and field transients. Only disruption qualification calculations were performed.**



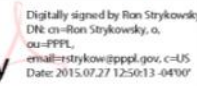
**Is all work scope for this control account complete per the control account plan?**

**Yes**       **No (Describe when the work will be completed)**

**Does the WBS dictionary accurately represent the work completed?**

**Yes**       **No (Describe additions and/or exclusions below)**

<b>Acknowledgements</b>	<b>Name</b>	<b>Signature</b>	<b>Date</b>
<b>Control Account Manager (CAM)</b>	T. Stevenson		3/19/15
<b>Responsible Line Manager (RLM)</b>	T. Stevenson		3/19/15
<b>Project Manager</b>	R. Strykowski		3/19/15

NSTX Upgrade Project			
Project Closeout Acknowledgement			
CD-4			
<b>Control Account:</b> 9418-****-2420	<b>Title:</b> 2 <sup>nd</sup> NBI Source Refurbishment (Job 2420)		
<b>WBS:</b> 1.2.4.2	<b>Control Account Manager (CAM):</b> M.Cropper		
<p><b>Scope Description;</b></p> <p>This WBS element included the activities to refurbish three neutral beam ion sources for the 2nd Neutral beamline, as currently being performed for the installed Neutral beamline 1.</p>			
<p><b>Is all work scope for this control account complete per the control account plan?</b></p> <p><input checked="" type="checkbox"/> <b>Yes</b>    <input type="checkbox"/> <b>No (Describe when the work will be completed)</b></p> <p>Due to TF fault 7/20/2011, existing sources were available so no new sources needed refurbishment.</p>			
<p><b>Does the WBS dictionary accurately represent the work completed?</b></p> <p><input checked="" type="checkbox"/> <b>Yes</b>    <input type="checkbox"/> <b>No (Describe additions and/or exclusions below)</b></p>			
Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	M.Cropper	Mark B. Cropper 	
<b>Responsible Line Manager (RLM)</b>	T.Stevenson	Timothy N. Stevenson 	
<b>Project Manager</b>	R.Strykowski	Ron Strykowski 	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

**Control Account:** 9418-\*\*\*\*-2425

**Title:** NSTX Beamline 2 Relocation (Job 2425)

**WBS:** 1.2.4.4

**Control Account Manager (CAM):** T. Stevenson

**Scope Description;**




Also included in WBS element 1.2.4.4 are the efforts necessary to relocate a TFTR neutral beam line and ancillary equipment into the NSTX test cell. This includes High Voltage Enclosures (HVEs) and the complete beam box and components.

**Is all work scope for this control account complete per the control account plan?**

Yes     No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**

Yes     No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
Control Account Manager (CAM)	T.Stevenson		3/19/15
Responsible Line Manager (RLM)	T.Stevenson		3/19/15
Project Manager	R.Strykowski		3/19/15

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9418-****-2430	<b>Title:</b> NSTX Beamline 2 Decontamination (Job 2430)
<b>WBS:</b> 1.2.4.3	<b>Control Account Manager (CAM):</b> T. Stevenson

**Scope Description;**

**This WBS element included the disassembly and decontamination of a TFTR Neutral Beam beamline in preparation for beamline refurbishment and reuse as an NSTX upgrade.**

**Is all work scope for this control account complete per the control account plan?**  
 **Yes**       **No (Describe when the work will be completed)**

**Does the WBS dictionary accurately represent the work completed?**  
 **Yes**       **No (Describe additions and/or exclusions below)**

<b>Acknowledgements</b>	<b>Name</b>	<b>Signature</b>	<b>Date</b>
<b>Control Account Manager (CAM)</b>	T.Stevenson	<i>T. Stevenson</i>	3/19/15
<b>Responsible Line Manager (RLM)</b>	T.Stevenson	<i>T. Stevenson</i>	3/19/15
<b>Project Manager</b>	R.Strykowski	<i>R. Strykowski</i>	3/19/15

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9418-****-2440	<b>Title:</b> NSTX Beamline 2 Refurbishment & Relocation(Job 2440)
<b>WBS:</b> 1.2.4.4	<b>Control Account Manager (CAM):</b> T. Stevenson


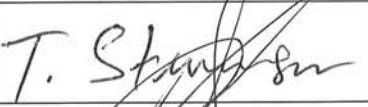

**Scope Description;**  
**This WBS element included refurbishment of a TFTR NBI and its relocation to the NSTX test cell.**  
**Included in this WBS element are the activities necessary to refurbish a TFTR Neutral Beam beamline for use on NSTX. This scope included replacing the ion dump and calorimeter bellows and refurbishment of the seals, thermocouple wiring, and bellows (cal and spool).**

**Is all work scope for this control account complete per the control account plan?**

**Yes**       **No (Describe when the work will be completed)**

**Does the WBS dictionary accurately represent the work completed?**

**Yes**       **No (Describe additions and/or exclusions below)**

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	T.Stevenson		3/19/15
<b>Responsible Line Manager (RLM)</b>	T.Stevenson		3/19/15
<b>Project Manager</b>	R.Strykowski		3/19/15



