

Work Authorization Document

NSTX Upgrade Project

Control Account #:	7400	Title:	Health Physics Support
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WBS	1.7.1.4	Title:	Project Support and Integration
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Period of Performance: 01 October 2009 through 30 September 2014

Authorized Budget:	\$2,507	Control Account Manager:	Stevenson
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Revision #:	0	Revision Date:	July-11
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Authorized Work 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.

Attachments:

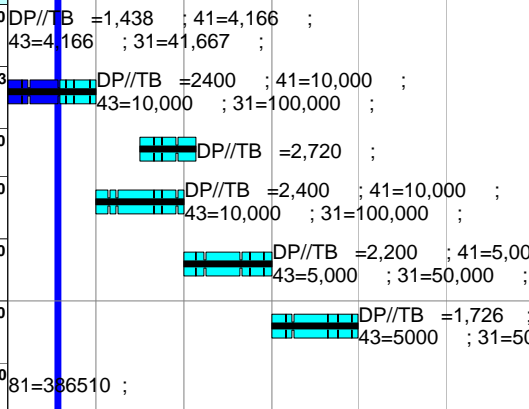
- 1- A detailed Control Account schedule showing all work packages and planning packages.
- 2- Budgeted Cost by month.
- 3- Original Work Authorization Form (WAF)
- 4- WBS Dictionary sheet that defines the scope of work for this WBS element.

Control Account History

ECP#	Implement Date	Prior Budget	New Budget	Signature

Approvals	Name	Signature	Date
NSTX-U Project Manager	R. Strykowski		
Control Account Manager	Stevenson		
Functional Manager	M. Williams		

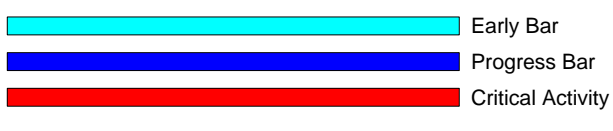
Activity ID	Activity Description	Work Days	BASELINE START	Forecast Start	BASELINE FINISH	Forecast Finish	Schedule Slip (Days)	Total Float	Budgeted Cost	PPCT	Earned value cost (BCWP)	Planned value cost (BCWS)	FY11	FY12	FY13	FY14	FY15	FY16
NSTX Upgrade Project																		
Subtotal		1,244	01OCT09A	01OCT09A	30SEP14	30SEP14	0	1,487	2,507,123.78		679,122.59	677,076.33						
Job: 7400 - Health Physics Support-STEVENSON																		
Subtotal		1,244	01OCT09A	01OCT09A	30SEP14	30SEP14	0	1,487	2,507,123.78		679,122.59	677,076.33						
740000100	FY2010 NBI Decon HP Technical Support	106*	03MAY10A	03MAY10A	30SEP10A	30SEP10A	0		0.00	100	0.00	0.00						
740000110	FY2011 NBI Decon HP Technical Support	250*	04OCT10*	01OCT10A	03OCT11	30SEP11	1	1,735	511,400.00	LOE	292,612.59	290,566.33						
740000115	FY2011 EQ Removal & Relocation HP Technical Supp	165	02APR12*	02APR12*	21NOV12	21NOV12	0	458	368,652.64		0.00	0.00						
740000120	FY2012 NBI Decon HP Technical Support	249	04OCT11*	03OCT11*	01OCT12	28SEP12	1	1,735	551,512.00		0.00	0.00						
740000125	FY2013 NBI Decon HP Technical Support	248	02OCT12	01OCT12	01OCT13	30SEP13	1	1,735	419,184.00		0.00	0.00						
740000130	FY2014 NBI Decon HP Technical Support	248	01OCT13*	01OCT13*	30SEP14	30SEP14	0	1,487	269,865.14		0.00	0.00						
FY107400	FY10 Actual Cost	260	01OCT09A	01OCT09A	30SEP10A	30SEP10A	0		386,510.00	100	386,510.00	386,510.00						



Data Date 30APR11 1105
 Run Date 20MAY11 11:04
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NSTX UPGRADES
 RESOURCE LOADED SCHEDULE
 CD-2 Schedule
 April 2011

Sheet 1 of 1



7400 Health Physics Support (Stevenson)	31JAN2011	28FEB2011	31MAR2011	30APR2011	31MAY2011	30JUN2011	31JUL2011	31AUG2011	30SEP2011	31OCT2011	30NOV2011	31DEC2011
BCWS	43	41	47	43	43	45	43	47	45	45	47	47
CUM BCWS	545	585	632	675	717	762	805	851	896	940	987	1,034
BCWP	43	41	47	43	0	0	0	0	0	0	0	0
CUM BCWP	545	585	632	675	675	675	675	675	675	675	675	675
ACWP	5	7	7	9	0	0	0	0	0	0	0	0
CUM ACWP	421	428	435	445	445	445	445	445	445	445	445	445
CV	123	157	197	230	230	230	230	230	230	230	230	230
SV	.	.	.	.	-43.	-87.	-130.	-177.	-221.	-266.	-312.	-359.
CPI	1.29	1.37	1.45	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52
SPI	1	1	1	1	0.94	0.89	0.84	0.79	0.75	0.72	0.68	0.65

