		N	ork Authorization Docum	nent	
			NSTX Upgrade Project		
Control Account #:	2430	Title:	2nd NBI Decontamination		
WBS	1.2.4	Title:	NB Injection		
Period of Perfor	mance:	23 February 2009	through 30 September 2010		
Authorized Bud	get:	\$2,057	Control Account Manager:	Stevenson	
Revision #:	0		Revision Date:	CLOSED	
This WBS elemen refurbishment and	nt includes the	e disassembly and NSTX upgrade.	decontamination activities of a TFTR Ne	eutral Beam bean	nline in preparation for beamline
2- Budgeted Co 3- Original Wor	ost by month. k Authorizatio	n Form (WAF)	g all work packages and planning packages of work for this WBS element.	jes.	
	[Control Account History		
ECP#	Implement Date	Prior Budget	New Budget		Signature
Approv	vals	Name	Signature		Date
NSTX-U Projec		R. Strykowsky			
Control Accour		Stevenson			
Functional N	lanager	A. vonHalle			

	Activity	Activity	Work BASELINE	Forecast	BASELINE	Forecast	Schedule T	Fotal	Budgeted	РРСТ		Planned value					
	ID	Description	Days START	Start	FINISH	Finish	Slip (Days) F	loat	Cost		cost (BCWP)	cost (BCWS)	FY1	1 FY12	FY13	FY14 FY15	FY16
Г		Jpgrade Project															
Su	total		427 23FEB09A	23FEB09A	30SEP10A	290CT10A	0		2,057,049.65	100	,057,049.65	2,057,049.65	7				
													′ I				
	Job: 243	0 - 2nd NBI Decontamina	ation-STE	/ENSON													
-	Subtotal		427 23FEB09A	23FEB09A	30SEP10A	290CT10A	0		2,057,049.65	100	057,049.65	2,057,049.65	7				
													′ I				
	24300230	Decon Calorimeter	30 01OCT09A	01OCT09A	11NOV09A	11NOV09A	0		0.00	100	0.00	0.00					
	24300240	Decon Ion Dump	42 03MAY10A	03MAY10A	30JUN10A	30JUN10A	0		0.00	100	0.00	0.00					
	24000240				COUCHICA	00001110/1			0.00		0.00	0.00					
	24300260	Decon Bending Magnet	25 26MAY10A	26MAY10A	30JUN10A	30JUN10A	0		0.00	100	0.00	0.00					
	24300280	Decon 90 inch flange & neutralizer	63 03MAY10A	03MAY10A	30JUL10A	30JUL10A	0		0.00	100	0.00	0.00					
	24300200	Decon so men hange a neutralizer	05 05 04 104	USINATION	JUJUEIUA	JUJUEIUA			0.00	100	0.00						
	24300300	Decon Exit Spool Piece	36* 01SEP10A	01SEP10A	30SEP10A	30SEP10A	0		97,606.20	100	97,606.20	97,606.20	EE//S	M =160 ;	EE//TB =	=800 :	
	24300310	Decon BL Lid	9 18JUN10A	18JUN10A	30JUN10A	30JUN10A	0		0.00	100	0.00	0.00	_				
	24300310		STOSONIOA		SUSCINICA	JUJUNIOA			0.00	100	0.00	0.00					
	24300370	Decon BL Box	11 13AUG10A	13AUG10A	27AUG10A	27AUG10A	0		0.00	100	0.00	0.00					
	24300380	Decon BL exterior & accoutrements	49* 13AUG10A	124116104	30SEP10A	30SEP10A	0		68,755.45	100	68,755.45	69 755 45					
	24300380	Decon BE exterior & accourtements	49 13400104	ISAUGIUA	JUSEFIUA	JUSEF IUA	0		68,755.45	100	68,755.45	00,755.45	EE//SI	M =120 ;	EE//TB =	=600 ;	
	24300390	Decon Program Evaluation/Operation Impact Report	10 01SEP10A	01SEP10A	30SEP10A	30SEP10A	0		0.00	100	0.00	0.00	ЕМ//∎	M =240 ;			
	24300399	DECON COMPLETE	0		210CT10A	210CT10A	0		0.00	100	0.00	0.00	_	,			
	24300399	DECON COMPLETE	U		21001104	21001104	U		0.00	100	0.00	0.00	7				
	24300400	Decon Procurement Support - Material &	121* 03MAY10A	03MAY10A	30SEP10A	30SEP10A	0		92,040.00	100	92,040.00	92,040.00	11=52	000 · 43=	26,000		
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	FY092430	FY09 Actual Cost	22* 23FEB09A	23FEB09A	30SEP09A	30SEP09A	0		1,238,513.00	100	238,513.00	1,238,513.00					
	FY102430	FY10 Actual Cost	143 01OCT09A	01OCT09A	30SEP10A	30SEP10A	0		542,135.00	100	542,135.00	542,135.00					
	FY112430	FY10 Actual Cost	143 010CT10A	010CT10A	29OCT10A	29OCT10A	0		18,000.00	100	18,000.00	18,000.00					
		1		1	I	1									1		