NSTX Upgrade Project			
Project Closeout Acknowledgement			
CD-4			
<b>Control Account:</b> 9418-****-2450	<b>Title:</b> NSTX Beamline 2 Services (Job 2450)		
<b>WBS:</b> 1.2.4.5	<b>Control Account Manager (CAM):</b> M.Cropper		
<p><b>Scope Description;</b></p> <p><b>This WBS element included the efforts to provide services to the new neutral beam beamline and ancillary equipment in NSTX test cell. These services include water, cryogenic systems, gas supplies, and vacuum lines.</b></p>			
<p><b>Is all work scope for this control account complete per the control account plan?</b></p> <p><input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No (Describe when the work will be completed)</p>			
<p><b>Does the WBS dictionary accurately represent the work completed?</b></p> <p><input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No (Describe additions and/or exclusions below)</p>			
Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	M.Cropper	Mark B. Cropper <small>Digitally signed by Mark B. Cropper            DN: cn=Mark B. Cropper,            o=Princeton Plasma Physics Lab,            ou=Neutral Beams,            email=mcropper@pppl.gov, c=US            Date: 2015.07.23 12:11:16 -0400'</small>	
<b>Responsible Line Manager (RLM)</b>	T.Stevenson	Timothy N. Stevenson <small>Digitally signed by Timothy N. Stevenson            DN: cn=Timothy N. Stevenson, o=PPPL,            ou=ENGR, email=tstevenson@pppl.gov, c=US            Date: 2015.07.23 16:03:52 -05'00'</small>	
<b>Project Manager</b>	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski            DN: cn=Ron Strykowski, o,            ou=PPPL,            email=rstrykow@pppl.gov, c=US            Date: 2015.07.27 12:50:44 -0400'</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

**Control Account: 9418-\*\*\*\*-2460**

**Title: NBI Armor (Job 2460)**

**WBS: 1.2.4.6**

**Control Account Manager (CAM): K. Tresemer**

**Scope Description;**

**This WBS element included the design, fabrication, and installation of upgraded and relocated neutral beam armor including cooling and instrumentation work.**

**Is all work scope for this control account complete per the control account plan?**

**Yes**       **No (Describe when the work will be completed)**

**Does the WBS dictionary accurately represent the work completed?**

**Yes**       **No (Describe additions and/or exclusions below)**

<b>Acknowledgements</b>	<b>Name</b>	<b>Signature</b>	<b>Date</b>
<b>Control Account Manager (CAM)</b>	K.Tresemer	Kelsey Tresemer <small>Digitally signed by Kelsey Tresemer DN: cn=Kelsey Tresemer, o=PPPL, ou=Engineering, email=ktreseme@pppl.gov, c=US Date: 2015.04.21 12:14:29 -0400</small>	
<b>Responsible Line Manager (RLM)</b>	T.Stevenson	Timothy N. Stevenson <small>Digitally signed by Timothy N. Stevenson DN: cn=Timothy N. Stevenson, o=PPPL, ou=ENOR, email=tstevenson@pppl.gov, c=US Date: 2015.04.21 16:12:29 -0500</small>	
<b>Project Manager</b>	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o= ou=PPPL, email=rstrykow@pppl.gov, c=US Date: 2015.08.05 13:41:01 -0400</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9418-****-2470	<b>Title:</b> NBI Power System (Job 2470)
<b>WBS:</b> 1.2.4.7	<b>Control Account Manager (CAM):</b> S. Ramakrishnan

**Scope Description;**

Included in this WBS element is providing power for the NBI beamline 2. NB2 is planned is powered from the TFTR NB4 A, B, & C line ups. The electrical equipment in these line ups was reactivated. The TFTR NB4 HVEs were relocated to the NSTX Test Cell as part of WBS element 1.2.4.4. New triax cables were installed with terminations from the Modregs to the HVEs. New Decel coaxial cables were installed from the Decel supplies to the Sources. The Arc, Filament, Magnet, and the 208 feeds, to HVEs cables, were spliced in the TFTR Test Cell basement to new cabling designed and installed from the TFTR Basement to the NSTX Test Cell. The fiber cables also were spliced with additional lengths recovered from other TFTR line ups. The AC auxiliaries and Grounding for the NB2 were designed and installed.

**Is all work scope for this control account complete per the control account plan?**

Yes     No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**

Yes     No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	S. Ramakrishnan	S. Ramakrishnan <small>Digitally signed by S. Ramakrishnan DN: cn=S. Ramakrishnan, o=PPPL, ou=Engineering, email=raki@pppl.gov, c=US Date: 2015.04.22 12:29:41 -04'00'</small>	04/12/15
<b>Responsible Line Manager (RLM)</b>	T. Stevenson	Timothy N. Stevenson <small>Digitally signed by Timothy N. Stevenson DN: cn=Timothy N. Stevenson, o=PPPL, ou=EHOR, email=stevenson@pppl.gov, c=US Date: 2015.04.22 15:26:24 -05'00'</small>	
<b>Project Manager</b>	R. Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o= ou=PPPL, email=strykow@pppl.gov, c=US Date: 2015.08.05 13:43:41 -04'00'</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9418-****-2475	<b>Title:</b> NBI Controls & Instrumentation (Job 2475)
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<b>WBS:1.2.4.7</b>	<b>Control Account Manager (CAM):</b> M. Cropper
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**Scope Description;**  
**Also included in WBS element 1.2.4.7 are the controls and instrumentation for the NB2. The work covers PLC, programming, control racks, new thermocouples, TC scanner, miscellaneous controls, and control cabling. The work also includes the gradient grid upgrade. System integration and testing will also be performed as part of this effort.**

**Is all work scope for this control account complete per the control account plan?**  
 **Yes**      **No (Describe when the work will be completed)**

**Does the WBS dictionary accurately represent the work completed?**  
 **Yes**      **No (Describe additions and/or exclusions below)**