7400 Health Physics Support (Stevenson)	31JAN2012	29FEB2012	31MAR2012	30APR2012	31MAY2012	30JUN2012	31JUL2012	31AUG2012	30SEP2012	31OCT2012	30NOV2012	31DEC2012
BCWS	47	45	47	90	99	90	95	99	86	89	69	34
CUM BCWS	1,080	1,125	1,172	1,262	1,361	1,452	1,546	1,645	1,731	1,820	1,889	1,923
BCWP	0	0	0	0	0	0	0	0	0	0	0	0
CUM BCWP	675	675	675	675	675	675	675	675	675	675	675	675
ACWP	0	0	0	0	0	0	0	0	0	0	0	0
CUM ACWP	445	445	445	445	445	445	445	445	445	445	445	445
CV	230	230	230	230	230	230	230	230	230	230	230	230
SV	-406.	-450.	-497.	-587.	-686.	-777.	-872.	-971.	-1057.	-1145.	-1214.	-1248.
CPI	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52
SPI	0.62	0.6	0.58	0.53	0.5	0.46	0.44	0.41	0.39	0.37	0.36	0.35

7400 Health Physics Support (Stevenson)	31JAN2013	28FEB2013	31MAR2013	30APR2013	31MAY2013	30JUN2013	31JUL2013	31AUG2013	30SEP2013	31OCT2013	30NOV2013	31DEC2013
BCWS	37	32	34	35	37	32	37	35	34	25	22	23
CUM BCWS	1,960	1,992	2,025	2,061	2,098	2,130	2,167	2,202	2,236	2,261	2,283	2,306
BCWP	0	0	0	0	0	0	0	0	0	0	0	0
CUM BCWP	675	675	675	675	675	675	675	675	675	675	675	675
ACWP	0	0	0	0	0	0	0	0	0	0	0	0
CUM ACWP	445	445	445	445	445	445	445	445	445	445	445	445
CV	230	230	230	230	230	230	230	230	230	230	230	230
SV	-1285.	-1317.	-1351.	-1386.	-1423.	-1455.	-1492.	-1527.	-1561.	-1587.	-1608.	-1631.
CPI	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52
SPI	0.34	0.34	0.33	0.33	0.32	0.32	0.31	0.31	0.3	0.3	0.3	0.29

Annex I – WBS Dictionary

This Work Breakdown Structure (WBS) organizes and defines the scope of the NSTX Upgrade using the WBS as established by the original NSTX project and modified to accommodate the NSTX Upgrade.

<u>WBS</u>			
<u>L1</u>	<u>L2</u>	<u>L3</u>	<u>Description</u>
1			NSTX UPGRADE PROJECT
	1.1		Torus Systems
		1.1.0	Project Integrated Model
		1.1.1	Plasma Facing Components
		1.1.2	Vacuum Vessel and Support Structure
		1.1.3	Magnet Systems
	1.2		Plasma Heating and Current Drive Systems
		1.2.1	High Harmonic Fast Wave (HHFW)
		1.2.2	Coaxial Helicity Injection (CHI) Current Drive
		1.2.3	Electron Cyclotron Heating (ECH)
		1.2.4	Neutral Beam Injection (NBI)
	1.3		Auxiliary Systems
		1.3.1	Vacuum Pumping System
		1.3.2	Coolant Systems
		1.3.3	Bakeout Heating System
		1.3.4	Gas Delivery System
		1.3.5	Glow Discharge Cleaning System
	1.4		Plasma Diagnostics
		1.4.1	Plasma Diagnostics
	1.5		Power Systems
		1.5.1	AC Power Systems
		1.5.2	AC/DC Converters
		1.5.3	DC Systems
		1.5.4	Control and Protection System
		1.5.5	General Power Systems and Integration
	1.6		Central Instrumentation and Controls (I&C)
		1.6.1	Control System
		1.6.2	Data Acquisition System
	1.7		Project Support & Integration
		1.7.1	Project Management and Integration
		1.7.2	Project Physics
		1.7.3	Integrated Systems Tests
	1.8		Site Preparation and Assembly
		1.8.1	Site Preparation
		1.8.2	Torus Assembly and Construction

Annex I – WBS Dictionary

cover Neutral Beam engineer's time to prepare for and participate in project cost and schedule reviews.

{NBI Project Support & Integration (Job 7300)}

WBS Element: 1.7.1.4

WBS Level: 4

WBS Title: Health Physics Support

Definition: 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.

{Health Physics Technical Support (Job 7400)}

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.

{NSTX Upgrade Health Physics Allocations (Job 7700)}

WBS Element: 1.7.1.5

WBS Level: 4

WBS Title: Direct Allocations (Job 7710)

Definition: This WBS element 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.