Data Date Run Date	30APR11 20MAY11 10:54	NSTX UPGRADES Sheet 1 of 1 RESOURCE LOADED SCHEDULE CD-2 Schedule	Early Bar Progress Bar
	© Primavera Systems, Inc.	April 2011	Critical Activity

2430 2nd NBI Decontamination (Stevenson)	START	28FEB2009	31MAR2009	30APR2009	31MAY2009	30JUN2009	31JUL2009	31AUG2009	30SEP2009	31OCT2009	30NOV2009	31DEC2009
BCWS	0	40	176	176	160	176	176	168	168	48	41	37
CUM BCWS	0	40	216	392	551	727	903	1,071	1,239	1,286	1,328	1,365
BCWP	0	0	0	0	0	0	0	0	0	0	0	0
CUM BCWP	0	0	0	0	0	0	0	0	0	0	0	0
ACWP	0	0	0	0	0	0	0	0	0	0	0	0
CUM ACWP	0	0	0	0	0	0	0	0	0	0	0	0
CV	0	0	0	0	0	0	0	0	0	0	0	0
SV		-40.	-216.	-392.	-551.	-727.	-903.	-1071.	-1239.	-1286.	-1328.	-1365.
CPI	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SPI	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

30 2nd NBI Decontamination (Stevenson)	31JAN2010	28FEB2010	31MAR2010	30APR2010	31MAY2010	30JUN2010	31JUL2010	31AUG2010	30SEP2010	31OCT2010	30NOV2010	31DEC2010
BCWS	44	44	50	48	61	67	64	93	204	18	0	0
CUM BCWS	1,408	1,452	1,502	1,550	1,611	1,678	1,742	1,835	2,039	2,057	2,057	2,057
BCWP	0	0	0	0	0	0	0	0	0	0	0	2,057
CUM BCWP	0	0	0	0	0	0	0	0	0	0	0	2,057
ACWP	0	0	0	0	0	0	0	0	0	0	0	2,070
CUM ACWP	0	0	0	0	0	0	0	0	0	0	0	2,070
CV	0	0	0	0	0	0	0	0	0	0	0	-13
SV	-1408.	-1452.	-1502.	-1550.	-1611.	-1678.	-1742.	-1835.	-2039.	-2057.	-2057.	
CPI	N/A	.99										
SPI	N/A	1										

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> 1	<u>L2</u>	<u>L3</u>	Description NSTX UPGRADE PROJECT
	1.1	1.1.0 1.1.1 1.1.2 1.1.3	Plasma Facing Components Vacuum Vessel and Support Structure
	1.2	1.2.1 1.2.2 1.2.3 1.2.4	
	1.3	1.3.1 1.3.2 1.3.3 1.3.4 1.3.5	Bakeout Heating System Gas Delivery System
	1.4	1.4.1	Plasma Diagnostics Plasma Diagnostics
	1.5	1.5.1 1.5.2 1.5.3 1.5.4 1.5.5	AC/DC Converters DC Systems Control and Protection System
	1.6	1.6.1 1.6.2	Central Instrumentation and Controls (I&C) Control System Data Acquisition System
	1.7	1.7.1 1.7.2 1.7.3	Project Support & Integration Project Management and Integration Project Physics Integrated Systems Tests
	1.8	1.8.1 1.8.2	Site Preparation and Assembly Site Preparation Torus Assembly and Construction

thermal loading. Disruption loads on the ECH waveguide will be evaluated for the Center Stack Upgrade Fields and field transients. Discussions with heating system experts regarding the performance of the ECH system for the higher Center Stack Upgrade fields indicate that no modification to the resonant frequency or other operational characteristic for the system will require upgrade. Only disruption qualification is planned. No previous qualification has been identified, so the resources include creation of a new calculation – not a review of an existing calculation as is the case for ICRH.

{Electron Cyclotron Heating (Job 2300)}

WBS Element: 1.2.4

WBS Title: Neutral Beam Injection (NBI)

Definition: The Neutral Beam Injection System Upgrade provides a second Neutral Beam as part of the NSTX Upgrade Project. The second NBI is identical to the one already installed on NSTX. An existing TFTR beam will be decontaminated, refurbished, and installed on NSTX. This WBS element includes the NBI source refurbishment; the TFTR beamline decontamination, refurbishment and relocation to the NSTX Test Cell; the 2nd NBI Services; the NBI armor modifications; the 2nd NBI Power, Controls and Instrumentation; the 2nd NBI Duct and vacuum vessel modifications; and the NSTX Test Cell equipment removals and relocations necessary to accommodate the 2nd NBI are included in WBS element 1.3. NBI Management and Health Physics support are included in element WBS 1.7.