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	M.Cropper	<b>Mark B. Cropper</b> <small>Digitally signed by Mark B. Cropper  DN: cn=Mark B. Cropper, o=PPPL, ou=Neutral Beam, ou=Neutral Beam, email=mcropper@pppl.gov, c=US  Date: 2015.05.12 07:10:37 -0400</small>	
<b>Responsible Line Manager (RLM)</b>	T.Stevenson	<b>Timothy N. Stevenson</b> <small>Digitally signed by Timothy N. Stevenson  DN: cn=Timothy N. Stevenson, o=PPPL, ou=ENR, email=stevenson@pppl.gov, c=US  Date: 2015.05.12 09:31:30 -0500</small>	
<b>Project Manager</b>	R.Strykowski	<b>Ron Strykowski</b> <small>Digitally signed by Ron Strykowski  DN: cn=Ron Strykowski, o=PPPL, ou=PPPL, email=strykow@pppl.gov, c=US  Date: 2015.05.12 10:34:06 -0400</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

**Control Account: 9418-\*\*\*\*-2480**

**Title: NSTX NB2 Duct & VV Mods (Job 2480)**

**WBS: 1.2.4.8**

**Control Account Manager (CAM): T. Stevenson**

**Scope Description;**




This WBS element included the design, and fabrication of all components connecting the Neutral Beam Box to NSTX, and the connecting ductwork and modifications to NSTX Vacuum Vessel to accommodate the second beamline.

**Is all work scope for this control account complete per the control account plan?**

Yes     No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**

Yes     No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
Control Account Manager (CAM)	T.Stevenson		3/19/15
Responsible Line Manager (RLM)	T.Stevenson		3/19/15
Project Manager	R.Strykowski		3/19/15



**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9418-****-2485	<b>Title:</b> NSTX NB2 TVPS (Job 2485)
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<b>WBS:</b> 1.2.4.0	<b>Control Account Manager (CAM):</b> W. Blanchard
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**Scope Description;**

**In order to accommodate the installation of the 2nd NBI on NSTX the Vacuum Pumping System was modified. This WBS element included the design, fabrication, and installation of a new vessel pumping system and includes new pump ducts off of the Neutral Beamline 2 duct, mechanical and electrical isolation of the system, vacuum diagnostic relocation, magnetic.**

**This WBS element also includes the controllers for all pumps. The relocation of racks and control equipment is covered under WBS 1.2.4.9**

**Is all work scope for this control account complete per the control account plan?**

Yes     No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**

Yes     No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	W.Blanchard	W. Blanchard <small>Digitally signed by W. Blanchard DN: cn=W. Blanchard, o=PPPL, ou=Engineering, email=wblancha@pppl.gov, c=US Date: 2015.03.24 13:58:34 -04'00'</small>	
<b>Responsible Line Manager (RLM)</b>	T. Stevenson	Timothy N. Stevenson <small>Digitally signed by Timothy N. Stevenson DN: cn=Timothy N. Stevenson, o=PPPL, ou=ENSR, email=stevenson@pppl.gov, c=US Date: 2015.04.22 09:25:57 -05'00'</small>	
<b>Project Manager</b>	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o= ou=PPPL, email=rstrykow@pppl.gov, c=US Date: 2015.08.05 13:48:46 -04'00'</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

**Control Account: 9418-\*\*\*\*-2490**      **Title: NTC Equipment Removals/Relocations (Job 2490)**

**WBS: 1.2.4.9**      **Control Account Manager (CAM): E. Perry**

**Scope Description;**

This WBS element covers moving of racks and diagnostics to clear space in the NSTX Test Cell (NTC) for the second Neutral Beamline. Racks to be removed and re-installed in a new location are #419, 431-435, 440-445, 447-449, 488. Racks 456 and 489 will be removed and excess. This scope also includes the fabrication and installation of five sections of platform at elevation 118' on the west side of the NTC to accommodate the racks being re-installed in the NTC. Racks #441-445 will be relocated to the Gallery east of the NTC. Diagnostics to be removed are those from the midplanes of Bay J and Bay K as well as those on the present pump duct. The diagnostics from Bay J will be re-installed ~5" outboard of their present position. IR windows and the Transmission Grating Spectrometer will be relocated to the new NB duct. Ion gages, filaments and the RGA will be relocated to the new pump duct under the NB2 duct. SPRED and LOWEUS will be relocated to Bay L. The Thomson Scattering Beam Dump Window will be relocated to between Bays K and L.

**Is all work scope for this control account complete per the control account plan?**

Yes       **No (Describe when the work will be completed)**

SPRED and LOWEUS re-installation deleted from scope.

**Does the WBS dictionary accurately represent the work completed?**

Yes       **No (Describe additions and/or exclusions below)**

SPRED and LOWEUS re-installation deleted from scope.

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	E.Perry	Erik D. Perry <small>Digitally signed by Erik D. Perry DN: cn=Erik D. Perry, o, ou, email=eperry@pppl.gov, c=US Date: 2015.05.06 10:13:12 -04'00'</small>	
<b>Responsible Line Manager (RLM)</b>	T. Stevenson	Timothy N. Stevenson <small>Digitally signed by Timothy N. Stevenson DN: cn=Timothy N. Stevenson, o=PPPL, ou=ENGR, email=stevenson@pppl.gov, c=US Date: 2015.07.22 16:12:01 -05'00'</small>	
<b>Project Manager</b>	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o, ou=PPPL, email=rstrykow@pppl.gov, c=US Date: 2015.07.22 10:17:13 -04'00'</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9417-****-3200	<b>Title:</b> Water System Coolant Modifications for CSU (Job 3200)
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<b>WBS:</b> 1.3.2	<b>Control Account Manager (CAM):</b> N. Atnafu
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**Scope Description;**  
**The Coolant System provides cooling water to remove heat generated from NSTX systems during experimental operations. The systems include the:**

- TF/PF bus and coil cooling water system;
- Center stack cooling water system;
- Component cooling water system; and the
- Ohmic heating cooling water system.