{NSTX Upgrade Direct Allocations (Job 7710)}

WBS Element: 1.7.2

WBS Level: 3

WBS Title: Project Physics

Definition: Project Physics includes the definition of requirements necessary to meet the overall NSTX mission and supporting objectives, physics analysis supporting the project's design and construction activities, and definition of R&D needs. In addition it includes the provision of hardware and software required for plasma control.

Project Physics is not included in the scope of the Upgrade Project.

WBS Element: 1.7.3

WBS Level: 3

WBS Title: Integrated Systems Tests

Definition: This element includes all of the activities associated with the support of development of all necessary procedures and documents to support the integrated tests, and to support performance of the pre-operational integrated system tests culminating in first plasma.

The WBS element includes Convening the NSTX Activity Certification Committee (ACC) for comprehensive review the upgrades. Prepare and make presentation to the PPPL ES&H Executive Safety Board for

Work Approval Form (WAF)

Cost Center: 9418
Job Number: 7400
Job Title: Health Physics Technical Support
Job Manager: Tim Stevenson


Description:

Decon, BL refurbishment, BL relocation require continuous HP support. This job covers time for two HPs, overtime, and minor sundries for HP ops for FY 10,11,12. Two HPs are required to cover surveys, regulatory compliance documentation, procedures, and RWPs. Two HPs are required during every decon evolution where one individual is suited up in PCs inside the RWP area and one is outside providing support and running smears. HP is also required to process cleaned items for release. FY09 Decon Ops experience has demonstrated the need for 2 HPs. Equipment Removal/Relocation (Job 2490) requires one HP support during the removal of equipment.


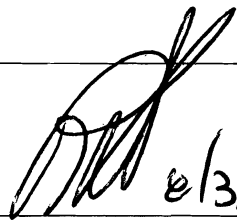
Schedule:

Refer to Primavera Data-Base

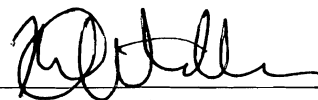
Approvals:

 7/20/10

Job Manager

 7/20/10  8/3/10

Project Manager

 8/3/10

Engineering Department Head

Cost Center:	9418																					
Job Number:	7400																					
##	9418	Health Physics Technical Support																				
Job Manager:	Tim Stevenson																					
<u>Uncertainty of the Estimate</u>																						
		High	Medium	Low	Uncertainty Range (%)																	
	Design Maturity	X																				
	Design Complexity			X																		
	<u>Residual Impacts</u>																					
	Risk Description				Likelihood of Occurring	Mitigation Plan	Basis of estimate	Cost Impact Low (\$K) High (\$K)	Schedule Impact Low High (Weeks)													
1	unplanned overtime						add'l 10%	35														
2																						
3																						
4										strykowsky estimates												
5																						
	<u>Notes:</u>																					
(1)	Cost impacts should NOT include standing army costs which are separately calculated from the schedule impact																					
(2)	The schedule impacts should be entered as the min and max impacts on the critical path. if there is no critical path impact then the schedule entries should be zero.																					
(3)	Likelihood of occurrence should be entered consistent with our risk classification methodology. i.e. VL= Very Likely (P>80%), L=Likely (80%>P>40%), U=Unlikely (40%>P>10%), VU=Very Unlikely (P<10%), NC=Non-credible (P<1%)																					
	<u>Comments/Other Considerations</u>																					

Design Maturity		Design Complexity			Design Maturity Definition			
		Low	Medium	High				
Low	-15%	+25%	-20%	+40%	-30%	+60%	High	Final design available. All design features/requirements well known. No further design development or evolution expected that will impact estimate.
Medium	-10%	+15%	-15%	+25%	-20%	+40%		
High	-5%	+10%	-10%	+15%	-15%	+25%		
Medium		Preliminary design available. Some additional design evolution likely. Further developments can be somewhat expected or anticipated and reflected in estimate.			Medium	No better than conceptual design basis currently available. Design details, procedures, etc. still need much development and evolution of requirements beyond estimate basis is likely and expected.		
Low		No better than conceptual design basis currently available. Design details, procedures, etc. still need much development and evolution of requirements beyond estimate basis is likely and expected.						
Design Complexity		Design Maturity			Design Complexity Definition			
		Low	Medium	High				
Low					Low	Work is fairly well understood -- either standard construction or repetition of activities performed in past. Little likelihood of estimate not being well understood and requirements not being well defined.		
Medium								
High								
Medium		More complex work requirements that have potential to impact cost and schedule estimates. Limited experience performing similar tasks, so ability to estimate accurately is somewhat suspect			Medium	Extremely challenging tasks and/or requirements. Unique or first-of-a-kind assembly or work tasks. No good basis for estimating work exists so there is a high degree of estimate uncertainty. Based on standard industry and DOE estimate classifications (Per AACEI Recommendation		
High		Extremely challenging tasks and/or requirements. Unique or first-of-a-kind assembly or work tasks. No good basis for estimating work exists so there is a high degree of estimate uncertainty. Based on standard industry and DOE estimate classifications (Per AACEI Recommendation						