WBS Element: 1.2.4.2

WBS Title: NBI Source Refurbishment

Definition: This WBS element includes the activities to refurbish three neutral beam ion sources for the 2^{nd} Neutral beamline, as currently being performed for the installed Neutral beamline 1. <u>{Source Refurbishment (Job 2420)}</u>

WBS Element: 1.2.4.3

WBS Title: NSTX Beamline 2 Decontamination

Definition: This WBS element includes the disassembly and decontamination activities of a TFTR Neutral Beam beamline in preparation for beamline refurbishment and reuse as an NSTX upgrade. {NSTX Beamline 2 Decontamination (Job 2430)}

WBS Element: 1.2.4.4

WBS Title: NBI Beamline Refurbishment and Relocation

Definition: This WBS element includes 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 includes

Annex I - 8

WBS Level: 4

WBS Level: 4

WBS Level: 4

WBS Level: 3

Work Approval Form (WAF)

Cost Center:	9418
Job Number:	2430
Job Title:	NSTX Beamline 2 Decontamination
Job Manager:	Tim Stevenson

Description:

This job includes disassembly and decontamination activities of a TFTR Neutral Beam beamline in preparation for beamline refurbishment and reuse as an NSTX upgrade. Job includes a Peer Review to assess results. (Held 4/21/10). Job also includes post- Peer Review decon on targeted areas of box, lid, dump, and calorimeter. Dump, source platform and calorimeter will be disassembled such that obscurred areas can receive decon attention. Primary Decon slated to conclude end of June 2010.

:chedule

Refer to Primavera Data-Base

Approvals:

7/20/10 Job Manager

Project Manager

Engineering Department Head

<u>el310</u>0

	Jer:	2430		_			1		_			_	-	_	-	-		_
Job Title:		VSTX Bea	mline 2 D	NSTX Beamline 2 Decontamination	-							_						
dob	Job Manager:	Tim Stevenson	nosn		の言語ない	100				Estim	Estimate (user input)	r input)			_	Ц		
				SCHEDULE			F	FY10\$K			HOI	HOURS (priced at FY10 rates)	ed at FY	0 rates)		Î		
<u>US</u>	USER INPUT TASKS AND DESCRIPTIONS	ONS		USER INPUT		1	a see a	State of the state	40. 100	20 10 10 10	1918° -	111 - 28		sulus.				
	TASK DESCRIPTION	Resp	Duration in WORK DAYS	Logical Pre- requisites (one task numbers in each column ,any order)	User Input Start Date (optional)	actual= A	(17) SBW	СНЕDIT САRD (43) ОТНЕR (39)	(35) (35) (15) ЭМТРАУС	EA** EM (analysis engr) EA** (Designer) EA** (computing	Tech) EC** 18 (Computing Ec** 58 (Computing Ent) Ec** 58 (computing	19cy) EE++ SW (Seulor Elech EE++ EW (Elch Euði)	(45eT 15eH) 82 **33	EE** T8 (Electr Tech)	EM** SM Serior Tech)	5 Db 28\18 (Hb 1004) EW 18 (EO&W 1004)	tt Names of req'd skills if known	Basis of Estimate mn Category
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	Decon Calorimeter		30		10/1/09							240	1,200	8		10-15%	Crew of 5 NB Techs with 5% Supervisor	2-Experience
	Decon Ion Dump		30									240		1,200		10-15%	Crew of 5 NB Techs with Supervisor	2-Experience
	Decon Bending Magnet		30								-	240		1,200		10-15%	Crew of 5 NB Techs with 5% Supervisor	2-Experience
	Decon 90 inch flange and neutralizer		30									240		1,200		10-15%	Crew of 5 NB Techs with Supervisor	2-Experience
	Decon exit spool piece		20									160		800		10-15%	Crew of 5 NB Techs with 5% Supervisor	2-Experience
	Decon BL Lid		45									360		1,800		10-15%	Crew of 5 NB Techs with Swpervisor	2-Experience
	Decon BL Box		45									360		1,800		10-15%	Crew of 5 NB Techs with 5% Supervisor	2-Experience
	Decon BL exterior and accoutrements		15									120		600		10-15%	Crew of 5 NB Techs with 5% Supervisor	2-Experience
	Decon Program Evaluation / Operation impact Report	ct Report	10					610						240		10-15%	5% 600 Tab D	2-Experience
	Radiation PCs, boots, gloves, masks, etc.						\$25	216								10-15%		2-Experience
	B-25 special sizes						\$25									10-15%		2-Engineering Judgement
	Decon supplies & consumables							\$12	-	+		_		-	-	10-15%	5% See Tab-D	2-Experience
	Post-Peer Review Decon (Box, Lid, Dump, Cal) Area maintenance Note: HP & ERWM coverage not included in this job.	(al) this job.	100		4/21/10		8	8				320		25		10-15%	5%	2-Experience 2-Experience
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	Subcontracts (non construction)				8		78.00		4 - Previo	4 - Previous PPPL/ORNL Experieince (e.g., TFTR, NSTX, PLT, etc.)	VL Experie	nce (e.g.,	FFTR, NS'	X, PLT, et	7			
	Construction subcontracts				л			+	5 - Proton 6 - Catelo 7 - Placed	 5 - Prototype Data/1est Results 6 - Catelogue Price/Vendor Quote 7 - Placed Contracts 	r Hesuits ndor Quote							
									8 - Actual	8 - Actual experience for NCSX Work	or NCSX M	ork						