**These systems will provide cooling water for normal operations and discharge cleaning of the vacuum vessel. This WBS includes engineering design, analysis, procurement activities, component fabrication and installation to the coil, bus and component cooling manifolds at the torus.**  
**The new Center Stack on NSTX required modifications to the existing coolant system. This WBS element provides water cooling services to the new Center Stack and ancillary equipment in the NSTX test cell.**


**Is all work scope for this control account complete per the control account plan?**

Yes     No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**

Yes     No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	N. Atnafu	Neway Atnafu <small>Digitally signed by Neway Atnafu DN: cn=Neway Atnafu, o=Princeton Plasma Physics Lab, ou=PPPL, email=neway@pppl.gov, c=US Date: 2015.04.15 09:53:19 -0400</small>	
<b>Responsible Line Manager (RLM)</b>	L. Dudek	 <small>Digitally signed by Lawrence E. Dudek Date: 2015.04.17 09:34:33 -0400</small>	
<b>Project Manager</b>	R. Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o=PPPL, email=strykow@pppl.gov, c=US Date: 2015.04.21 09:04:20 -0400</small>	

NSTX Upgrade Project			
Project Closeout Acknowledgement			
CD-4			
Control Account: 9417-****-3300	Title: NSTX CSU Bakeout System Mods (Job 3300)		
WBS: 1.3.3	Control Account Manager (CAM): S. Ramakrishnan		
<b>Scope Description;</b> This WBS element includes the purchase of a new power supply/supplies, to replace the existing one, to be used for electrical heating of the vessel. It is proposed to buy two 0-8V, 0-4000 amps supplies for the application. The supplies will then be connected in parallel to get 0-8000A. Suitable cable leads will be fabricated and necessary interlocks will be incorporated.			
<b>Is all work scope for this control account complete per the control account plan?</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (Describe when the work will be completed)			
<b>Does the WBS dictionary accurately represent the work completed?</b> <input type="checkbox"/> Yes <input type="checkbox"/> No (Describe additions and/or exclusions below) The description can be amended as stated in the Scope			
Acknowledgements	Name	Signature	Date
Control Account Manager (CAM)	S. Ramakrishnan	S. Ramakrishnan <small>Digitally signed by S. Ramakrishnan            DN: cn=S. Ramakrishnan, o=PPPL,            ou=Engineering,            email=sr@pppl.gov, c=US            Date: 2015.07.24 11:09:49 -0400'</small>	07/24/15
Responsible Line Manager (RLM)	L. Dudek	 <small>Digitally signed by Lawrence E. Dudek            Date: 2015.07.28 16:07:05 -04'00'</small>	
Project Manager	R. Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski            DN: cn=Ron Strykowski, o,            ou=PPPL,            email=rstrykow@pppl.gov, c=US            Date: 2015.07.29 08:11:34 -04'00'</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9417-****-3400	<b>Title:</b> Gas delivery system modifications (Job 3400)
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<b>WBS:</b> 1.3.4	<b>Control Account Manager (CAM):</b> W.Blanchard
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**Scope Description;**

**This WBS included engineering design, analysis, procurement activities, component fabrication, installation and test of up to four center stack fueling lines and modifications of the gas delivery assemblies. The relocation of racks, control equipment and external delivery system is covered under WBS 1.2.4.9.**

**Is all work scope for this control account complete per the control account plan?**

**Yes**     **No (Describe when the work will be completed)**

**Does the WBS dictionary accurately represent the work completed?**

**Yes**     **No (Describe additions and/or exclusions below)**

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	W.Blanchard	W. Blanchard <small>Digitally signed by W. Blanchard DN: cn=W. Blanchard, o=PPPL, ou=Engineering, email=wblanchard@pppl.gov, c=US Date: 2015.07.27 11:22:48 -0400'</small>	
<b>Responsible Line Manager (RLM)</b>	LDudek	 <small>Digitally signed by Lawrence E. Dudek Date: 2015.07.28 16:05:50 -04'00'</small>	
<b>Project Manager</b>	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o, ou=PPPL, email=rstrykow@pppl.gov, c=US Date: 2015.07.29 08:12:29 -04'00'</small>	



**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

**Control Account:** 9417-\*\*\*\*-4100

**Title:** Stack Upgrade Diagnostics (Job 4100)

**WBS:** 1.4.1

**Control Account Manager (CAM):** R. Kaita

**Scope Description;**

The Plasma Diagnostics provide information on discharge parameters to characterize NSTX plasmas and guide its operation for optimized performance. The diagnostic subsystems included in this WBS are; Magnetic measurement diagnostics, Current density profile diagnostics, Laser and microwave diagnostics, Visible and total radiation diagnostics, Ultra violet and x-ray diagnostics, Particle measurement diagnostics, Divertor diagnostics, and Plasma Edge and vacuum diagnostics.

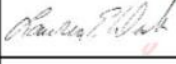
The NSTX Center Stack Upgrade required new magnetic diagnostics that were installed. This WBS element included the design and fabrication of Center Stack magnetic diagnostics which replaced units removed with the old Center Stack. Installation of these diagnostics is included in WBS element 1.1.3.3.4.

