#### **NCSX Work Approval Form (WAF)**

WBS Number: 54 WBS Title: Facility Timing & Synchronization Systems Job Number: 5401 **Job Title: Data Acquistion & Facility Computing Systems** Job Manager: Paul Sichta Description: The Facility Timing and Synchronization System will provide up to 256 preprogrammed events triggers to define the NCSX shot cycle. These systems will utilize a new timing and synchronization technology since the old CAMAC-based TFTR Timing System will not be adequate for NCSX. It is anticipated that this new system will include a 10 MHZ time base and an off-the-shelf or existing solution. Schedule: See Attached Approvals: Job Manager Date Responsible Line Manager Date **Project Manager** Date **Engineering Department Head** Date

#### NCSX June 2007 ETC TABLE I - DESIGN LABOR

WBS N	lumber: 54											1	
	itle: Facility Timing & Syr	ochroniz	ation 9	Sveton	16								
	bor. F404	ICI II OI IIZ	auon c	ysten	13								
JOD NI	umber: 5401												
Job Ti	tle: Data Acquistion & Fac	ility Con	nputing	g Syste	ems								
Job Ma	anager: Paul Sichta						Ì						
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Descript	ion:												
Title I and													
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Activity ID	Activity Description	<u> </u>	43	84	37STK	351	ECEM	E C	EMTB	EA	EEEM	EETB	Basis of Estimate
													Originally manhours estimate based on NSTX experience.
													However, this estimate has been updated to reflect experience
													of experieince on other similar networking installation
													projects.
54-10	Preliminary System Design						40						
54-20	Final SystemDesign						40						
54-30	Preliminary Design - Clock Dist.						20				40		
54-40	Final Design - Clock Dist.						20				120		
	Test - Clock Dist.						20				100	120	
54-60	Procurement	\$16K	\$14K		\$4K		40						
54-70	UNT - Timing & Seq Emulation (FPGA Pgm)							160					
54-80	UNT - Device Driver Prog (EPICS/MDSplus)						160						
54-90	Central Clock (EPICS) Programming						80						
54-100	Installation						40	80	120	40			
54-110	Test						40	40			ļ		
	0:-b	6461	04 AV	¢0V	¢ 4 1/	¢0V	500	200	420	40	262	422	
	Subtotal Job 5401	\$16K	\$14K	\$0K	\$4K	\$0K	500	280	120	40	260	120	

## NCSX June 2007 ETC TABLE II - Materials and Subcontracts

WBS Number: 54				
WBS Title: Facility Timing & Synchr	onization Systems			
Job Number: 5401				
Job Title: Data Acquistion & Facility	Computing Systems			
Job Manager: Paul Sichta				
Materials and Subcontracts (M&S)			Bas	is of Estimate
Description:				
See Table I				
See Table I				

# NCSX June 2007 ETC TABLE III - Fabrication/Assembly Installation

WBS Number: 54						
WBS Title: Facility Timing & Syn	chronization (	Syste	ms			
Job Number: 5401						
Job Title: Data Acquistion & Facil	lity Computin	g Sys	tems			
Job Manager: Paul Sichta		_				
In-house Fabrication and Assembly ar	nd Installation					
See Table I						

### NCSX June 2007 ETC TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

WB:	S Number: 54											
	S Title: Facility Timing & Synchroi	nization	Svster	ns								
	Number: 5401											
	Title: Data Acquistion & Facility C	omputi	na Syct	ome								
		omput	ing Syst	EIIIS								
JOD	Manager: Paul Sichta											
					1							
<b>Unce</b>	rtainty of the Estimate											
				<u>Uncertainty</u>								
	<u>High</u>	<u>Medium</u>	<u>Low</u>	Range (%)					mments/Of	ther Cons	<u>iderations</u>	
	Design Maturity	Х			Although	PDR, some more design	needed to	finalize.				
	Decision Complete	v		-15%/+25%	D I' (' .							
	Design Complexity	Х			Duplication	on of NSTX architecture						
Note:	High/Medium/Low uncertainty assessment from Job M	anager Un	certainty ran	nge hased on A	ACEL recor	nmended practice 18R-97	as amend	ed for NCS	SX			
Hote.	Ingrimediani 200 anocitanity assessment from 600 in	dilager. On	ocitamity rai	ige basea on A	- COLITICOOI	initeriaca praeties for er	us uniona	ca for No.	J			
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Resid	ial Impacts											
- Kesiut	iai iiiipacis											
Reside	ar impacts								Cost I	mpact	Schedule	Impact
				Likelihood of	BALL or	otion Plan		-4-		•		
Job	Risk Description			Likelihood of Occurring	Mitig	ation Plan Bas	sis of estin	nate	Cost I	mpact High	Schedule Low	Impact High
Job					Mitig	ation Plan Bas	sis of estin	nate		•		
					Mitig	ation Plan Bas	sis of estin	nate		•		
Job					Mitig	ation Plan Bas	sis of estin	nate		•		
Job NONE	Risk Description				Mitig	ation Plan Bas	sis of estin	nate		•		
Job NONE Notes:	Risk Description			Occurring			sis of estin	nate		•		
Job NONE	Risk Description  Low cost and schedule impacts are considered the mi			Occurring  pacts should to	he event o	ccur.	sis of estin	nate		•		
Job NONE Notes:	Risk Description  Low cost and schedule impacts are considered the millingh cost and schedule impacts	aximum (1	00-percentile	Occurring  pacts should to impacts should to impact should should should should should should should should should s	he event o	ccur.	sis of estin	nate		•		•
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Job NONE Notes:	Risk Description  Low cost and schedule impacts are considered the mi High cost and schedule impacts are considered the m Cost impacts should be entered as man-hours (by der	aximum (10 nographic) s which are nd high cos	00-percentile and M&S di e separately at impacts ba	npacts should to impacts should to impacts should to rect cost under calculated from ased on the labor	he event o ld the ever basis of es the sched	ccur. at occur stimate. ule impact	sis of estin	nate		•		•
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Job NONE Notes: [1] [2]	Risk Description  Low cost and schedule impacts are considered the mi High cost and schedule impacts are considered the m Cost impacts should be entered as man-hours (by der Cost impacts should NOT include standing army cost: Project control is reponsible for quantifying the low an The schedule impacts should be entered as the min an If there is no critical path impact then the schedule en	aximum (10 nographic) s which are nd high cos nd max imp tries should t with our i	on-percentile and M&S did separately of the impacts backs on the documents of the impacts on the documents of the impacts on the documents of the impacts of the impact of the impacts of the impact of	npacts should to be impacts cost under calculated from a sed on the laboratical path.	he event o ld the ever basis of es the sched or hours ar	ccur. at occur stimate. ule impact ad M&S identified		nate		•		•
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