Tab B Cost & Schedule Estimate Page 1 of 4

7/30/2010

2430 24300 2430 2430	Cost Center:	9418								
INSTX Beamline 2 Decontamination Instruction	Job Number:	2430								
Identager: Tim Stevenson Identager: Tim Stevenson Identation: Line Identatin: Line	Job Title:	NSTX E	seamline 2	Decont	tamination					
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		al path imp irrence sho	act then the	schedule	e entries should be stent with our risk o	zero. lassification methodology. i.e.				
		>80%), L=I	Likely (80%>	P>40%),	U=Unlikley (40%>P>	-10%), VU=Very Unlikely (P<10%	6), NC=Non-credible (P<1%)			

Tab C Risk and uncertainty 2 of 4

2/بعہ/2010

JOB NO 2430 CD2 R0.xls

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	Low	٧	Mec	Medium	H	High		known. No	further des	ign develop	ment or ev	known. No further design development or evolution expected that
							5	will impact estimate.	estimate.			
-1 ⁶	2%	+25%	%00-	-15% +25% -20% +40% -30%		460%	Medium					
	2	201	204			200		Preliminar	y design av	ailable. Son	ne addition	Preliminary design available. Some additional design evolution
				生活のない				likely. Furt	her develop	ments can	be somew	likely. Further developments can be somewhat expected or
Madium 1	700	100K ±150K	1506	150% 1750%	7000	TOURT		anticipated	anticipated and reflected in estimate.	ted in estim	ate.	
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								well defined.	эd.			
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								cost and s	schedule est	limates. Lin	lited experi	cost and schedule estimates. Limited experience performing
								similar tas	ks, so abilit	y to estimat	e accuratel	similar tasks, so ability to estimate accurately is somewhat suspect
							High					
								Extremely	challenging	tasks and/	or requiren	Extremely challenging tasks and/or requirements. Unique or firstof-
								a-kind ass	sembly or w	ork tasks. N	o good bas	a-kind assembly or work tasks. No good basis for estimating
								work exist	's so there is	s a high deg	Iree of esti-	work exists so there is a high degree of estimate uncertainty.

Tab C Risk and uncertainty 3 of 4

JOB NO 2430 CD2 R0.xls

7/30/2010

Cost Center:	9418		
Job Number:	2430		
Job Title:	NSTX Beaml	mline 2 Decontamination	
Job Manager:	Tim Stevenson	uo	
Materials and Subcontracts (M&S)			Basis of Estimate
Description:			
Radiation PCs, boots, gloves masks, etc	26	Cost estimate for FY2010 was based on costs incurred in FY2010 ytd pro-rated for a full year of decon activities 2-Exp	2-Experience
Hardware/Tools, Decon Supplies & Consumables	27	is incurred in FY2010	2-Experience
* Double the cost of PCard and StockRoom costs incurred		i "Hardaware & Too	and "Decon Suppies & Consumables"
B-25 Container Special Size	\$25K	Assumed we could incur costs as much as \$25K if we had to 2- En Judge fabricate Special Size B-25 container	2- Engineering Judgement
	53		
· .			
		CATEGORIZATION CODES:	
		1 - National Standards	
		 2 - Engineering JudgemenvExperience 3 - Estimates/Data from External Sources (e.g., W7X, ATF, etc.) 	
		4 - Previous PPPL/ORNL Experieince (e.g., TFTR, NSTX, PLT, etc.)	
		5 - Prototype Data/Test Results 6 - Catalogue Brice/Vendor Ouote	
		o - caterogue Frite vendor Guote 7 - Placed Contracts	
		8 - Actual experience for NCSX Work 9 - Other	
			TOTALS

Tab D M&S Detail

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