Is all work scope for this control account complete per the control account plan?

Yes     No (Describe when the work will be completed)

Does the WBS dictionary accurately represent the work completed?

Yes     No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
Control Account Manager (CAM)	R.Kaita	Robert Kaita <small>Digitally signed by Robert Kaita DN: cn=Robert Kaita, o=Princeton Plasma Physics Laboratory, ou=Princeton University, st=New Jersey, c=US, email=rkaita@pppl.gov Date: 2015.04.01 17:24 EDT</small>	
Responsible Line Manager (RLM)	L.Dudek	 <small>Digitally signed by Lawrence E. Dudek Date: 2015.04.02 10:19:29 -0400</small>	
Project Manager	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o=PPPL, email=rstryk@pppl.gov, ou=US Date: 2015.04.02 10:22:24 -0400</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9417-****-4500	<b>Title:</b> MPTS VV Modification Job 4500
<b>WBS:</b> 1.4.1	<b>Control Account Manager (CAM):</b> G. Labik

**Scope Description;**  
 The increased diameter of the Center Stack Upgrade required changes to the MPTS laser beam path, which required a new laser input vessel penetration, and plugging of the existing penetration, increasing the nozzle diameter of the L port to accommodate an external laser dump, furnishing a vacuum boundary for the extension tube. Modifications were made are to anticipate a third laser in the future and a new penetration for a FIDA diagnostic above and slightly offset from Bay L. The laser input location required a special design of the PF coil support column between Bays F and G.

**Is all work scope for this control account complete per the control account plan?**  
 **Yes**     **No (Describe when the work will be completed)**

**Does the WBS dictionary accurately represent the work completed?**  
 **Yes**     **No (Describe additions and/or exclusions below)**  
 The work scope expanded to include installing additional diagnostic vacuum interfaces :  
 1. Two ports for IR cameras to view the NB carbon tiles and the RF antennas.  
 2. Background CHERS and Future tangential views.  
 3. High K Scattering.  
 4. Fusion Products Probe.  
 5. FIRE TIP or other Tangential View.  
 6. 6 Wire vacuum feedthroughs for magnetics inside the vacuum vessel.  
 7. Rerouted the RWM coils for Bays JK and AL  
 8. Funded the impact of multi physics loading of vacuum vessel to design the Bay L upgrade using a combination of Ansys and Maxwell software. The combined software was used to design other vessel changes and additions .

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	G.Labik	George Labik <small>Digitally signed by George Labik DN: cn=George Labik, o, ou, email=glabik@pppl.gov, c=US Date: 2015.03.18 08:29:44 -0400'</small>	
<b>Responsible Line Manager (RLM)</b>	L.Dudek	 <small>Digitally signed by Lawrence E. Dudek Date: 2015.04.16 09:30:11 -0400'</small>	
<b>Project Manager</b>	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o, ou=PPPL, email=rstryko@pppl.gov, c=US Date: 2015.04.16 09:43:53 -0400'</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9417-****-5000	<b>Title:</b> NSTX Center Stack Upgrade Power Systems (Job 5000)
<b>WBS:</b> 1.5.1	<b>Control Account Manager (CAM):</b> S. Ramakrishnan

**Scope Description;**

**AC Power Systems:** The scope of the AC Power Systems was to provide the supply and distribution of all AC power to NSTX. This included all the experimental and auxiliary loads.

**AC/DC Converters:** The scope of the AC/DC Converters was to reactivate existing AC/DC Converters that have not been used since the shutdown of TFTR for use by NSTX.

**DC Systems:** The scope of the DC was to receive AC input power and deliver controlled DC output power to the NSTX coil systems. This included power cabling changes, DC Reactor changes, associated raceway changes, and changes required in the Power Cable Termination Structure (PCTS) inside the NSTX Test Cell.


**Power Systems Integration and Testing:** This WBS element covers general power systems activities including interaction with the designers of other WBS elements, design review support and procedure preparations as well as the administrative and supervisory efforts for the NSTX Power Systems.

**Is all work scope for this control account complete per the control account plan?**

Yes     No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**

Yes     No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	S. Ramakrishnan	S. Ramakrishnan <small>Digitally signed by S. Ramakrishnan DN: cn=S. Ramakrishnan, o=PPPL, ou=Engineering, email=ramak@pppl.gov, c=US Date: 2015.04.22 12:31:37 -04'00'</small>	04/10/15
<b>Responsible Line Manager (RLM)</b>	L. Dudek	 <small>Digitally signed by Lawrence E. Dudek Date: 2015.04.22 13:34:11 -04'00'</small>	
<b>Project Manager</b>	R. Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o, ou=PPPL, email=strykow@pppl.gov, c=US Date: 2015.07.22 10:12:01 -04'00'</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account: 9417-****-5200</b>	<b>Title: NSTX Digital Coil Protection System (Job 5200)</b>
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<b>WBS:1.5.2</b>	<b>Control Account Manager (CAM): T. Stevenson</b>
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**Scope Description;**

The scope of the Control and Protection System WBS element is to control and protect the power loop components for all magnet circuits. This includes the design of hardwired interlock system, kirk-keys, real time controls, the PC Link, Firing Generator, and Fault Detector changes, measurement of signals, changes to existing coil protection devices.


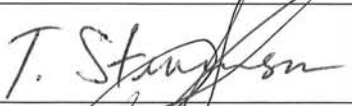

The scope of this job was to design, install, and test a new digital coil protection system (DCPS) on NSTXU.

**Is all work scope for this control account complete per the control account plan?**

Yes       No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**

Yes       No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	T.Stevenson		3/19/15
<b>Responsible Line Manager (RLM)</b>	T.Stevenson		3/19/15
<b>Project Manager</b>	R.Strykowski		3/19/15




**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9417-****-5501	<b>Title:</b> Coil Bus Runs (Job 5501)
<b>WBS:</b> 1.5.3	<b>Control Account Manager (CAM):</b> N. Atnafu


**Scope Description;**  
 This WBS element included the design and fabrication of the coil bus runs/supports between the NSTX coils and the FCPC cable terminations located in the NSTX test cell.

**Is all work scope for this control account complete per the control account plan?**  
 Yes     No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**  
 Yes     No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	N. Atnafu	Neway Atnafu  <small>Digitally signed by Neway Atnafu DN: cn=Neway Atnafu, o=Princeton Plasma Physics Lab, ou=PPPL, email=atnafu@pppl.gov, c=US Date: 2015.04.15 09:04:44 -0400'</small>	
<b>Responsible Line Manager (RLM)</b>	L. Dudek	 <small>Digitally signed by Lawrence E. Dudek Date: 2015.04.17 09:33:41 -0400'</small>	
<b>Project Manager</b>	R. Strykowski	Ron Strykowski  <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o= ou=PPPL, email=rstrykow@pppl.gov, c=US Date: 2015.04.21 09:04:54 -0400'</small>	



NSTX Upgrade Project			
Project Closeout Acknowledgement			
CD-4			
Control Account: 9417-****-6100		Title: Central I&C and Data Acquisition (Job 6100)	
WBS: 1.6		Control Account Manager (CAM): P.Sichta	
<p><b>Scope Description;</b></p> <p>This upgrade will be capable of producing plasmas on the order of 6.5 seconds; to-date they are less than two seconds. For dozens of CAMAC and PC-based data acquisition systems this will require an upgrade, and, in some cases, replacement. The real-time plasma control system was upgraded to accommodate additional input/output signals, control loops, and a longer control period. The networks and analysis pool computers were upgraded to achieve reasonable performance for time-sensitive functions. Some test cell racks were relocated; there was a modest effort required to route the control, timing, and communication cabling and qualify the systems.</p>			
<p>Is all work scope for this control account complete per the control account plan?</p> <p><input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No (Describe when the work will be completed)</p>			
<p>Does the WBS dictionary accurately represent the work completed?</p> <p><input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No (Describe additions and/or exclusions below)</p>			
Acknowledgements	Name	Signature	Date
Control Account Manager (CAM)	P.Sichta	Paul Sichta <small>Digitally signed by Paul Sichta DN: cn=Paul Sichta, o=PPPL, ou=PPPL, email=p.sichta@pppl.gov, c=US Date: 2015.07.28 07:33:00 -0400</small>	
Responsible Line Manager (RLM)	L. Dudek	 <small>Digitally signed by Lawrence E. Dudek Date: 2015.07.28 07:33:27 -04'00'</small>	
Project Manager	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o=PPPL, ou=PPPL, email=rstrykow@pppl.gov, c=US Date: 2015.07.28 07:46:18 -0400</small>	



**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account: 9417-****-7100</b>	<b>Title: Project Management and Integration (Job 7100)</b>
<b>WBS:1.7.1.1</b>	<b>Control Account Manager (CAM): R.Strykowski</b>

**Scope Description;**

**This WBS element includes overall management; a Project Manager, Deputy Project Manager, and Project Controls support to manage, monitor, integrate, control, and report on the progress on the NSTX Upgrade. Also included in this WBS element is System Engineering support and support for updating of the General Arrangement Drawings for the NSTX Test Cell as well as funds for independent reviewers as necessary.**

**Is all work scope for this control account complete per the control account plan?**

- Yes      **No (Describe when the work will be completed)**

Scope will be concluded upon;

1. Reconciliation of CD4 closeout review recommendations
2. Delivery of the final project closeout report
3. Final year end accounting adjustment verifications. Expected finish Sept 2015

**Does the WBS dictionary accurately represent the work completed?**

- Yes**      **No (Describe additions and/or exclusions below)**

<b>Acknowledgements</b>	<b>Name</b>	<b>Signature</b>	<b>Date</b>
<b>Control Account Manager (CAM)</b>	R.Strykowski		
<b>Responsible Line Manager (RLM)</b>	Mike Williams		
<b>Project Manager</b>	M. Williams		

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account: 9417-****-7200</b>	<b>Title: NSTX CSU Project Management (Job 7200)</b>
<b>WBS: 1.7.1.2</b>	<b>Control Account Manager (CAM): L.Dudek</b>

**Scope Description;**  
**Level of Effort job to cover the oversight of Center Stack Upgrade work which includes a Manager, Project Engineering support and support and to cover Center Stack engineer's time to prepare for and participate in project cost and schedule reviews.**

**Is all work scope for this control account complete per the control account plan?**  
 Yes      **No (Describe when the work will be completed)**

Scope will be concluded upon;

4. Reconciliation of CD4 closeout review recommendations
5. Delivery of the preliminary project closeout report

**Does the WBS dictionary accurately represent the work completed?**  
 Yes      **No (Describe additions and/or exclusions below)**

<b>Acknowledgements</b>	<b>Name</b>	<b>Signature</b>	<b>Date</b>
<b>Control Account Manager (CAM)</b>	L.Dudek		
<b>Responsible Line Manager (RLM)</b>	R.Strykowski		
<b>Project Manager</b>	R.Strykowski		

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**




<b>Control Account:</b> 9418-****-7300	<b>Title:</b> NBI Project Support & Integration (Job 7300)
<b>WBS:</b> 1.7.1.3	<b>Control Account Manager (CAM):</b> T. Stevenson

**Scope Description;**  
**Level of Effort job to cover the oversight of the 2nd Neutral Beam Upgrade work which includes a Manager, Engineering support and support and to cover Neutral Beam engineer's time to prepare for and participate in project cost and schedule reviews.**

**Is all work scope for this control account complete per the control account plan?**  
 Yes     No (Describe when the work will be completed)

Scope will be concluded upon;  
 1. Reconciliation of CD4 closeout review recommendations  
 2. Delivery of the preliminary project closeout report.

**Does the WBS dictionary accurately represent the work completed?**  
 Yes     No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	T.Stevenson		3/19/15
<b>Responsible Line Manager (RLM)</b>	R.Strykowski		3/19/15
<b>Project Manager</b>	R.Strykowski		3/19/15

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**


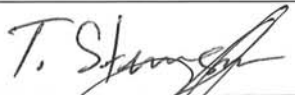

<b>Control Account:</b> 9418-****-7400	<b>Title:</b> Health Physics Technical Support (Job 7400)
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<b>WBS:</b> 1.7.1.4	<b>Control Account Manager (CAM):</b> T. Stevenson
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**Scope Description;**  
 This WBS element includes the effort necessary for continuous health physics (HP) support for the Neutral beamline decontamination, refurbishment, and relocation to the NTC as well as the HP support for equipment removal and relocations being accomplished under WBS 1.2.4.

**Is all work scope for this control account complete per the control account plan?**  
 Yes     No (Describe when the work will be completed)

**Does the WBS dictionary accurately represent the work completed?**  
 Yes     No (Describe additions and/or exclusions below)

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	T.Stevenson		3/19/15
<b>Responsible Line Manager (RLM)</b>	R.Strykowski		3/19/15
<b>Project Manager</b>	R.Strykowski		3/19/15

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

**Control Account: 9417-\*\*\*\*-7710**      **Title: NSTX Upgrade Direct Allocations (Job 7710)**

**WBS: 1.7.1.5**      **Control Account Manager (CAM): R.Strykowski**

**Scope Description;**

**This WBS element is a LOE overhead that includes the costs to cover Laboratory Engineering and Scientific Computing and Environmental Services that are allocated to all Laboratory projects based on their funding levels. Also included in this WBS element are the home office Health Physics efforts necessary to support the collection of radiological analyses of various environmental samples and bioassay samples, and the collection of analyses of data on the gamma radiation spectra of radioactive material at PPPL that are allocated to all Laboratory projects based on their usage of Health Physics staff.**

**Is all work scope for this control account complete per the control account plan?**




**Yes**       **No (Describe when the work will be completed)**

6. Work scope complete but final adjusted cost not available until end of fiscal year.

**Does the WBS dictionary accurately represent the work completed?**

**Yes**       **No (Describe additions and/or exclusions below)**

<b>Acknowledgements</b>	<b>Name</b>	<b>Signature</b>	<b>Date</b>
<b>Control Account Manager (CAM)</b>	R.Strykowski		
<b>Responsible Line Manager (RLM)</b>	R.Strykowski		
<b>Project Manager</b>	M. Williams		

NSTX Upgrade Project			
Project Closeout Acknowledgement			
CD-4			
Control Account: 9417-****-7900		Title: Integrated Systems Test (Job 7900)	
WBS: 1.7.3		Control Account Manager (CAM): C.Gentile	
<p><b>Scope Description;</b></p> <p>The WBS element includes Convening the NSTX Activity Certification Committee (ACC) for comprehensive review the upgrades. Prepare and make presentation to the PPPL ES&amp;H Executive Safety Board for issuance of appropriate Safety Certificate parameters for operation of NSTX with new enhanced operating capabilities; preparation of documentation (procedures) for safely integrating the upgrades for operations within NSTX safe operating parameters; working with NSTX Operations Group for the successful integration of the upgrades.</p>			
<p><b>Is all work scope for this control account complete per the control account plan?</b></p> <p><input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No (Describe when the work will be completed)</p>			
<p><b>Does the WBS dictionary accurately represent the work completed?</b></p> <p><input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No (Describe additions and/or exclusions below)</p>			
Acknowledgements	Name	Signature	Date
Control Account Manager (CAM)	C.Gentile	Charles A. Gentile 	Digitally signed by Charles A. Gentile DN: cn=Charles A. Gentile, o=PPPL, email=cgentile@pppl.gov, c=US Date: 2015.08.11 13:48:44 -0400'
Responsible Line Manager (RLM)	A.vonHalle	Alfred von Halle 	Digitally signed by Alfred von Halle DN: cn=Alfred von Halle, o=PPPL, email=acvonhalle@pppl.gov, c=US Date: 2015.08.11 13:03:03 -0500'
Project Manager	R.Strykowski	Ron Strykowski 	Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o=PPPL, email=rstrykow@pppl.gov, c=US Date: 2015.08.12 08:14:07 -0400'



**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9417-****-8200	<b>Title:</b> Installation of the Coil Support System (Job 8200 TASKS)
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<b>WBS:</b> 1.8.2	<b>Control Account Manager (CAM):</b> E. Perry
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**Scope Description;**

**Torus Assembly and construction. Includes the assembly and installation of the NSTX torus, coils systems and all associated supports including construction management. This WBS element includes removal of equipment for clearance and accessibility, moving existing coils, modifying existing supports mounted on the vacuum vessel and installing a new external coil support structure.**

**Is all work scope for this control account complete per the control account plan?**

**Yes**       **No (Describe when the work will be completed)**

**Does the WBS dictionary accurately represent the work completed?**

**Yes**       **No (Describe additions and/or exclusions below)**

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	E.Perry	Erik D. Perry <small>Digitally signed by Erik D. Perry DN: cn=Erik D. Perry, o. ou, email=eperry@pppl.gov, c=US Date: 2015.05.06 10:20:38 -04'00'</small>	
<b>Responsible Line Manager (RLM)</b>	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o, ou=PPPL, email=rstrykow@pppl.gov, c=US Date: 2015.07.22 10:07:31 -04'00'</small>	
<b>Project Manager</b>	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o, ou=PPPL, email=rstrykow@pppl.gov, c=US Date: 2015.07.22 10:07:50 -04'00'</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9417-****-8210	<b>Title:</b> Installation of the Coil Support System (Job 8210 LOE)
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<b>WBS:</b> 1.8.2	<b>Control Account Manager (CAM):</b> E. Perry
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**Scope Description;**

**Field supervision and oversight for Torus Assembly and construction. Includes the assembly and installation of the NSTX torus, coils systems and all associated supports including construction management. This WBS element includes removal of equipment for clearance and accessibility, moving existing coils, modifying existing supports mounted on the vacuum vessel and installing a new external coil support structure.**

**Is all work scope for this control account complete per the control account plan?**

**Yes**       **No (Describe when the work will be completed)**

**Does the WBS dictionary accurately represent the work completed?**

**Yes**       **No (Describe additions and/or exclusions below)**

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	E.Perry	Erik D. Perry <small>Digitally signed by Erik D. Perry DN: cn=Erik D. Perry, o, ou, email=eperry@pppl.gov, c=US Date: 2015.05.06 10:21:10 -0400</small>	
<b>Responsible Line Manager (RLM)</b>	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o, ou=PPPL, email=rstrykow@pppl.gov, c=US Date: 2015.07.22 10:06:58 -0400</small>	
<b>Project Manager</b>	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o, ou=PPPL, email=rstrykow@pppl.gov, c=US Date: 2015.07.22 10:07:07 -0400</small>	

**NSTX Upgrade Project  
Project Closeout Acknowledgement  
CD-4**

<b>Control Account:</b> 9417-****-8250	<b>Title:</b> CS Removal&Re-Install/Pumpdown/Bakeout (Job 8250)
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<b>WBS:</b> 1.8.2	<b>Control Account Manager (CAM):</b> E. Perry
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**Scope Description;**

Included in this WBS element is the removal of the existing Center Stack and installation of the NSTX Upgraded Center Stack, followed by closing up the vacuum vessel, pumping down, leak checking, bakeout and machine area scrubs to be ready for Integrated System Testing.

**Is all work scope for this control account complete per the control account plan?**

**Yes**       **No (Describe when the work will be completed)**

**Does the WBS dictionary accurately represent the work completed?**

**Yes**       **No (Describe additions and/or exclusions below)**

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	E.Perry	Erik D. Perry <small>Digitally signed by Erik D. Perry DN: cn=Erik D. Perry, o, ou, email=eperry@pppl.gov, c=US Date: 2015.05.08 10:21:45 -0400'</small>	
<b>Responsible Line Manager (RLM)</b>	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o, ou=PPPL, email=rstrykow@pppl.gov, c=US Date: 2015.07.22 10:05:31 -0400'</small>	
<b>Project Manager</b>	R.Strykowski	Ron Strykowski <small>Digitally signed by Ron Strykowski DN: cn=Ron Strykowski, o, ou=PPPL, email=rstrykow@pppl.gov, c=US Date: 2015.07.22 10:05:40 -0400'</small>	

**NSTX Upgrade Project**  
**Project Closeout Acknowledgement**  
**CD-4**

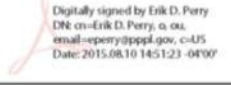


<b>Control Account:</b> 9417-****-8251	<b>Title:</b> CS OH fault repairs (Job 8251)
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<b>WBS:</b> 1.8.2	<b>Control Account Manager (CAM):</b> E.Perry
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**Scope Description;**  
Included in this WBS element are the cost associated with the NSTXU arc fault repairs that are necessary to support CD-4.

**Is all work scope for this control account complete per the control account plan?**  
 **Yes**     **No (Describe when the work will be completed)**

**Does the WBS dictionary accurately represent the work completed?**  
 **Yes**     **No (Describe additions and/or exclusions below)**

Acknowledgements	Name	Signature	Date
<b>Control Account Manager (CAM)</b>	E.Perry	Erik D. Perry  <small>Digitally signed by Erik D. Perry  DN: cn=Erik D. Perry, o.ou,  email=eperry@pppl.gov, c=US  Date: 2015.08.10 14:51:23 -0400'</small>	
<b>Responsible Line Manager (RLM)</b>	R.Strykowski	Ron Strykowski  <small>Digitally signed by Ron Strykowski  DN: cn=Ron Strykowski, o.ou=PPPL,  email=rstrykow@pppl.gov, c=US  Date: 2015.08.10 15:13:48 -0400'</small>	
<b>Project Manager</b>	R.Strykowski	Ron Strykowski  <small>Digitally signed by Ron Strykowski  DN: cn=Ron Strykowski, o.ou=PPPL,  email=rstrykow@pppl.gov, c=US  Date: 2015.08.10 15:13:48 -0400'</small>	